

SCIENCE

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BOTANICAL GARDENS¹

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THE ADMINISTRATION OF BOTANICAL GARDENS

THE common idea of a botanical garden appears to be that of a collection of many kinds of plants chiefly marked by their lack of beauty and unattractive arrangement. A fair average impression of most botanical gardens would perhaps be that of large collections of living plants, grouped for reasons of economy and convenience, like the bottles on the shelves of a laboratory, with little regard to their individual or collective appearance: variety and some sort of classification are fundamental elements of this mental picture. It is a question how far this idea may be modified without passing the limits of popular acceptance of any definition that may be given of a botanical garden.

Such gardens originated in the herb gardens of the middle ages, which were almost as natural an outgrowth of the use of simples as a field of wheat or yams was of the use of vegetable food—though later reached. With the teaching of medicine they became demonstration gardens closely limited to the vegetable materia medica. Travel and exploration brought to them the curiosities of the vegetable kingdom. With the development of taxonomy, they have become its exponents, varying into epitomes of local or cosmic plant communities. Morphology and physiology, as these subjects progressively claimed attention, have in turn left their imprint on the gardens. Through it all, variety and economical and

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convenient arrangement have persisted as dominant characters, the recessives or mutants rarely proving in close enough harmony with environment to hold their own apart, unless protected.

The average botanical garden, in fact, is a museum of living plants, and as such is affected by whatever affects museums of other classes. It exists for the exemplification of coordinated facts; for the provision of material for dissociated demonstration and for study; and, in so far as it can meet the requirement, it is charged with the duty of making such study of its materials. Departure from this average tends to convert it into a show-window, a warehouse or a laboratory, according to the direction and degree of specialization.

The administration of a garden of this type rests upon fundamental principles common to the fields of business, education and research. Few visitors to a museum or a garden carry away a distinct impression of fifty objects, though they have gazed upon and perhaps observed hundreds—while they may have seen thousands. If they have derived pleasure and an impression that the collection is worth while, and have carried away an understanding of something not before so well understood, they are likely to return and to send others to see what they have seen. The second, and especially the last, of these results depends upon some salient feature of the exhibit. Beauty, taste and order may give pleasure and make a collection worth seeing for the general impression it creates; but a lesson is much more often taught than picked up. In this lies a strong reason for supplementing even the greatest collections by synopses of various kinds and for frequently changing or alternating these. This principle is a rule in retail commerce; it is understood in the best museums, and is admirably practised

in the display of works of art. The out-of-door plantations of a garden are less tractable in some ways than merchandise, paintings or collections of gems, prepared animals, or such botanical material as is usually found in museums or even in plant houses; but if the arrangement of the grounds is right, these may be supplemented by a great variety of special features knit into or appended to the general plantation in such a way as not to affect its unity of design.

Enough—but not too much—of everything is an essential rule, which applies with increasing force as one passes from the general to the particular—from landscape to lesson; perhaps nowhere so forcefully as in marking an exhibit. Essential are a key-map to the whole, from which its purpose and the location of its larger units are quickly ascertained; group and synopsis markers exemplifying the happy mean between obtrusiveness and obscurity; increasing prominence to the details of supplementary collections; and everywhere and for everything labels showing at least the common and botanical names, the geographic home, and a key to the history of each individual. Too much of or on a label may be as bad as too little, and what I have indicated, if truly and legibly but unobtrusively presented for each specimen, opens the books for all that is known of it and its kind. But when it is transferred from its place among the marshaled reserves to a position in which it exemplifies some special fact it acquires a need of justifying this place which is best met by increased information on its label. A collection of plants, though accurately named, is but a living atlas, the special meaning of which calls for explanatory text; and this, if appreciated, points to strict limitation and descriptive labeling of those parts of a collection which, permanently or tran-

siently, are charged with conveying special information—success in this, as in the choice of material, lying between too little to convey the desired lesson and too much to be examined or understood.

The research use of a garden, as of a museum, introduces considerations quite different from those necessarily encountered in providing for its use as a means of giving pleasure or conveying information, not the least of these being that every dollar spent for these purposes may mean a dollar less for such research. Just as many museums are compelled to limit their activity to the educational display of their treasures, many gardens find no means for doing more than to present object lessons in the vegetable kingdom either to persons who visit them in its quest or by providing demonstration material for the class room. Adequately planned and economically administered to this end, a garden is indispensable wherever botany is taught as a biological science; and few European universities have failed to include it in the equipment of a botanical department. If the department is a live one, the same forces which impel its professors to snatch from teaching some small part of their time and strength for investigation are almost sure to convert a part of the garden into an implement of research.

It is here that one difficulty in defining a botanical garden enters. A very complete gradation might be marked between so typical and well-rounded an establishment as that at Kew and the grounds of one of our agricultural experiment stations—or, to follow another cleavage line, a park planned to convey knowledge of trees and shrubs while serving its main purpose as a breathing place and recreation spot.

Most botanists will probably agree that any adequately planned and conducted garden devoted to the educational dem-

onstration or productive investigation of plants is a botanical garden, irrespective of breadth or specialization in performing these functions. No small part of the cost of maintaining an ordinary botanical garden is incident to the need of making and keeping it presentable and of cultivating in it plants that require much care and the provision of special conditions for their growth. Even with the best that can be done for them, such plants often appear little more happy in their cramped and artificial surroundings than the animals in a menagerie; and as a class they are perhaps even less indicative of the species they are labeled as representing. Necessary as such surrogates may be, they afford a nominal rather than a real foundation for demonstration, morphological investigation or physiological experimentation. For the latter purposes, and particularly the last-named, supplementary research gardens are necessary, where tropical, desert, alpine or marine conditions are afforded by nature. Dissociated from the centers of human activity, as many such establishments must be and as all, perhaps, might profitably be if their purpose is the solution of life problems, they need not necessarily be burdened by the prior liens on the parent garden; and if of independent origin, for specific study, they necessarily should not bear these trammels. Indeed, from such special-purpose research gardens or garden-adjuncts productive results are as confidently to be expected as from the laboratory or the study as contrasted with a table and a book-shelf somewhere in the house. Research gardens of this type, limited to and concentrated on a specific line of inquiry, are likely to appear with increasing frequency in the next few decades. The results that come from them should bear a close ratio in quantity and quality to the freedom for investigation enjoyed

by the men who are privileged to make and use them; and in economy to the absence of cost other than for meeting the needs of the work in progress at any given time. That they are more likely to be adjuncts rather than independent establishments, in the main, is quite probable, because of the impossibility of doing much thorough-going and far-reaching work apart from the university and other centers about which libraries, herbaria, varied laboratories and extensive collections of living plants have clustered, and to which frequent pilgrimages are sure to be necessary.

The arrangement of this program assigns to me only an analysis of the general meaning and administrative problems of botanical gardens, and I am fortunately able to leave to specialists in their several fields the discussion of these phases of botanical gardening that have been touched on only that I might indicate how truly any worthy research plantation is, in fact, a botanical garden.

To the world at large, nevertheless, a botanical garden is likely to continue to mean, as it now means, a place where plants are attractively and instructively displayed—a museum of living plants. Professor Britton will tell, more forcibly than I could, of its duty to the public, and of the succor to be hoped for from the public that makes it very unwise to overlook this fact, even for a moment. Rather than the garden which is an adjunct to the class room and laboratory, and the research garden pure and simple, therefore, *the* botanical garden of the future, *par excellence*—the garden that appeals to the community as being worth while and that reaches beyond the confines of the class room and the laboratory in its direct usefulness—is likely to adopt in its administration more and more the best rules of museum administration, to appeal to the esthetic sense

first, that through it the mind—and perhaps ultimately and incidentally the pocket-book—may be reached. Only so can it reach its goal as a force in education, and through this come into its own as a maker as well as a giver. To do this, it must be beautiful as well as varied, specialized and didactic; and its interest and attractiveness must last through the seasons. Few educational synopses or research plantations are capable of standing this test, and a fatality seems to attend their continued maintenance. In my judgment, the botanical garden of the future that is to appeal to the public like those that (as the one at Kew) most forcefully make this appeal to-day, will be devoted primarily to the presentation of plants in great variety, careful culture and artistic arrangement, and at once exemplifying and indexed by an understood taxonomy; teaching special lessons and reaching special ends through adequate supplementation.

Guided by a botanist whose first love is a broad comparative knowledge of the vegetation of the earth, planned by an artist whose skill can convert the picture of his mind into something that the eye can see, cared for by a gardener to whom a dandelion or a dock in place is as desirable as an oak or an orchid out of place is undesirable, such a garden calls for the further constant care of the teacher to insure through unceasing watchfulness that what is intended to be educational shall be kept from becoming near-demonstration, and the alert supervision of the investigator in each field of research so that experiment may not turn into chance and supposedly adequate resources prove quite inadequate when drawn on at a critical moment. These talents are rarely if ever embodied in one person. The garden that is to profit by them is likely to cherish their possessors in the order indicated, even though, finally, in

taking rank in the achievement of its highest aim—the enlargement of knowledge—there are last which shall be first and there are first which shall be last.

WILLIAM TRELEASE

THE BOTANIC GARDEN AS A FIELD MUSEUM
OF AGRICULTURE

A FULLY equipped botanic garden serves more or less strongly a variety of useful purposes. To the public at large its chief function may appear to be that of a park or amusement ground where the dweller in flats may find, amid the fresh beauties of a productive soil, rest and refreshment for his soul, wearied by the daily dash over a city's well fertilized but unproductive pavement, and where the nurse-maid may sit reposefully on a shaded bench and give her charge a needed airing without fear of death by passing automobiles or beer wagons. To one interested in plants for their own sake, the botanic garden often means a place where may be found growing in conservatories or in the open rare plants of native and foreign origin—strange types that travelers tell us of in their wonder books—tree ferns, palms and exotic orchids. In European gardens American trees may be most strikingly present, while in American gardens it is the European trees that catch our eyes. The botanic garden is not, however, merely a species of plant circus that the curious may enter with the expectation of being surprised at oddities in nature and horticulture. It is primarily an attempt to represent the different types of vegetation of the world. In so doing, however, the native and agricultural flora is generally neglected on the perhaps not unnatural ground of its familiarity.

It is not in my province to discuss the various departments and aims of a modern botanic garden. I wish to speak as a

teacher chiefly of the economic section already in botanic gardens, and to make some suggestions for its further development.

A systematically arranged and well-labeled botanic garden may be called a dictionary of living plants. You look up the family, the genus or the species and you find the meaning in the growing specimens or you find the known plant, and the label gives you its name and classification. Plants are not excluded from the subject-matter of the young child's continual search for the names of things. It is the fear of his frightful question, "What is it?" that has been the end of many a teacher's attempt to give simplified botany or nature study in the lower schools. To a teacher, if a botanic garden is to serve as a plant dictionary, it should be built on the type of a school or pocket dictionary. Botanic gardens are perhaps too often on the plan of those dictionaries of rarer words that have several times been published. In such a dictionary, says the author, it is needless to give common words familiar to all, as house, church and the like. Only those less familiar words, then, need be included which are at all likely to give trouble to a reading public such as pragmatism, esoteric and the like. A botanic dictionary on this plan might be expected to throw out such simple words as root, leaf and bud; but for the sake of the beginner who may stand abashed at the tangled mass of Greek and Latin roots that confront him in his pathway up the steep ascent of botanic knowledge, explicit definition might be expected of such words as "the law of priority," heterotypic division, and of the recent verbal immigrants of Greek origin not yet out of the quarantine of public opinion. Few of these dictionaries of rarer words are actually in use, for practise has shown that on the whole it is the common