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Issued February 25, 1909.

U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN 204.

A. C. TRUE, Director.

SCHOOL GARDENING AND NATURE STUDY  
IN ENGLISH RURAL SCHOOLS  
AND IN LONDON.

BY

MISS SUSAN B. SIPE,  
*Collaborator, Bureau of Plant Industry.*



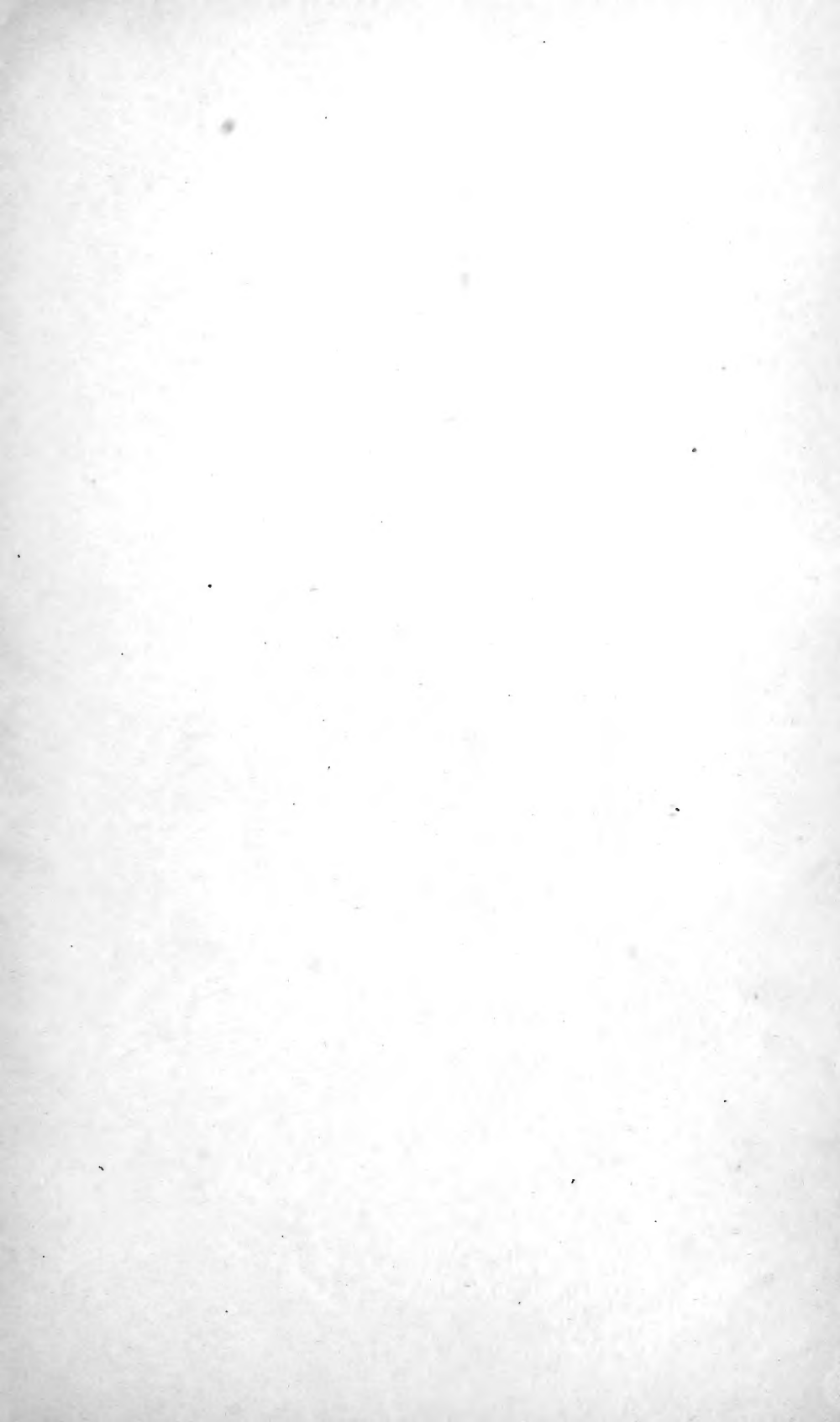
WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
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## THE OFFICE OF EXPERIMENT STATIONS.

A. C. TRUE, Ph. D., Sc. D., *Director.*

E. W. ALLEN, Ph. D., *Assistant Director and Editor of Experiment Station Record.*

W. H. BEAL, A. B., M. E., *Chief of Editorial Division.*

DICK J. CROSBY, M. S., *Specialist in Agricultural Education.*

MAR 5 1909  
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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
OFFICE OF EXPERIMENT STATIONS,  
*Washington, D. C., October 1, 1908.*

SIR: I have the honor to transmit herewith a manuscript submitted by Dr. B. T. Galloway, Chief of the Bureau of Plant Industry, for publication as a bulletin of this Office. The manuscript is entitled "School Gardening and Nature Study in English Rural Schools and in London," and was prepared by Miss Susan B. Sipe, teacher of botany and nature study in Normal School No. 1 of this city, and collaborator of the Bureau of Plant Industry in school-garden work. It is a report upon some investigations of methods of teaching nature study and school gardening conducted by Miss Sipe in connection with a recent visit to Europe. For the successful prosecution of these investigations Miss Sipe was much indebted to Mr. T. S. Dymond, a member of the board of education for England, and to the secretaries of the education committees in the counties visited, the county agricultural inspectors, and the principals of the schools in London. Through the courtesy of these gentlemen, special opportunities for study were afforded Miss Sipe, and it gives her pleasure to express her appreciation of their efforts in her behalf.

The report contains many points of interest to American readers concerning methods of teaching nature study and school gardening and will supplement her earlier report on school gardens in some American cities, published as Bulletin 160 of this Office. I therefore recommend that it be published as Bulletin No. 204 of this Office.

The bulletin contains 15 illustrations which are considered necessary for the clear understanding of the text.

Respectfully,

A. C. TRUE,  
*Director.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*



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# SCHOOL GARDENING AND NATURE STUDY IN ENGLISH SCHOOLS.

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## **NATURE STUDY IN THE SCHOOLS OF WHITECHAPEL, LONDON.**

The Whitechapel district of London, with its mass of unemployed humanity and with foreigners forming a large proportion of its population, seems an unpromising place to carry on investigations in nature-study teaching. But the investigator is very soon impressed with the earnest belief of the Whitechapel teachers in the immense value of nature study in the education of the Jewish and Russian children whom they are training for British subjects, with the spirit of self-sacrifice in these underpaid men and women, and with the intelligent enthusiasm shown by the children into whose lives comes nothing of the beautiful except that brought by the teachers, and whose natural environment is smoke, mud, and rain.

### **ROOF GARDEN, MYRDLE STREET SCHOOL.**

The head mistress of the Myrdle Street Higher Elementary School, Miss M. Brooks, is working out the problem by means of a roof garden. This school is one of the newest council schools, a well-lighted three-story building with a commodious central hall extending to the roof, but with absolutely no ground. The playground is on the roof. Miss Brooks is making herculean efforts to bring nature interests into this school. The children are being encouraged to beautify this playground and to take an intelligent interest in seasonal gardening operations. In October, 1905, the London county council granted permission for an expenditure of 20 shillings to purchase boxes to form a garden. Butter tubs were also purchased, painted, bored, and raised from the floor, and thus a beginning was made. Later the council voted that properly constructed troughs should be placed around the roof, and furnished 200 bushels of soil to fill these troughs. The plan for the garden was made by Annie Lazarus, a pupil in the seventh standard. From her plan a group of pupils, directed by one of the teachers, made a model in wood and cardboard of what the garden will be in 1910. Each pupil has a small space assigned to her in the roof-garden boxes, scarcely more than a foot square, but even so, more than she has at home. At the time of my visit, in September, 1907, the Virginia creeper in the

butter tubs was beginning to climb the protecting wall of the playground and the marigolds in the boxes were blooming. A turret room adjoined the playground. This had been fitted up by the council with water-tap sinks and table for experimental work in plant life and preparation for the roof gardening.

On the mistress's desk a miniature forest of oaks was growing in a straight-sided aquarium jar. Two years ago a few acorns of *Quercus pedunculata* were planted in it in leaf mold. The children watched the germination, the first year's growth, the change of color in the autumn, the fall of the leaf, the winter rest, the awakening of the buds, and the putting forth of leaves the second year. The little trees at the time of my visit had reached the top of the jar, about 10 or 12 inches high. I asked the ultimate fate of the forest and was told the children would be given them to plant at home, if any space could be found.

On the window sills in the hall were some interesting though pathetic attempts of these East Side children to grow plants at home. The children were asked to bring pots and soil from home in which to plant seeds and bulbs. The response proved the scarcity of such things in their homes. The teachers then procured the material. Seeds were given them and when vacation came the plants were taken home to be cared for. The results showed how little the children know of plants. In one pot were a half dozen varieties of weeds, the original plant having been choked out of existence, but the child owner of the pot thought them "so beautiful." Stunted and sickly marigolds and nasturtiums gave ample proof of the blighting effect of London smoke.

#### NATURE-STUDY MUSEUM, ST.-GEORGE-IN-THE-EAST.

An opportunity to study animal life is found for this school at the St.-George-in-the-East Nature Study Museum. The museum is the offspring of the Stepney Borough Museum, 77 High street, Whitechapel. The parent museum is a place of much interest. The nucleus of it was a gift of a heterogeneous private collection to the Stepney borough council by a canon of the Church of England, who resided many years in Whitechapel. This collection was housed at the borough library building, and a curator, Miss K. M. Hall, appointed by the library and museum committee. Miss Hall is a university graduate in science and a social settlement worker of the most practical type. Devoting her scientific training to the uplifting of the masses, she has developed both a local museum and a nature study museum "in the center of one of the blackest spots of the sociologist's magpie map of London," which probably have not their counterpart in the world.

## ITS AIMS AND GROWTH.

In her report, published in 1901, when the local museum was in its beginning, Miss Hall gives her views of what a borough museum should be, stating that as there was no precedent to follow, it rested with the committee to make one. Some of these aims are as follows:

(1) A metropolitan borough museum should exist for the pleasure and instruction of its inhabitants, who pay for it, and as a means of education for their children.

(2) Primarily it should serve as a safe repository for all objects of local antiquity and permanent historic interest.

(3) The aim of the exhibited collection should be to attract judiciously the ordinary visitor and inspire him with an interest and enthusiasm for the subject illustrated and not weary him with details.

(4) Apart from its central purpose, the London local museum should aim only at being a stepping-stone to the better understanding of our larger national museums.

(5) In the arrangement of the collections the needs of the locality should be most carefully considered. It is possible that natural history would form one of the most valuable means of general instruction and education, and especially so in East London, where man has crowded out most other living things.

(6) The museum should not only be a source of pleasure to the general visitor; but in order to carry out its function as a means of general education to the children it should be in immediate touch with the schools of the borough, and ready to illustrate lessons given in schools.

(7) Educational authorities can not fail to recognize the advantages which would be afforded to their schools by a well-equipped central museum and will, without doubt, when applied to, be found willing to bear their share of the expense.

These aims have been rigidly adhered to by Miss Hall. That the museum "exists for the pleasure and instruction of its inhabitants and to inspire the ordinary visitor with interest in the subject and not to weary him with details" is shown by the simple language used in labeling the collection, but which at the same time is scientifically accurate. Local antiquities are well represented. A whale's head found a few feet below the surface of the ground a block or two away, fossils and innumerable pieces of pottery unearthed in local excavations, show the keen interest the laboring classes have in collecting for the museum. British sailors in foreign ports remember the museum at home and frequently bring living lizards and snakes to interest the Whitechapel inhabitants.

## ITS USE TO SCHOOLS.

The use of the museum to the schools of the borough is incalculable. Natural science is a required part of the course of study in London schools, but the teachers are allowed freedom in selecting the branch of science to be taught in their respective schools. The

curator of the museum extended invitations to the teachers to outline the work they proposed to teach and she in turn would make lists of material at the museum available for such lessons. She also expressed her willingness to help the teachers by giving demonstration lessons at the museum to classes not exceeding forty-five children. An observatory hive of living bees, an exhibition of ants, an arrangement to show the value of the earthworm as a soil mixer, toads, etc., were added from time to time. These living exhibits attracted so much attention from the nature-starved parents and children of the East Side that Miss Hall began plans to expand the "living" side of the museum, and soon a circular was issued stating that the committee was considering "how an available space in the borough may be adapted to form a center for nature study."

#### THE MORTUARY.

The "available space" was the public mortuary of the parish of St.-George-in-the-East, about a mile distant from the museum.

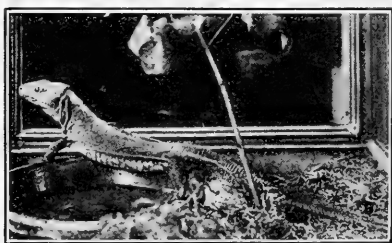


FIG. 1.—"Sallie," the borough lizard.

This mortuary had not been used for several years, and an anonymous benefactor, prompted by the vigilant curator, donated £100 to turn the dead-house into a museum for the living. It is a one-story building of two rooms in the corner of the old churchyard, which also has been turned over to

the living as a recreation ground. On the tiled walls of the mortuary in old English script are the following inscriptions:

"There are four things which are little upon earth, but they are exceeding wise—ants, conies, locusts, spiders."

"For so work the honey-bees, creatures that by a rule in Nature teach the act of order to a peopled kingdom."

"In Nature's infinite book of secrecy a little I can read."

"Nature is the art of God."

The rooms have been heated, fitted up with electric lights, and electric motive power furnished for aerating the aquaria. On shelves around the walls are large and small tanks containing animals and plants of both fresh water and sea water, and vivaria containing living specimens of lizards, toads, frogs, snakes, worms, and ants. "Sallie," the borough lizard (fig. 1.), was brought by a sailor from an Italian port. During the hour between 12 and 1 that the writer spent in the museum the cages and observational beehive were



surrounded by men and boys intently watching the activities of the animals and insects. A half dozen laborers, resting from their work in a street excavation, awkwardly asked permission to feed flies to "Tom," the borough toad (fig. 2), and for fifteen minutes in subdued tones discussed his omnivorous powers.

A guidebook is for sale for a penny. This gives simple accounts of 71 exhibits and a list of books that deal with living land and fresh-water animals. An extract from this guidebook may be of interest and help to others planning to conduct such work:

#### 51. HONEYBEES (*Apis mellifica*).

From May to the end of September a colony will be exhibited working in an observatory hive with glass sides. Visitors should not only look at this interesting exhibit once; they should study its inhabitants from day to day and they will find them to be a well-ordered community—a state, in fact, wherein no citizen exists for itself alone but each for the community:

"For so work the honeybees,  
Creatures that by a rule in Nature teach,  
The act of order to a peopled kingdom."

—Henry V, Act I, Scene II.

The community consists of a single queen or worker, several thousand workers, and in summer time a few hundred drones or males. The queen, who should be looked for on the most crowded comb, may be distinguished by her long, slender body with short wings, barely covering half her abdomen, whereas the wings of the workers nearly cover their bodies. Her legs are clad with golden yellow hairs and she stands higher on the comb than the other bees. The drones are broad and heavy, with large eye masses and very large and powerful wings.

The wax with which the bees build their comb is an excrement which forms under certain conditions of temperature in thin minute plates beneath the scales on the underside of the body. In the observatory hive there are six combs built by the bees into the wooden frames supplied to them. Above the large combs is a space for the bees to put their surplus honey.

The combs hang vertically and consist of two rows of six-sided cells placed back to back, having the openings laterally directed. Two sizes of cells are built. By far the larger number run five to the inch. These are called worker cells, for in them the eggs laid by the queen will develop into workers. They may be also used for storing honey and pollen (beebread). Cells of a larger size running three to an inch are built as cradles for drones. These are also used as storerooms. The cells built for the cradles of royalty are of a peculiar shape, having the openings directed downward.

Bees are important agents in plant fertilization. When visiting flowers to suck up honey from the nectaries or honey glands, the pollen gets caught in their hairy bodies and is thus carried to other flowers. The honey is carried



FIG. 2.—"Tom," the borough toad.

to the hive in the crop. Pollen for beebread is also collected and kneaded into small masses and carried home on the hind legs in little depressions called "honey bags."

A good queen, under favorable circumstances, in the height of the season will lay 2,000 to 3,000 eggs a day. A single egg only is laid in each cell. It is a tiny white speck which may be seen lying in the bottom of each cell. On the fourth day a white maggot larva hatches out of it, which is constantly fed and attended to by the workers. As it grows it becomes curled around in the cell and looks very like a pearl button. On the ninth day it spins a cocoon and becomes a chrysalis. The workers cover the cell with a cap of wax mixed with pollen. On the twenty-first day, the young bee, having acquired during her chrysalis sleep her wings, legs, eyes, etc., eats off the roof of her cell and pushes her way into the world. Drones take twenty-four to twenty-eight days to develop and queens seventeen to nineteen. The broad cells will be found in the center of the comb and are usually darker.

All the facts mentioned above may be seen in this hive by any visitor, and as the bees have free access to the garden they may be watched at work on the flowers.

Simplicity and interesting facts characterize this description as they do all others in the catalogue.

This nature-study museum is placed at the disposal of schools during school hours. Though it is stated to be open to the public during some of these hours, it is closed to them should the collections be needed for educational purposes. It has come to be the greatest of inspirations in a study so difficult at first hand in London. Miss Hall wrote shortly after its formation:

Primarily I hope to make a nature museum which shall be a source of joy for us in East London, if only a small one. I hope teachers will use it themselves and bring their pupils to see it. I hope for small bodies of pupils from neighboring schools to come once or twice a week and make notes and sketches following the changes in any particular group they may wish to study.

Miss Hall's wish is being realized. One thousand children from the schools were given lessons by her in November. The children's appreciation of the venture is the most important testimony. Their point of view is given in the following extracts taken at random from a chance set of compositions of the girls of the Myrdle Street School:

If I were not to go to the nature study museum, I should not know much about nature.

I am glad that I go there, for I never have a chance of seeing these animals elsewhere.

I like to go there because everything is real except the birds, and they were real birds.

The Italian toad sits in a little pot of water and hardly moves when we look at him; he snaps at us as if he wants to eat us.

We can learn a great deal at the museum. We see how lizards change their skins, how fishes breathe, and how frogs do all sorts of things. We learn how birds live. The bees can be seen making their honey, how snails crawl out of their shells, how worms live, and how the queen bee is different from her sub-

jects. The moth is seen as a chrysalis and the ants are seen at work. The fishes are most interesting to me and they swallow the water they breathe.

The reasons why we like these are because we need not talk about insects and animals without seeing, but when we learn all about them we can see it with our own eyes.

#### RECREATION GROUND AND CHILDREN'S GARDEN.

The recreation ground in which this museum is located was originally the churchyard of St.-George-in-the-East. As an American enters it through a narrow passageway by the side of the church he has to revise his definition of a "recreation ground." It is as quiet as the original churchyard, though well patronized, but patronized in midday by sleeping men and women on the benches and the low sills of the church windows. The tombstones have been removed, but only as far as the high wall bordering the churchyard. The flower beds, lawns, and trees are pleasing, and in its restful seclusion it stands in strange contrast to the mass of hopeless, discontented people without.

In one corner of the grounds is the children's garden (fig. 3) started by Miss Hall, and which probably gives the children of this crowded district their only opportunity to plant in the ground. Last year an experimental arbor day was held, when the mayor, aldermen, and councilors attended in state and planted several specimen trees. A large number of school children were present. During the ceremony the mayor stood on the bed where bulbs had been planted in the fall. One of the children, in distress, spoke to Miss Hall about it. "Ask him to step off," said Miss Hall, and much to his surprise he was invited to do so. A borough councilor speaks of this nature-study museum as "a little temple of nature in the least romantic and most commercial center of the metropolis which has stimulated interest in the nature-study movement alike among borough councilors, the public, and local schools." Its destiny seems greater to the writer, for its influence has reached across the Atlantic in its short period of existence.

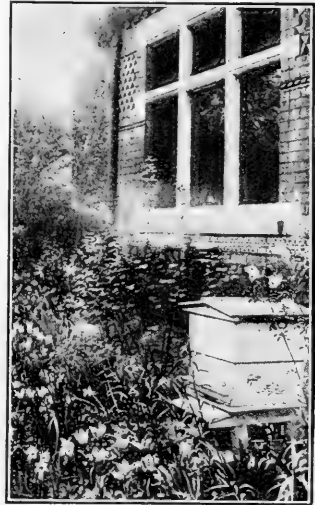


FIG. 3.—Children's garden at the Nature Study Museum.

#### CABLE STREET SCHOOL.

On the other side of the very high wall surrounding the recreation ground is the Cable Street Public School. Mr. Winkworth, the head

master, has tried every means at his command to have the wall removed to give his school easy access to the grounds and the museum. So high is the wall that it shuts out every vestige of green from the school, and so winding the alleys and streets that it takes ten minutes to reach the museum. So far he has met with no success. Mr. Winkworth is an expert botanist who has the unusual faculty of imparting his knowledge and his enthusiasm to his teachers and pupils. He spends his week-end vacations in the country, returning laden with material. His method develops investigation in his pupils. Every Monday morning some item for study and investigation is placed in the main hall in full view of the children passing to and from the class rooms. During the fall season, when nature is scattering her



FIG. 4.—Typical drawing lesson required in London schools. Pupils are required to copy carefully in pencil the printed example, increasing the height about 1 inch and the width in proportion. No ruling or measuring of any kind is allowed, and the copy must not be marked in any way.

seed, he hung up his bicycle leg-gings, covered with sticking seed, for the children to make discoveries of nature's methods of seed dissemination. Another week a cocoon with a large label, "What is it?" aroused the questioning spirit. The writer visited the school when the country outside of London was covered with heather. Three varieties had been brought in, in abundance, and then a botanical classification chart was hung up. The children were expected to find out the names for themselves. A cabinet in one corner of the hall is filled with minerals, shells, fossils, and birds' nests; but, unlike the average school cabinet, the collections are not constantly on view. The doors

of the cabinet have green curtains which may be lowered or raised. During seasons when material is available in the fields, or whenever the master thinks interest in the collection is waning, the curtains are lowered. There is always renewed interest when the collection is reexhibited. In connection with the nature work, selections from the best poets are memorized.

The most remarkable work developed in the schools is probably the painting in water colors. Most of it is flower and fruit work painted from the material, a great advance in London, where copying and enlarging or decreasing outline copies are the principal forms em-

ployed (fig. 4). The master exhibits with pride the stages of the opening of the horse-chestnut buds, the catkins of the alder (fig. 5), plums of different varieties, orchids painted by children from 10 to 12 years of age that would do credit to the graduating classes of many of our high schools (fig. 6). The Jewish children are particularly adept. He has discovered and developed latent talent to such a degree that he has had no difficulty in securing positions for the boys, as they leave school, in stained-glass establishments or as jewelry and poster designers. This independence of thought on the part of the teacher is not confined to nature study and drawing, but is felt in history, geography, and all subjects taught in his school.

#### COUNTRY-IN-TOWN EXHIBITION.

With individuals vitally interested in bringing nature into the slums of London, it is but a step to organized effort. A country-in-town exhibition was held in the Whitechapel Art Gallery during the first two weeks of July. I quote from a booklet issued in its interest:

To be blind and deaf to nature is to be in the current phrase "defective"—to lack one of the senses that God gave to man, and through which He speaks to man. There is no sadder sight in the world than to see a crowd of town-bred men and women wandering forlornly through beautiful scenery searching for the nearest public house \* \* \*. Thousands of us—men, women, and children—are tied to our duties and have to live in the heart of great towns. It is mockery to tell poor, hard-worked people that they should go away to see flowers and green fields. They can not. The only thing is to bring the flowers and green fields to them, in the form of parks, gardens, or even window boxes. Much has been done of late years and much would be done but for the smoke. It is the object of this exhibition both to show what has been done by some and to encourage others to do more.

Collections of wild flowers were exhibited by two country schools; paintings of wild flowers and nature studies by many of the schools in London; collections of flowers and shrubs suitable for growing in London parks; a model back yard and garden showing on a reduced scale what might be done in an ordinary London back yard at little expense; a model recreation ground, 24 feet square, constructed to illustrate the many health-giving opportunities which might be intro-

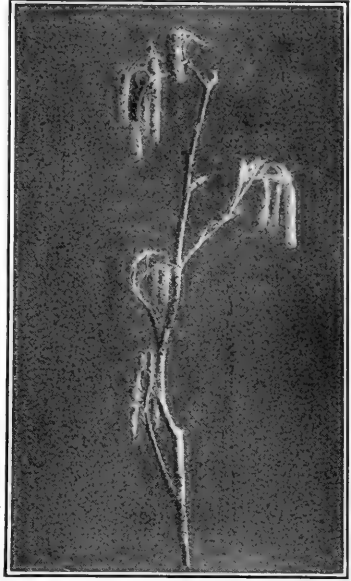


FIG. 5.—Water color of alder made from natural spray by a Russian Jew, 9 years old, Cable Street School.

duced into public grounds under good management and good planning. Among other things, the model dealt with sleeping out of doors under methods by which children can manage their tents and beds as soldiers do. The plan and model of a roof garden for a school, designed by Annie Lazarus, of the Myrdle Street School, attracted much attention.

#### PLANTS GROWN FROM SEEDS BY LONDON SCHOOL CHILDREN.

The most striking feature was a large collection of plants grown from seeds by London school children. This special exhibit is of



FIG. 6.—Water colors of orchid and currants made from the objects by a Russian Jew boy in Whitechapel School. Show advanced thought on part of teacher over the required method of drawing in London schools.

peculiar interest to us, having been inspired by Mr. T. S. Dymond, member of the board of education, South Kensington, after a visit to the children's flower shows held in the schools of Washington, D. C. In an address to teachers on the "American" method he said:

In the schools of Washington, D. C., the practical study of plant life is carried on by a means which I think might be adopted in our own cities. The lecturer on natural science in the normal school has succeeded in inducing all the schools of the city to cooperate in a scheme whereby the children are all asked to grow something. Whether it be in a little garden, or a back yard, or a window box, or a flower pot, each child grows something, and on one day in the summer the children bring the plant, or a flower, or the fruit, or some evidence that they have grown it, to exhibitions at their schools. The Department of Agriculture

supplies the seed free. Now, this is a form of nature study that might be carried out even in this great city of London. It occurred to me that five or six London schools might care to make the experiment, and I have ascertained that if it were done space would be afforded at the country-in-town exhibition for the display of those of the children's exhibits which were considered worthy of the distinction. Of course, the scheme would need careful consideration, and a committee should be formed to settle details. It is quite possible that the seed would be supplied free by some friend of the country-in-town movement.

The plan has proved so successful in Washington, and it was so delightful to see the crowds of children, each with something that he or she had grown, that I venture to hope it may be tried here.

The teachers acted upon his suggestion. A well-known seed dealer of Reading gave 6,000 packets of seed for distribution in the schools by the teachers. Lessons were given on seed sowing and the pots then carried home for window-sill cultivation. No prizes were given. Exhibits were classified as:

- (1) Plants raised from seed—
  - (a) Supplied through the schools.
  - (b) Supplied through the School Nature Study Union.
- (2) Pot plants—cared for by the children for not less than eight weeks previous to the exhibition.
- (3) Home plants—cared for by the children for not less than eight weeks previous to the exhibition.

All exhibits were labeled with the name of the school, name, age, and standard (grade) of the exhibitor, name of plant, date of sowing or acquisition of the plant, and the signature of the head teacher. Thirty schools applied for seeds. Of these, twenty-five schools sent in exhibits. The exhibition was most successful. It was visited by 30,000 people.

#### SCHOOLS MUTUAL AID SCHEME.

Another feature of the country-in-town exhibition was the schools mutual aid scheme.

This scheme was inaugurated shortly before Christmas, 1906, for the promotion of correspondence in connection with nature study, between town and country schools, and by the middle of June, 1907, included twenty-three couples of schools in London and the provinces.

Each country school included in the scheme sends parcels of the commonest objects suitable for nature study to a town school, the objects, or similar ones, having been previously used for a lesson by the senders. The specimens include, among many others, common wild flowers with their leaves in sufficient quantity to provide each child of a class with one specimen of the same flower; common grasses, fruits and seeds; shells; creatures, such as caterpillars, which can be kept for study in confinement without cruelty, etc. It is requested that no birds' eggs or nests be sent (except such as have been deserted), and no harmless creatures killed, or rare plants uprooted, for the purpose of the correspondence.

Town schools send in exchange letters giving interesting details of town life, especially of zoological gardens, museums, etc., picture post cards, newspaper cuttings, and magazines, previously inspected by the teachers; specimens from factories, etc.

Photographs of a town school examining the specimens sent from their corresponding country school, drawings made by the town schools, and specimen letters graphically illustrated this helpful cooperation.

### SCHOOL NATURE STUDY UNION.

The success of this exhibit was largely due to the School Nature Study Union. This is an organization largely of teachers, with a membership of 429 the last year.

The union aims at bringing together, for mutual help and advice, those interested in nature study in general and its place in education in particular. This it proposes to do by the following means:

- (1) Monthly meetings in winter, at which papers will be read by specialists on various aspects of nature study, the papers to be followed by discussions.
- (2) Excursions in summer, for purposes of practical nature study.
- (3) The publication, three times a year, of an official organ, entitled "School Nature Study," containing general reports of the work of the union, résumés of the papers read at the monthly meetings, and other matters of interest.
- (4) The provision of information, through the above organ or by occasional leaflets, concerning:
  - (a) Suitable localities for excursions, museums, etc.;
  - (b) The supply of books, apparatus, and specimens;
  - (c) Other facilities for nature study, such as vacation courses.
- (5) An annual conference, at which it is hoped leaders in education will open the discussions.
- (6) Cooperation with other societies whose work may touch that of the union at any point.
- (7) The encouragement of the provision of nature study courses for teachers.

The union is growing steadily, both indoor and outdoor meetings are largely attended, and on the completion of its third year, in 1906, it was admitted as an associated society of the British Association for the Advancement of Science. The fee for membership is 2 shillings, which includes the official organ, *School Nature Study*, an interesting publication containing résumés of lectures, proposed study courses, programmes for outdoor excursions in spring and summer, and leaflets after those of Cornell and Hampton. A copy of the rambles for 1907 is given below, with the thought that American teachers would do well to follow the example of the union:

#### SUMMER PROGRAMME.

The following nature study rambles have been arranged for members only on the following Saturday afternoons:

- (1) April 27, to Leatherhead for Boxhill.

Object: The study of scenery with special reference to the work done by the river mole.

Leader: Mr. G. G. Lewis.

- (2) May 25, to Cheshunt.

Object: Although the chief purpose of the expedition is to study pond inhabitants and the conditions of life in the pond, special stress will be laid on ways and means of keeping pond animals in aquaria in schoolrooms for purposes of continued observation.

Leader: Miss C. von Wyss.



## (3) June 15, to Hainault Forest.

Object: To consider the following features:

- (a) The rapid spread of certain native plants when once nature is left to herself.
- (b) The dependence of herbage upon the geological character of the subsoil.
- (c) Nature the master; abortive attempts to improve the herbage.
- (d) Wind as an enemy of trees.
- (e) What the cattle are doing to modify the natural forest growth.
- (f) The grasses natural to the forest and how one grass may be an enemy to all others.

Leaders: Mr. T. S. Dymond, H. M. I., and Mr. F. Dent.

## (4) July 13, to Caterham.

Object: A further study of plants found on chalky soils.

Leaders: Miss K. M. Hall and Miss Foxlee.

## (5) September 21, to Kew Gardens.

Object: The study of trees.

Leader: The director of the Royal Gardens, Lieutenant-Colonel Prain, M. B., C. I. E., F. R. S.

**NATURE STUDY AT THE KENTISH TOWN ROAD SCHOOL, LONDON.**

The present head master of this school is Mr. G. G. Lewis. It is one of the old schools of London, with many classes in one room. Mr.

Lewis encourages original investigation among his boys. He gives them suggestive lists of problems they may study out of school hours in plant growing, in the aquarium, and in soil formation. Prizes are awarded for the papers showing independent work.



FIG. 7.—Lesson in forestry on Hampstead Heath.

**LESSONS ON HAMPSTEAD HEATH.**

Hampstead Heath is a mile away. But here geography, botany, and animal life are taught (figs. 7 and 8). The new code allows classes to be taken for outdoor trips of not less than an hour and a half. The classes are large, 40 in each. Each class is taken out once in five weeks. There are many ponds on Hampstead Heath which

provide material for geography lessons for the younger boys. Capes, bays, islands, straits, and isthmuses are available for illustration. The bed of the Fleet River, a tiny stream, provides material for les-

sons on "Pebbles and how they are formed," "The mud and where it comes from," and "Sand and clay." The boys are familiar with the trees of the heath and the life of the water. An exercise they all enjoy is to lie down on the bank of the stream for three minutes



FIG. 8.—Lesson on pond life, Hampstead Heath.

and report their observations (fig. 9). However, a large proportion of the time is devoted to earth lore, partly because the teachers, being men, know more of physiography than of botany or biology, and partly as a preparation for the scenery study on Saturdays, during the Easter and summer vacations.

#### LONG-DISTANCE JOURNEYS.

Schools in England have but a month's vacation. A teacher who gives eight or ten days of his holiday to conducting thirty or forty boys on a tramp into Wales, with the combined purposes of teaching them how to spend a holiday rationally and usefully and to arouse their interest in nature, is truly a missionary. This Mr. Lewis has been doing for ten years. (See fig. 10.)



FIG. 9.—Three-minute observation on the edge of the pond.

Physical improvement is attained by eight days' outdoor life, and the brown faces of the boys and the pleased remarks of the parents testify to evident good results.

To fully appreciate the moral results, it is almost necessary to spend the week with the boys. Acts of kindness one to another; daily converse with teachers and comrades; the necessity of helping themselves, and the partaking of pleasure without an admixture of hooliganism, did more than years of ordinary school life would do in fostering habits of good-fellowship, self-reliance, and unselfishness, and taught the children how to spend a holiday intelligently and happy.

The trip the past spring cost 23 shillings. Of the 42 who took the trip at Easter, 13 were helped by a board of managers.

The following is a brief outline of the work done during the 1907 Kentish town road excursion to the Welsh marches:

SATURDAY, MARCH 30. JOURNEY  
DOWN—MALVERN HILLS.

A special corridor was attached to the rear of the 9.45 a. m. train from Paddington, and the boys were soon tracing their route on the map supplied in their guide-book, noting the outline of the hills they passed, and observing the bends and banks of the Thames and its tributaries. By permission of the G. W. R. the journey was broken at Great Malvern, topcoats being left in the "corridor," which was locked up and shunted into a siding while the Beacon was climbed. Here the lads encountered igneous rock in situ for the first time in their lives, and they were much interested in finding hills made of hard quartz, feldspar, and hornblende instead of the clays and sands they encounter during open-air lessons on Hampstead Heath. It was too misty to recognize all of the 13 counties—and goodness knows how many battlefields, cathedrals, and towns which are said to be visible from this old Armada Beacon—but the youngest boy could not help seeing that Herefordshire in the west was very hilly, while the Severn Plain in the east was a most decided and extensive plain, and an attempt was made to explain the why and wherefore by the aid of diagrams in the guidebook in a short ten-minute lesson.

Good specimens of quartz, hornblende, schist, gneiss, chlorite, and diorite were obtained from the numerous quarries on the hillside, after which a descent was made to the uptilted Silurian rocks, which yielded very beautiful fossil corals. Tea was taken at Colwall Temperance Hotel before taking the train for Abergavenny, which was visited at 9 p. m. Here a hot supper and a warm welcome awaited the boys, and before 11 p. m. they were all safely tucked in bed.



FIG. 10.—Long-distance vacation journey,  
Kentish Town Road School, London.

## WORK DONE.

1. Boys taught how to turn a railway journey to profitable account.
2. Introduction to igneous rocks and the scenery they produce.
3. Fossil corals obtained and formation of coralline limestones explained.
4. Igneous rock specimens secured.

\* \* \* \* \*

The following extract from a report in the Brecon County Times is interesting as showing how the long distance journey strikes one who is not a teacher:

The schoolmaster was abroad to good purpose; mountain and pass, hill and dingle, river and rivulet, forest and hedgerow, lake and meadow, cave and cromlech, church and castle, ancient road and modern rail—all were laid under tribute for the educational intake of the week. The writer's recollection of history lessons in early years is a hotchpotch of memorized names and dates, with which examination papers were to be liberally bestrewn; a kindred vice being practiced under the name of geography. But to the participants in the educational excursions the scholastic dry bones will leap into vigorous and ordered life, as in the seer's vision. These lads have trodden mountains standing proudly aloft from insinuating rivers at their feet; and day after day uttered speech, as church and castle, hill and field and stream, proclaimed their own history to greedy ears. Here the signal hill, there the battlefield, yonder the tomb; and in the story of the conflict of nationalities along the Welsh marches the boys will surely learn to appreciate their share in an imperial heritage, and incidentally to abstain from treading on a Welshman's corns. There are many things in life to be striven for; but Laocoön is not spelled with a double "L." The application of common sense to the spending of holidays is another fruit that grows on the Easter tree; and we confidently predict that no tourist will be found in later years spending his fortnight per annum on a switchback railway. The countryside becomes full of meaning as the boys assimilate the instruction of their nature teachers, who give practical illustrations beneath the branches of oak, ash, and thorn, and gather specimens of anemone, marsh marigold, celandine, and golden saxifrage. The open-air work is all in favor of vigorous health; and the "common-room" living of boys and masters promotes good feeling all round. Let the Easter educational excursions flourish and abound. Their merits are so patent that to seek out weaknesses would be worse than hunting the needle in the bottle of hay.

Below are given a boy's impressions of a visit to the forest of Dean:

It was a beautiful morning when our party awoke, and to our great surprise we had been mistaken for college boys. We therefore tried to look like them for the rest of the week. Our journey to the forest of Dean took us to Lydney, the port of the forest, and it was the only place that seemed to me like London, owing to the smoke from the works. One of the forest keepers met us at the station, and led us up the Roman road to the Speech House. I enjoyed the climb, and a balloon floated over us for many hours of the day. The Speech House must be very old, as it was built by Charles II. Our guide said that his ancestors had lived in the forest for generations. At any rate, he knew a lot about trees and animals. When we reached the coal mine it gave me a chance to obtain some lovely fossils I had longed for. What a lot of shale the men had to get out to obtain the coal. It was like a great mountain, and

very steep to descend. It was funny to be able to pick the pictures of ferns and plants in the shale, that grew many thousands of years ago. We were industrious for an hour or more, picking away like miners at work. On getting home that night we felt richer in fossils, but jolly tired and sleepy.

### **RURAL SCHOOL GARDENS.**

In connection with the country schools there are in England about 1,000 school gardens with perhaps 300 more evening school gardens for boys who have left school. A school report for 1905-6, just published, says that at least 32 counties have day school and 22 maintain evening school gardens. Some of the counties give liberal grants for the work. Others practice much economy.

### **AGRICULTURAL INSPECTORS.**

Each county has its agricultural inspector, a class of most earnest men, poorly paid, whose work seems only to be limited by the number of hours in a day. They inspect and often instruct in all the schools throughout their respective counties, lecture on Saturdays and evenings to teachers preparing for examination, and carry out a most detailed system of marking day and evening school gardens, allotment gardens, and judging flower shows. The writer spent a day with one who frequently rode 100 miles a day on his bicycle, inspecting schools, and then lectured at night. As they ride over the county roads on their visits of inspection they are called into the wayside gardens to identify varieties of apples, gooseberries, currants, etc., and to suggest cultural methods after the manner of a country doctor. There is a natural aptitude for plant culture and a widespread amount of plant-life information among the villages and rural dwellers of England, so the agricultural inspector must hold the confidence of the cottagers, allotment holders, and farmers. They are therefore well-equipped men. Their knowledge is clear and certain. They plan the school gardens and seem to feel that the results should be the best obtainable, even though the workers are children, else the parents will not be in sympathy with the work.

### **EVENING SCHOOL GARDENS.**

Evening school gardens, or "continuation gardens," were the first form of school gardens in England, begun in Surrey in 1892. As their name implies, they were intended for "lads otherwise employed during the day, to instruct them in the principles and practice involved in the successful cultivation of cottage and allotment garden." The teachers are usually the teacher or gardener who conducts the day school classes and who gives strictly practical

lessons twice a week. Each boy has his own plat, "all useful crops being represented on it to show how the most and best can be made from the land." The produce of each plat belongs to the pupil and in addition prizes are given, based on marks of merit, for good workmanship, orderly arrangement and condition of crops, and for neatness of plats, edgings, and paths. (See figs. 11 and 12.)

The greatest number of marks are given for the more important crops and superior cultural attention, as, for example, up to 10 marks can be obtained for each of the following 7 subjects:

Cleanliness and good workmanship, judgment and order in cropping, peas, potatoes, winter greens (including savoy, Brussels sprouts, kale, and broccoli), flowers, and berry fruits.



FIG. 11.—Surrey school garden on very poor soil.

Up to 8 marks each for 11 serviceable crops: Broad beans, runner and dwarf kidney beans, beets, cabbage (cooking), cauliflowers, onions, turnips, carrots, parsnips, and vegetable marrows.

Up to 6 marks each for asparagus, celery, cucumbers, leeks, lettuce, rhubarb, seakale, tomatoes.

Up to 4 marks each for artichokes (globe and tuberous), cabbages (red), shallots, spinach, herbs (including parsley, mint, sage, etc.), radishes and small salads, and others not enumerated.

These marks are carefully given by the county inspector, a county average is made, and the teacher's salary is regulated by the relation

of his school's marks to this average. Paragraph 17 in the code of instruction in practical horticulture, issued by the Surrey education committee, states that the teacher's emoluments take the form of fees and merit grants. The fees are 3 shillings for each cultivated plat for the full season. As the number is limited to 14, the fees are not high. The merit grants are determined by marks obtained by the gardens in each center and their relation to the county average. Plats gaining 15 or more above the average receive 3 shillings; 10 marks, 2s. 6d.; 5 marks, 2 shillings; equal to the average, 1s. 6d.; and not more than 10 marks below 1 shilling. Frequently an extra award of a medal or silver watch and chain is made the teacher of the school that has the best garden, the owner of such garden being known as the "county premier."



FIG. 12.—Surrey school garden on same kind of soil as that shown in figure 11, showing the effect of trenching and fertilizers applied intelligently and judiciously by the boys under direction of teacher.

The county of Surrey is probably far in advance of other counties in the extent of its school-garden work. This is in part due to its liberality in educational expenditure by the county council and in part to the inspector for the county, Mr. John Wright. Wherever gardening has an acknowledged status Mr. Wright is known as an authority. In 1890 Mr. Wright won a prize offered by the Worshipful Company of Fruiterers for the best essay, entitled "Profitable fruit growing for cottagers and others with small holdings." The seventh edition of this essay is still finding a ready sale. He was one of the first recipients of the Victoria commemoration medal for services rendered in

horticulture during the Queen's reign, and holds with this the freedom of the city of London. In 1891 he began to lecture to school-teachers, and through his efforts gardens were later provided on the estate of P. Robertson Roger for day-school boys. There are now over 1,000 boys cultivating plats in the country. Mr. Wright has worked untiringly for the movement, and now, as he is advancing in years, his son, Horace Wright, is taking the burden of the work. Mr. Wright's comprehensive knowledge of gardening and his readiness of pen have made him invaluable in promoting the movement. His report on the first and the last garden in the ranking of 1905 is appended:

#### SYNOPSIS OF EVENING SCHOOL GARDENS.

1. *Hale*.—Twelve gardens. Average merit, 139 marks. A remarkable group, which for the sixth time heads the county list. Crops luxuriant and order nearly, but not quite, perfect. Group leader and county premier, Andrew Trimming, with the unexampled number of 149 marks; lowest plat, 120 marks, or exceeding the highest over a period of the first seven years of his teaching. The site was for years absolutely barren; it is now astonishingly productive in comparison. Still, the Hale youths must not be vain, for half of them lost 1 mark each through a lack of absolute cleanliness or high finish. These gardens now possess an advantage over most others. Water is laid on with something in it; but this was only secured by persistent effort, and the success achieved is richly deserved by Mr. E. Cæsar, schoolmaster.

14. *Hersham*.—Nine gardens. Some station must fall last on the list, and this year it is sandy Hersham. Why? It is not the fault of the land, the weather, the seeds, or the teacher. Of this there is conclusive proof. Alongside the evening-school gardens there are day-school plats. Both sets were supplied alike and both are worked under the same teacher, yet while the last named rank among the best gardens in the county, the others bring up the rear in their section. The cause of their weakness is cricket. The youths start well, but as the season advances they can not get past the village green on the way to their plats. However, this station affords a great lesson—land and materials wasted through negligent or slipshod methods on the one hand, and through attentive cultural care on right lines, admirable order, and productiveness on the other. Thus Hersham is a most instructive station after all. Mr. Vaux, the owner of the land, is a good and valued helper. He has provided bricks for edging the whole of the gardens, which have been well set anglewise, forming a neat ridged margin, by his gardener, Mr. A. Skeet, local teacher.

#### DAY-SCHOOL GARDENS.

##### ESSEX COUNTY SCHEME FOR GARDENS.

A few extracts from the code of 1905 and from the scheme for school gardens, published by the Essex education committee, will give the best understanding of regulations and methods of work of a large majority of the rural day-school gardens and will be in many ways suggestive to our own teachers. Plan II is designed for two workers, a senior and a junior, a plan carried out successfully in many places.



## EXTRACT FROM SCHEDULE III TO THE CODE (1905).

- (1) No attendances but those of boys over 11 years of age are recognizable for the special grant.
- (2) There must be at least one teacher for every fourteen scholars.
- (3) Each lesson in gardening should last for at least one hour.
- (4) Not more than one grant of 4 shillings or two grants of 2 shillings will be paid in respect of any one scholar for the same special subjects year.

## SIZE AND SHAPE OF PLATS.

In order to provide for the cultivation of a variety of vegetables, it is most desirable, to divide the land into rather long and narrow plats, at least three times as long as wide. A plat of 1 rod will generally be sufficient for each pupil. The actual measuring of the ground ought to be carried out by the boys themselves as a preliminary lesson. It is preferable to arrange that the rows of plants shall run from north to south, in order that full exposure to sunlight may be obtained on all sides.

## DEMONSTRATION PLATS.

In addition to the plats allotted to the scholars, others are desirable for demonstration purposes. Thus, plats of about 1 rod each would serve for the raising of vegetables and flowers for transplanting, for the propagation of bush fruits, and for the culture of strawberries. A larger plat for the culture of apple, pear, and plum trees should be provided where practicable. These should be under the teacher's charge, and will serve a useful purpose by providing scope for demonstrations in sowing, transplanting, propagating, pruning, and spraying. Paths of 2 feet in width are necessary between the plats.

## TOOLS, ETC.

Tools, seeds, fruit bushes, and manure will be provided by the county education committee. The plats will be periodically inspected, and note will also be made of the state of the tools. It is an essential part of the training to impress the importance of care and cleanliness with regard to these.

## DISPOSAL OF PRODUCE.

The disposal of the produce will rest with the head teacher. It may be practicable in some cases to offer part of the crops as prizes, and the remainder may be sold at current prices.

## PLAN I.

*Suggested plan of cropping for a first year.*

[Scale, 1 inch = 6 feet.]

2 feet .....	{	Single row of runner beans.	} 30 feet.
2 feet 6 inches .....		Savoy cabbage. <sup>a</sup> Early potatoes.	
2 feet .....	{	Brussels sprouts, <sup>a</sup> Late potatoes.	
2 feet .....		Curled kale, <sup>a</sup> Broad beans.	
2 feet .....	{	Cauliflower.	
2 feet .....		Cabbage.	
2 feet 6 inches .....	{	Peas.	
3 feet .....		Lettuce on ridge.	
3 feet .....	{	Celery.	
3 feet .....		Radishes on ridge.	
1 foot 3 inches .....	{	Parsnips.	
1 foot 3 inches .....		Beets.	
1 foot .....	{	Carrots.	
6 inches .....		Onions.	
1 foot .....	{	Path.	
4 feet .....		Flower border.	
9 feet.			

9 feet.

<sup>a</sup> These green crops will be planted soon after the potatoes are earthed up.

## PLAN II.

[Scale, 1 inch=6 feet.]

30 feet.	2 feet.	Double row of runner beans.	Double row of peas.	2 feet.
	6 feet 6 inches.	3 rows of	Potatoes.	6 feet 6 inches.
	2 feet 6 inches.	Cauliflower.	Broad beans.	2 feet.
	2 feet.	Cabbage.	Savoy cabbage.	2 feet.
	3 feet.	Lettuce on ridge.	Brussels sprouts.	2 feet 6 inches.
	3 feet.	Celery.	Kale.	2 feet 6 inches.
	3 feet.	Radishes on ridge.	Broccoli.	2 feet.
	3 feet.	Dwarf beans.	Early peas.	2 feet 6 inches.
	1 foot 6 inches.	Parsnips.	Turnips.	2 feet.
	1 foot 3 inches.	Beets.	6 inches.	1 foot 6 inches.
	1 foot 3 inches.	Carrots.	Path.	
	1 foot 3 inches.	Onions.		
	6 inches.			
	1 foot 6 inches.	Path.		
	4 feet.	Flower border.		4 feet.

18 feet.

In the day-school gardens the disposal of the crops rests with the head teacher. These he may sell as an addition to his salary, use on his table, or offer as prizes to the boys who cultivate them. The natural outcome of the teachers' rewards and the marking system is that many teachers lose sight of the chief object of growth in the garden—the child, mentally, morally, and physically—but keep prominently to the front the production of the best broad beans, shallots, vegetable marrow, etc. They feel that the produce of the children's gardens must surpass that of their parents in their cottage gardens or there is no value in gardening in the school curriculum. The matter resolves itself into a match between teachers and parents and the children are lost in the contest. Children can not reach



FIG. 13.—Evening school plats, Westfield Council School garden, Surrey, England.

perfection. The teacher and parent have reached their height through years of trial. I do not criticise holding a high standard for results; I am of the opinion that American teachers of school gardening would do well to have a higher standard for visible results than they have had; but I do criticise emphasizing the perfection of the vegetable at the expense of the growth of the child. Ruskin states this well when he says: "The imperative demand for finish is ruinous because it refuses better things than finish."

#### WESTFIELD COUNCIL SCHOOL, WOKING, SURREY.

This condition does not prevail at all the schools. A notable exception is the Westfield Council School at Woking (fig. 13), Mr.

J. W. Marsh, master. With the quiet, effective persistency of the Englishman, in this secluded spot Mr. Marsh is studying and working out child development in a manner equal to many well-known educators of the day whose fortune has thrown them into more prominent fields. The garden plats are similar to those found throughout the county of Surrey, as there are certain regulations each school must follow. The class is restricted to fourteen boys above the age of 11, and the planting scheme is similar throughout. He has varied his gardens by the use of different fertilizers on each plat through several years, so that the boys learn first hand the best fertilizer for different crops. He is far in advance in the connection of



FIG. 14.—Observatory in garden, showing sundial, barometer, rain gauge, bird boxes, and signpost showing direction of neighboring villages. Note standard roses grafted by the boys.

the garden work with reading, composition, arithmetic, and nature study. Then, too, he has flower plats for twelve girls to work on as their own during the noontide interval. He said, when interviewed:

I am encouraging the girls with flower culture at school and at home. I give them seeds, plants, and directions for home use. It is not officially recognized yet, but all legislation must be pushed forward by public opinion and therefore can never be in advance of it. Girls' gardens will no doubt be recognized in the future, but at present we have not time for an extra subject with them.

#### NATURE OBSERVATORY.

There is a small space in the garden, semicircular in shape, known as the "observatory" (fig. 14). Here are thermometer, barometer,

rain gauge, insect breeding cages, sundial, bird boxes made by the boys, standard roses that have been grafted, and a signpost giving the direction and distances of the neighboring villages. From this latter the boys map the district to a scale. The older boys take turns in making weather observations and daily readings of the thermometer, barometer, and rain gauge for the rest of the pupils to record in their notebooks. But best of all are the experiments in plant life conducted here. Many of these require ordinary outdoor conditions or they are misleading. An intelligent question put to the teacher by any scholar is usually answered by the setting up of an experiment in the observatory, where the children may watch its progress and solve the question for themselves. Reading follows to fix the information and to supply additional thought. Slight alterations are made from year to year in the plan of the garden to bring the garden work in touch with arithmetic and mensuration. The report of the inspector of Surrey shows that the practical work which is so dear to the English is eminently satisfactory. He states: "The soil in this new group is an exceedingly sandy loam. The pupils have worked with an evident determination to do credit to themselves and they have more than succeeded, for in regularity of cropping and cleanliness the plats could scarcely be exceeded." This shows that it is possible in the hands of a gardener educator to carry on the growth of crops and children hand in hand.

#### THE COMMON GARDEN PLAT, OXFORDSHIRE.

While the individual plat is the approved method in most rural schools, in some counties a single plat worked by the entire class is considered preferable. Successful examples of this method are found around Oxford (fig. 15). The education committee of the county of Oxfordshire pays the rent for a piece of land 20 rods in extent, supplies the seeds, manure, and tools. The teacher receives the produce in addition to his pay. The committee of this county is economical. The initial cost of establishing a garden is £5, and after that an expenditure of 20 to 30 shillings a year is considered sufficient. It is not sufficient, however, as tools were lacking at many gardens and the teachers were supplying the deficiency from their small salaries of £90 to £120 a year.

#### ALLOTMENT GARDENS.

The wages of the agricultural laborer of this county is 14 shillings a week. He adds to his income by cultivating a piece of land which he can rent, usually from the parish council. The council rents the land from a landholder and sublets it in plats of 10 square rods at 5 pence a rod per year. This stretch of land is known as a "village

allotment." The school garden is located in the allotment and serves as an example to the villagers for best cultural methods and best varieties of crops to be grown. The most striking example of such a garden is at Bicester, a few miles from Oxford. The master, an enthusiastic gardener, is an active old gentleman of 66. He reached the retiring age last year, but his services are so valuable in the community that he was asked to continue. In activity of movement and speech he seems but half his years. At one time it was feared the education committee would discontinue its practice of renting land for gardens, so he rented a plat in the allotment, determined that his



FIG. 15.—Rural school garden at Culham, Oxfordshire.

boys should have instruction at his own expense. The advantage of this form of garden, he thinks, is the opportunity given the boys to become acquainted with cultural methods of many crops, his school having planted more than forty kinds last summer. Everything raised belongs to the master. I remarked upon the value of ownership in retaining interest, but his experience was not of the kind to cause him to agree with me. The English lads return to the garden frequently during vacation to water and weed the common garden plat.

## TEACHERS' COURSES AND EXAMINATION.

The question of teachers fitted to instruct in the subject is as troublesome in England as it is here. In some counties teachers are given additional salaries if they are capable of giving the instruction. This has stimulated many of them to attend evening classes in horticulture or Saturday classes at specified centers, conducted by the county agricultural inspector, and then to enter the school-teachers' examination in cottage and allotment gardens held in the spring by the Royal Horticultural Society. A candidate must pass upon the following syllabus, and then will be entitled to additional salary:

### OUTLINE SYLLABUS.

- (1) Some knowledge of the formation or nature of soils, not necessarily scientific, but such as is essential to cultivators.
- (2) Information as to the best average sizes of cottage gardens and allotments such as men engaged in diverse vocations can cultivate in spare time.
- (3) Preparation of soils for the reception of crops of all descriptions to insure successful results.
- (4) Renovating neglected gardens.
- (5) Manuring soils for diverse crops with some knowledge in practical form of the nature of manures and their constituents.
- (6) Spring vegetable crops, varieties and method of cropping, times for manuring, planting, etc.
- (7) Summer crops—successional.
- (8) Autumn or winter crops for successional purposes.
- (9) General treatment to secure best results for all seasons.
- (10) Suitable fruits for cottage gardens; varieties, methods of culture, pruning, and training; general treatment.
- (11) Fruits suitable for allotment culture.
- (12) Flowers for cottage gardens, seasons of flowering, methods of propagation, etc.
- (13) Flowers suited for allotments, varieties and general culture.
- (14) Window gardening, inside and out.

### HORTICULTURAL COLLEGE, SWANLEY, KENT.

The Horticultural College at Swanley, Kent, offers probably the best opportunities to women for training in practical gardening and in teaching it. This college is of peculiar interest, as its faculty is almost wholly women, and all of the outdoor work, that in the green-houses and the marketing of produce, is done entirely by women. The following statements from the prospectus of the college give a good idea of its aims and the scope of its work:

The college aims chiefly at giving a thorough systematic training to women who wish to become market growers and gardeners in private places, but the course is also useful in fitting students to act efficiently as landowners, teachers, stewards, and for intending colonists. Attention is naturally given to all subjects by which horticultural knowledge may be extended, one of the objects of the college being to meet the increasing demand for scientific education and business training in fruit and flower growing. The teaching is in theoretical



and practical work, much stress being laid by lecturers and instructors on the due combination and relative proportions of the two kinds of work. Special care is taken in the elementary training of each student. No gardening operation is considered as too menial, the method being that actual work accompanies, under skilled supervision, the theoretical instruction.

There are two courses, (1) the full diploma course and (2) the certificate course, each of which may be taken in two years, though students are strongly advised to spread the course of study for the diploma over three rather than two years. In order to gain either the diploma, which is the highest award of the college, or the certificate, students must satisfy the authorities by their general conduct, industry, punctuality of attendance, and by their having passed satisfactorily through their college career. They must each produce a diary of horticultural work performed during that time and make a collection of injurious insects and weeds. The examination in practical work is identical for both the above courses.

A third-year course is offered in natural history to those desiring to qualify as teachers of gardening and nature study.

A syllabus of the course for this third year is given below:

#### SYLLABUS OF INSTRUCTION.

##### BOTANY.

Students who have attended the college course of instruction in botany, and other students who can produce satisfactory evidence of having received a similar training, will not be required to take the first section of the following syllabus. The subjects of sections 2 and 3 will be treated more fully in the case of such students.

##### I. GENERAL.

##### (1) FLOWERING PLANTS.

The structure and life history of a flowering plant from seed to seed. The morphology of the stem, leaf, and root. Structure of the flower, pollination, and fertilization. Fruits and seeds and methods of dispersal. The internal structure of the various members and organs.

The functions of the various organs. Nutrition, foods and food materials, transpiration, assimilation, respiration, growth, and movement. Relation of plant to environment, various modifications of water plants, marsh plants, heath plants, etc.

The general classification of flowering plants.

The Gymnosperms: Structure and life history of the Scotch fir, and comparison with some common conifers.

##### (2) FLOWERLESS PLANTS.

(a) *The ferns and their allies*, as exemplified by the male fern, horse-tail, and club moss. Common British ferns.

(b) *The mosses and liverworts*.—Life histories of some typical members of these groups and identification of common and characteristic mosses and liverworts.

(c) *The seaweeds and their allies*.—Life histories of a number of fresh-water and marine algae. Identification of some common seaweeds and confervas.

(d) *The fungi*.—Molds, mildews, mushrooms, and other parasitic and saprophytic fungi.

(e) *The slime fungi*.—Life history of *Badhamia*. Character of the fructification of common *Myxomycetes*.

## II. SPECIAL.

## (3) PRINCIPAL ORDERS OF BRITISH FLOWERING PLANTS.

Identification of plants by means of floras.

Study in the different seasons of the plant associations of selected localities. Common trees and shrubs—identification in winter and summer.

*Practical experimental physiology.*

## ZOOLOGY.

## I. GENERAL.

Study of the external characters, anatomical structure, mode of life and life history of the following animals, as representatives of the principal divisions of the animal kingdom: Rabbit, pigeon, frog, dogfish or haddock, honeybee, crayfish, earthworm, pond mussel, hydra, vorticella, amœba, together with the general characters of the protozoa, porifera, cœlenterata, annelida, arthropoda, mollusca, chordata.

## II. SPECIAL.

Distinctive features of rabbit, dog, mole, etc., as representatives of indigenous orders of mammals. British birds, their notes and habits. Common insects. Useful and injurious insects. Hatching and rearing of larvæ. Aquatic insects and larvæ—their adaptation to their mode of life. Management of aquaria.

## GEOLOGY AND PHYSICAL GEOGRAPHY.

## I. GENERAL.

- (1) The crust of the earth. The classification of rocks.  
Physical characters and chemical composition of the principal rock-forming minerals.  
Study of typical British aqueous, igneous, and metamorphic rocks.
- (2) Subaerial and marine denudation. Formation of soils. Structure of sedimentary rock masses. Nature and mode of preservation of fossils. Use of fossils in classification of rocks.
- (3) Volcanic action and volcanoes. Volcanic and plutonic rocks. Lavas. Contact metamorphism. Regional metamorphism. Mineral veins and metallic ores.
- (4) The atmosphere: Rainfall, springs, rivers, glaciers.

## II. SPECIAL.

The geological structure of the British Isles and their physical geography.

Chronological classification of strata and characteristic fossils of British formations. Use and interpretation of geological maps and sections.

Simple land surveying; mapping of small areas.

## SIMPLE ASTRONOMY.

The earth as a planet. The solar system. The celestial globe, the principal constellations. The moon and tides.

## METEOROLOGY.

*The atmosphere*, its composition and extent.

*Temperature of the air*.—Causes of variations in temperature. Thermometers and thermographs. Solar and terrestrial radiation.

*Pressure of the air*.—The barometer and barograph. Variations in pressure. Winds.

*Moisture of the air*.—Hygrometers. Condition of formation of dew, fog, mist, cloud, rain, hail, and snow.

*Weather charts, etc.*—Interpretation of charts. Use of meteorological instruments. Making and recording weather observations.

## GARDENING.

(This is only intended for those who have not passed through the college training.)

*Cultural operations.*—Use of garden tools and preparation of soils. Eradication of weeds. Care of pot plants. Watering.

*Propagative operations.*—Seed sowing, thinning, and transplanting. Cuttings, layers, etc. Budding and grafting.

*Pruning* of fruit trees, bush fruits, and roses.

*Culture* of some common vegetables and of flowers.

## SUMMER COURSES.

In addition to its regular course, Swanley offers a vacation course of two weeks which includes, besides garden lectures and demonstrations, outdoor work in plant life, plant geography, pond life, insects, birds, geology, and astronomy.

Some of the agricultural colleges conduct teachers' courses in gardening and nature study, notably Wye College, in Kent, and the Midland Agricultural College, in Leicestershire. Short vacations are the rule in England. The month of August is the usual vacation period. The length of the vacation period, four weeks, is never exceeded, but the time of the holiday in some counties depends upon the crop to be harvested, for child labor is important in the hop and pea districts. Colleges therefore regulate their course by the vacation. Usually two courses are given, each of two weeks duration, one for men and one for women.

When one considers the short vacation and that the large majority of the teachers are men supporting families on hopelessly small salaries, the attendance at the summer courses is phenomenal and predicts much for the future of English agriculture.







## LIST OF PUBLICATIONS OF THE OFFICE OF EXPERIMENT STATIONS ON AGRICULTURAL EDUCATION—Continued.

### SEPARATES—continued.

- Statistics of Land-grant Colleges and Agricultural Experiment Stations, 1904. Compiled by Marie T. Spethmann. Pp. 203-235. Reprinted from Annual Report of Office of Experiment Stations for 1904.
- Progress in Agricultural Education, 1904. By A. C. True. Pp. 575-616. Reprinted from Annual Report of Office of Experiment Stations for 1904.
- County Schools of Agriculture in Wisconsin. By K. C. Davis. Pp. 677-686. Reprinted from Annual Report of Office of Experiment Stations for 1904.
- The Use of Illustrative Material in Teaching Agriculture in Rural Schools. By Dick J. Crosby. Pp. 257-274. Reprinted from Yearbook of Department of Agriculture for 1905.
- Progress in Agricultural Education, 1905. By A. C. True. Pp. 303-357. Reprinted from Annual Report of Office of Experiment Stations for 1905.
- Courses in Agriculture, Horticulture, and Allied Subjects. By F. W. Rane. Pp. 77-89. Reprinted from Office of Experiment Stations Bulletin 164.
- Introduction of Elementary Agriculture into Schools. By A. C. True. Pp. 151-164. Reprinted from Yearbook of Department of Agriculture for 1906.
- Progress in Agricultural Education, 1906. By Dick J. Crosby. Pp. 213-300. Reprinted from Annual Report of Office of Experiment Stations for 1906.
- Training Courses for Teachers of Agriculture. By Dick J. Crosby. Pp. 207-220. Reprinted from Yearbook of Department of Agriculture for 1907.
- Progress in Agricultural Education, 1907. By Dick J. Crosby. Pp. 237-306. Reprinted from Annual Report of Office of Experiment Stations for 1907.

### MISCELLANEOUS.

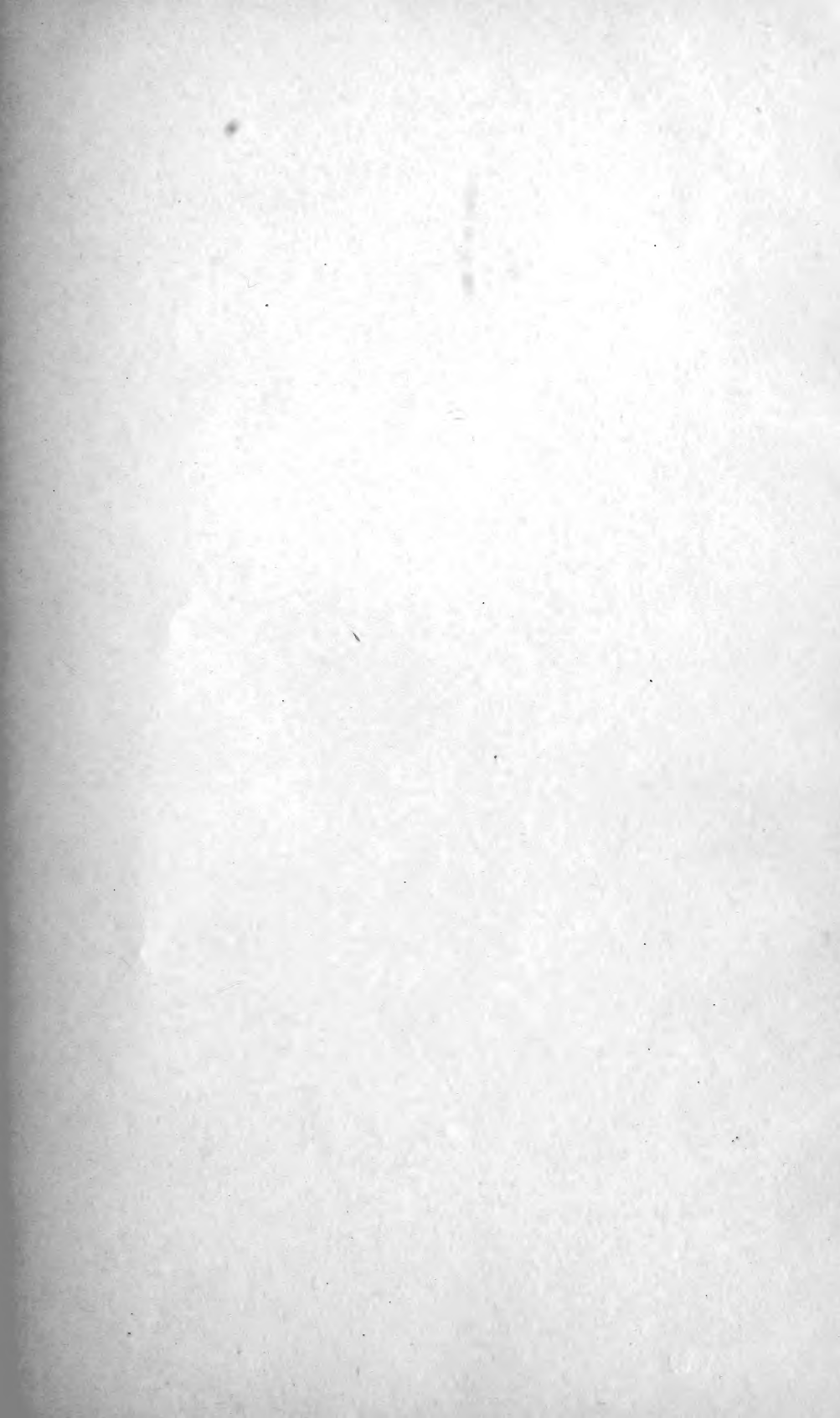
- The American System of Agricultural Education. By A. C. True and Dick J. Crosby. Doc. No. 706. Pp. 21.
- Description of Exhibit of Colleges of Agriculture and Mechanic Arts and Experiment Stations, Louisiana Purchase Exposition, St. Louis, Mo., 1904. By W. H. Beal. Doc. No. 710. Pp. 23.
- Institutions in the United States Giving Instruction in Agriculture. Doc. No. 1110. Pp. 9.



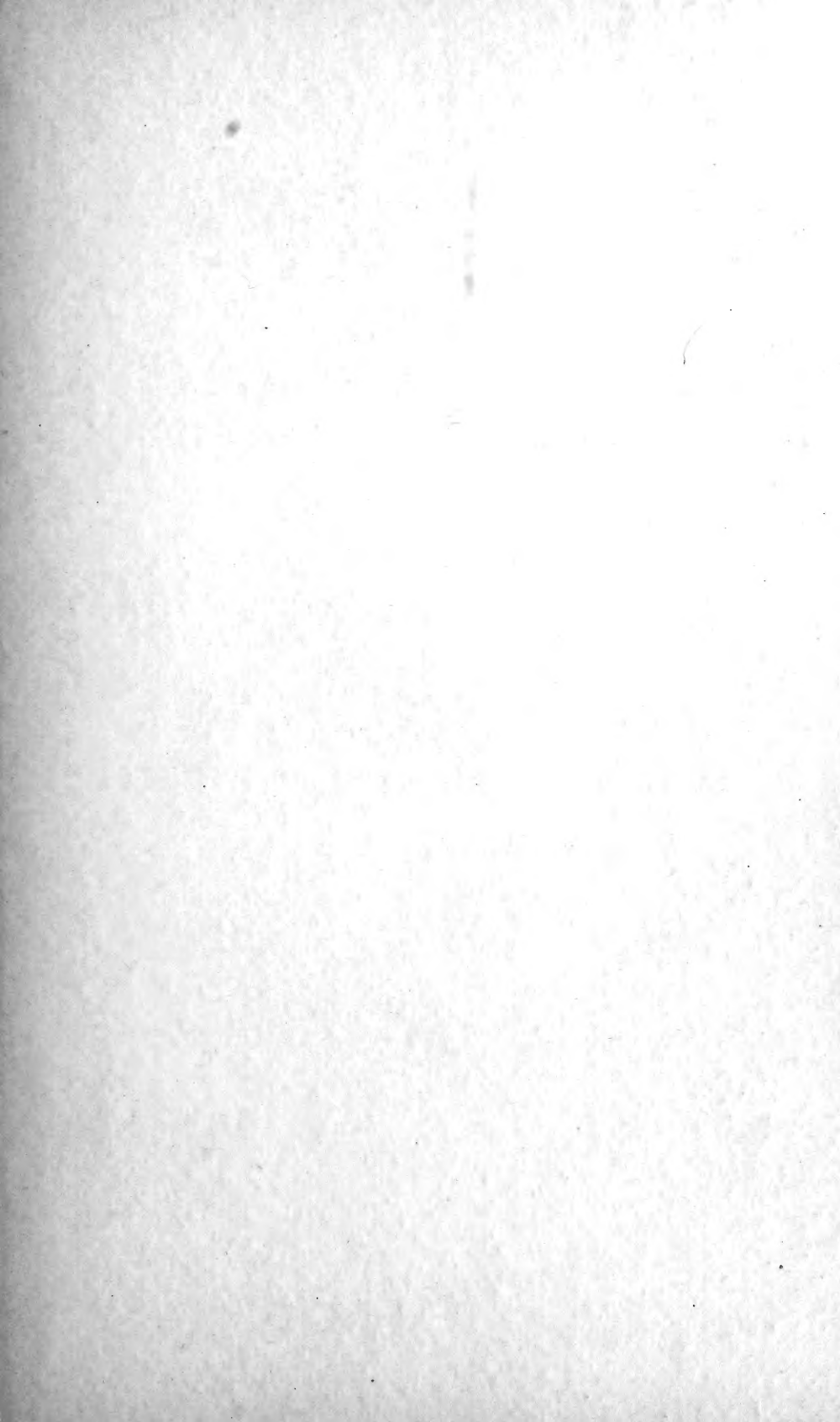












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