

THE ADVANTAGES OF AN ARBORETUM.

READ BY PROF. W. J. BEAL IN REPRESENTATIVE HALL, LANSING,
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An Arboretum is an artificial collection of living trees and shrubs, including those raised for fruit, of course. It is more limited in signification than Botanic Garden, which means a plantation of herbs as well as trees and shrubs.

Europe possesses large numbers of Botanic Gardens. They are found in or near Naples, Florence, Turin, Milan, Leipsic, Berlin, Paris, London, and many other cities and villages. Some are celebrated for one family of plants, while others excel in several departments. The gardens of Munich and Nymphenburg excel in palms; that of Edinburgh in heaths; that of the London Horticultural Society in trees. Many of these gardens contain museums of vegetable products in various stages of growth or in different degrees of advancement in their manufacture. All or nearly all have an herbarium,—a collection of dried plants properly named,—a library of works on botany and kindred subjects, and green-houses for raising trees, shrubs, and other plants too tender to endure the cold of northern climes.

Gardens of more or less pretension are as ancient as the human race. One of the oldest now in existence was founded by Queen Elizabeth at Hampton Court, continued under Charles II. and William III., and since rendered still more illustrious by Leonard Plunkenet, one of the most active of plant collectors. One of the richest gardens known is that of Prince Eszterhazy at Kismartony, containing 70,000 species of plants. The United Kingdom of Great Britain has at least ten public and thirteen private Botanic Gardens. The Kew Garden, near London, surpasses all the rest. It was first opened to the public in 1840, when it was put under the directorship of Sir William J. Hooker. The whole grounds include 345 acres, a large part of which are covered by native forests. The garden proper contains about 60 acres. The grounds contain at least nine large green-houses, among which is a palm-house, 100 by 362, and 66 feet high. The Kew Garden not uncommonly contains 1,200 visitors at one time, and during the whole of one holiday it reached over 28,000. The yearly amount appropriated for its support would be considered extravagant by many of our Western people.

France has at least twenty-five prominent public gardens; little Switzerland has five; Denmark four; and poor sterile Sweden supports five. Each of the following places has one, and perhaps some of them more: Bombay, Ceylon, Calcutta, Cape of Good Hope, Canton, Mexico, Rio Janerio, Chili, Teneriffe, Cambridge, Mass., New York, Philadelphia, Washington, and St. Louis. Each has made a good start.

As near as I can learn, the first successful attempt in this country at a Botanic Garden was made near Philadelphia, in 1730, by John Bartram. One of the best in the United States was started in 1800 by Joshua and Samuel Peirce at Westchester, Penn. Probably the Arboretum containing the greatest number of species of any in this country, has been quite recently started on the College Campus of the Ohio Wesleyan University. It now contains 600 species, though most of them are still too small to make much of a display.

I do not know that Michigan has any yet worthy of the name. A small beginning has been made at the Agricultural College. If the prosperity of the State continues, and her school system holds its rank, I have no doubt that she will have a number of Botanic Gardens started within the next twenty or thirty years.

I will briefly enumerate some of the

USES OF AN ARBORETUM.

Nearly all of our prominent cities are spending large amounts on parks for the health and pleasure of their people. Chief among the attractions of a park are trees and shrubs. The study of these and the interest they awaken would be much increased by giving a greater variety of plants to the parks. Some of them are now monotonous on account of too many plants of one kind. Private grounds and cemeteries could be made much more attractive by planting a greater variety of trees and shrubs, appropriate to each particular spot.

The Prairie States are already extensively engaged in planting for timber and shelter, but no man knows for certain whether he has the best trees for his purpose. It may seem too soon to talk of raising forest trees in Michigan, so celebrated for her extensive forests; but at the present accelerated rate of cutting off timber, the next generation must begin to look out for a supply of some kinds either by importation or raising. I heartily indorse what Mr. T. T. Lyon says of the importance of timber belts.

It will take some years for Arboreta to get established so as to be very instructive, hence the great need of starting them soon. The expense is very trifling when we think of the advantages which would arise from it. "Its utility is as obvious and important as any other museum of natural history,—certainly not inferior to any in the intrinsic value of its connection with arts and manufactures, and presenting a school of instruction that will largely tend to advance our progress in the knowledge of vegetable physiology, and furnish a strong incentive to botanical studies. Unlike many other museum collections, this will constantly vary in its beauty and attractions; the yearly development of individual forms, with its combinations of form, foliage, flowers, and fruit the opening buds in spring, and the gorgeous hues of the autumn foliage, represent extreme periods between which each day has its own peculiar beauties. To the artist, such a collection presents a field where may be studied the form of every leaf and outline of the superior vegetation of the temperate zones; and the botanist will here find the material living presence of those objects which, in their more refined relations, enter into his abstract and recondite arrangements."*

Such a garden will be the delight of the nurserymen, as here they can then see what would be hardy, and most suitable to ornament the grounds of their customers. As a part of this Arboretum should be an experimental garden of orchard fruits, where should be found all the fruit trees hardy in our climate,

* Report of U. S. Department of Agriculture, 1867.

with their various modes of training, pruning, and culture. In connection with the Arboretum it would be very useful to have green-houses well supplied with various economic plants,—those valuable in medicine, for dyeing, those used for gums, resins, ornament, or those furnishing articles of food.

A museum of vegetable products also would tend to make the establishment complete in all its departments. This they are beginning on a large scale at Washington. The authorities estimate that there are 2,248 species and varieties of trees and shrubs which will thrive in the open air in that latitude.

With our severe winters, where the thermometer sometimes reaches 33° below zero, and often 15° below, I think the number of hardy trees and shrubs would be reduced to 1,200 or 1,500 species and varieties besides the varieties of fruit trees.

Quite a nice start can be made in such a collection by getting all the trees and shrubs which can easily be picked up in any neighborhood, and by purchase of our nurserymen. After this we shall be obliged to resort to the slower process of exchanges with like collections in our own country and in foreign countries. It will need constant vigilance and some money to get trees and shrubs from distant countries, through missionaries, travelers, and merchants.

We have already begun an Arboretum at the Agricultural College. We have taken several small specimens of each kind we could get in the neighborhood, and placed them temporarily in nursery rows, where some will die, some may harden, some may be used in exchange; and when we get enough together, they may be set in groups where they are to be permanently located.

Nearly all methods have been tried in the arrangement of an Arboretum, each having its advantages and disadvantages. Some try to show to the intelligent visitor the geographical distribution alone, by having a part of the garden for plants from Europe, a part from North America, while each of the other grand divisions of the globe has its corner. Others put trees together, shrubs together, and herbs together. Others attempt to arrange them solely with reference to landscape effect, though in this they must fail, to a great extent, because so many of their plants are new and their habits of growth are not known.

The prevailing tendency now seems to be to arrange them in groups, according to the natural orders or families. This method puts all the oaks together, and near them all the chestnuts, and near these the beeches and hazels, iron-woods and blue beeches. These plants just mentioned constitute one of the largest and most important natural families.

In another spot may be placed all the cone-bearing plants (*coniferæ*) including our pines, cedars, spruces, larches, and cypresses. Another order includes all the poplars and willows; another, birches and alders; another, hickories and walnuts.

In each of these natural orders geographical distribution can be shown to some extent,—for example, by arranging the pines from North America on one side of a drive or path, and those from Europe on the opposite side. Each natural order should have a large label near it, containing its name, and each plant should be conspicuously labeled. These natural families can be dotted here and there over the lawn, and may be easily reached by paths and drives running through and around them.

The importance of such a collection must be apparent to all cultivated minds. The study of trees can not be otherwise than ennobling to all who behold them, whether he be artist, botanist, arboriculturist, or man of culture

who is seeking for novelties with which to adorn his grounds and make home pleasant. Trees and shrubs are the cheapest ornament.

Many of our native trees and shrubs are preferable to those from distant countries. The shrewdest men have long since discovered that no money pays a better interest than that used by skillful hands in making a home pleasant. If you wish to sell a place, it is sure to pay more than 20 per cent on the investment; if you want it for a permanent home, who dare say it pays less? More attention to these subjects is one of the greatest wants of our thrifty Western people.

THE FERTILIZATION OF PLANTS.

On Thursday evening, January 24, in Representative Hall, Professor Beal was called upon to make some explanations about the fertilization of flowers. He responded as follows:

Suppose my hat, with these papers stuck upon it, represents a strawberry blossom. There are the showy petals, and there the slender stamens, each bearing a pouch at the tip full of dust called pollen, and in the center or top of the flower other small bodies called pistils, the top of which are naked and sticky, without epidermis. That the vines bear fruit, it is necessary for the dust to fall upon the naked portion of each pistil. This is the structure of the Wilson strawberry; but some of our cultivated varieties bear no pollen in the pouches. These will produce no fruit without receiving pollen from other plants. Insects transfer this pollen from flower to flower. In Indian corn the pollen is all on the tassels at the top of the stalk. The threads of silk on the young ear run down, each to what is to become a kernel. A speck of pollen falls on the end of each silk, and grows down several inches to fertilize the embryo kernel; else there will be no corn formed.

Cucumber vines and vines of melons, squashes, pumpkins, all like Indian corn, have two kinds of flowers on different parts of the same plant. A small part of these flowers (may be one in five) has a large bunch at the base of the flower which becomes the fruit if it be fertilized. The vines are low, the pollen slightly sticky, and situated down deep in the yellow part of the flower. This dust cannot get to the pistil unless insects carry it there. The little striped bugs, considered such pests on the young squashes, when first out of the ground, are found covered all over with the pollen as they go about for the honey in the flowers of older plants. If there were no insects, there would be no melons, squashes, nor cucumbers. They would perish. Each helps the other. Insects eat the young plants and honey of flowers, but help in reproducing plants to pay for their food. Bees carry pollen as well as the striped beetles.

It has been suggested that the Yellows in the peach are transmitted by insects visiting the flowers. This seems to me quite probable, though I have not proved it. There is an idea, which some physicians have some testimony to sustain, that diseases, like the small-pox, are transmitted by the common house-fly. Then why not transmit the Yellows to the naked tip of the pistil? Mr. Charles Darwin, an eminent English experimenter as well as theorizer, proved some years ago that there would be no seed in our common flax plants without the aid of insects to carry the pollen. This seemed incredible, because each flower has pollen and pistil close to each other, so that they always meet. Insects do the work. Our common garden beans would only be half a crop without the aid of insects, though the flowers all have both stamens and pistils touching each other. Our common blue flag, and all cultivated plants called *Iris*, have the flowers so constructed—which I cannot well explain without