

A Short History of the Rancho Santa Ana Botanic Garden  
by Philip A. Munz

*Rancho Santa Ana Botanic Garden of the Native Plants of California May 1947*

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Introduction

The year 1926 was notable in the history of Rancho Santa Ana Botanic Garden; for it was then that the concept of such an institution came to Susanna Bixby Bryant. Mrs. Bryant had long hoped to establish a memorial to her father, John W. Bixby, desiring something that would be a fitting tribute to the pioneer spirit of adventurous and inspiring courage that had motivated his short life of thirty-nine years. Mr. Bixby was always a great lover of the out-of-doors and turned naturally to ranching on his arrival in California from Maine. He was but twenty-five, a young man in a new land. It was a country only recently recovered from the mad fever of the Gold Rush; colonizing was under way. With a vision of the untold possibilities for the development of his newly adopted home and with an appreciation of its scenic and floral beauty, he purchased land which combined these various assets.

Such a property was the Rancho Santa Ana with a large acreage extending from the banks of the Santa Ana River into the lofty Puente hills to the north. Apparently this name Santa Ana goes back to July 26, 1769 when Governor Portola came in view of a broad valley to which he gave the name of St. Anne after having celebrated the mass dedicated to that holy day. Many years later, in 1810, Bernardo Yorba under Spanish Grant founded the "Santiago de Santa Ana" and later added the adjoining "Canada de Santa Ana," renaming the entire holding "Rancho Cajon de Santa Ana." This Yorba ranch was notable as being

one of the first places, if not the very first, outside the missions, where ditches were dug and irrigation by gravity was instituted. The ranch remained in the possession of the Yorba family until 1875 when a portion [1] of it was acquired by Mr. Bixby who added other acreage and named his holding "Rancho Santa Ana." Thus in the period of over one and one-third centuries since its original occupation in 1810, the ranch has remained in the possession of two families, each typical of its own nationality and civilization.

It seems particularly fitting then, that as a memorial to Mr. John W. Bixby, a lover of wild flowers and beauty, a Garden be dedicated to the study of the plants of his adopted state and be located on a historical property which he purchased and began to develop -- a Botanic Garden conducted as a scientific institution for a better understanding of the native flora, its interest and use and conservation.

With all this in mind, Mrs. Bryant selected a site of commanding view and set aside about 160 acres in the hills bordering the river valley and ranging in elevation from 450 to 1100 feet above the sea. Additional land added to it later has brought the area to 200 acres. Lying immediately above the gorge of the Santa Ana River Canyon and facing the Santa Ana Mountains, with Mt. San Jacinto visible between the hills to the East and the Pacific Ocean to the West, this tract of land has point after point looking out over the sweep of river-valley and hills and is plainly visible from State Highway 18 which runs along the south side of the river. In itself it encompasses a number of deep canyons affording many exposures and soils. Some areas slope gently, some steeply. Some offer full sun, others partial or almost complete shade. It was the expectation in the beginning, and almost twenty years of experience have supported this hope, that a very large percentage of the species native to California could be grown on this single site. Originally, however, there was almost no woody vegetation present, but the land consisted of pasture or supported the half-woody species of the Coastal Sage formation. Development as a Botanic Garden had to proceed from nothing.

Therefore, when in 1926 such an institution was first projected and the vastness of so ambitious an idea was realized, it was necessary to seek advice. It was natural to turn to that [2] successful organizer and administrator of one of America's foremost gardens, Dr. Charles Sprague Sargent of the Arnold Arboretum near Boston. This experienced scholar emphasized the need of a working plan and gave council to engage the service of Mr. Ernest Branton of Los Angeles, who had long identified himself with horticultural development of southern California and had interested himself in the native flora. Mr. Branton drew up a preliminary planting scheme, for which he used a comprehensive list of native plants provided for the purpose by Dr. W. L. Jepson of the University of California, whose long and active interest in the Garden has aided materially in its development.

The year 1926 projected the plan of a Botanic Garden and 1927 began active work. Early in that year a lath house and a glass house and potting shed were built at the Ranch Headquarters under the supervision of Mr. Fred H. Howard, California horticulturist. Mr. E. R. Johnson, Ranch Superintendent, took charge of collecting and propagating plant materials from nearby areas, with B. D. Stark as nurseryman. In June, 1927 John Thomas Howell, student of Dr. Jepson, joined the staff as botanist. Although the first seed planted was obtained from Theodore Payne of Los Angeles, collecting in the wild was soon under way, the Garden staff carrying out four trips for such purpose in that first year.

In May, 1927 a crew of Mexicans, several of whom had been employed by Mr. Bixby forty years earlier and who took a great interest in their new task, was set to work making adobe bricks for the Administration Building which was completed in 1928. Many difficulties were encountered in the

construction of so large and massive a structure from adobe, a heavy rain coming after much of the wall had been erected and before the roof was in place. But eventually all problems were met and an almost fireproof building erected. In 1940 a concrete addition was built for housing the library.

In 1930 Dr. Carl B. Wolf replaced Mr. Howell as Botanist. Dr. Wolf had taken his undergraduate work at Occidental College, had had practical experience in the nursery of Mr. [3] Theodore Payne and had studied for the doctorate under Professor L. R. Abrams of Stanford University. An active and keen botanist with great interest in horticultural as well as taxonomic problems, and with unusual ability to organize and systematize, Dr. Wolf not only furthered the development of Herbarium and Garden, but did much in maintaining the records so necessary in a young scientific institution.

Since at the beginning the Botanic Garden had to be considered an experiment, seven years, 1927-1934, elapsed before a legal foundation was established. During this period active work was underway, and it was proved that the site chosen was usable for the purpose in mind and that this sort of project would succeed and would be of educational and other value to the people of California. By 1934 it was felt that this experimental stage had passed and a foundation was established with a self-perpetuating board of five trustees. Mrs. Bryant conveyed to the Board the site, the buildings and improvements that had been constructed, and an endowment for maintenance and development. Since that time the Garden has been administered by the Board of Trustees.

The John W. Bixby Foundation was dedicated as a Garden Foundation to the Board of Trustees September 21, 1934 for the Rancho Santa Ana Botanic Garden of the Native Plants of California as follows:

"THE NATURE, OBJECT AND PURPOSE OF THE INSTITUTION HEREBY FOUNDED AND TO BE MAINTAIN HEREUNDER.

*Its NATURE:* A botanic garden of the native plants of California, herbarium and botanical library, containing living and/or preserved specimens of trees, plants and flowers native to California, and literature relating thereto.

*Its OBJECT:* The preservation and improvement of the property now transferred and such property as may hereafter be transferred to the Trustees for those who not only wish to enjoy, but to study, assembled in one accessible locality, native California plants; and for the advancement of science [4] and education with reference to plant life indigenous to the State of California.

*Its PURPOSES:* (a) An institution founded primarily for scientific research in the field of local botany.

(b) To preserve the native California flora, try to replenish the depleted supply of some of the rarest plants which are rapidly being exterminated, and bring together in a comparatively small area as complete a collection of the rich store of native California plants as can be grown in the southern section of the state, thereby promoting the general welfare of the people of the state by providing the means for encouraging and carrying on the above mentioned activities in said state and by doing such other things as may be necessary and desirable to carry out the objects hereof."

The later history of the Garden can perhaps best be presented under several topics or headings descriptive of personnel, physical assets, equipment and the like, rather than by a recital of events in their order of occurrence.

## *Personnel*

Those who have had official connection with the Rancho Santa Ana Botanic Garden in one capacity or another fall naturally into three categories: Board of Trustees, Councilors, and Staff. They are here discussed in the above order.

The Board of Trustees held its first meeting on March 13, 1932 but did not take over the property until September 21, 1934, the legal Foundation having been set up July 12, 1934. As originally constituted the Board consisted of Mr. Allen L. Chickering of San Francisco, Chairman; of Mrs. Susanna Bixby Bryant, Los Angeles, and Mr. Ernest A. Bryant, Jr., Long Beach, Secretary. By 1934 two additional members had been elected: Mr. John Treanor and Mr. Roy Lacy, both of Los Angeles. The death of Mr. Treanor in 1935 led to the election of Mr. Stuart O'Melveny of Los Angeles and the resignation of Mr. Lacy in 1939 to the appointment of Mr. [5] Irving M. Walker of Los Angeles. Mr. Robert Casamajor of Pasadena was elected to the Board in March, 1947. The Board of Trustees meets frequently and transacts the official business of the Garden.

Since 1933 there has been an Advisory Board made up of two groups: a smaller one of Honorary Councilors and a larger one of Councilors. In the first group have served three distinguished men who have lived in the East and not been able to attend meetings, but whose advice has been sought from time to time. The first of these men, Dr. Liberty Hyde Bailey of Cornell University, Ithaca, New York has resigned because of advancing years. The other two, Dr. Walter T. Swingle, Plant Physiologist for the United States Department of Agriculture, Washington, D.C., and Mr. Frederick Law Olmsted, Landscape Architect, Brookline, Massachusetts, have occasionally been able to visit the Garden and continue their interest in it.

The larger group of Councilors has consisted of residents of California who have for the most part been able to attend the spring and fall Field Day meetings with the Board of Trustees and Staff of the Garden until such meetings were suspended in 1942, but the development of the Garden has been maintained throughout this war period and semi-annual meetings are again being resumed. Thus the Councilors have been able to observe the development of the Garden, receive reports on its growth and problems, and take council together. Many of them have made great contributions to the Garden by advice on special matters. Their interests have been along several lines:

*Taxonomic Botany:* Dr. W. L. Jepson\*, University of California; Dr. L. R. Abrams, Stanford University; Dr. Philip A. Munz, Pomona College to 1944, Cornell University 1944-1946; Miss Alice Eastwood, California Academy of Sciences; Dr. Lyman Benson, Pomona College, since 1945.

*Plant Biology:* Dr.\* and Mrs. Thomas Hunt Morgan, California Institute of Technology. [6]

*Plant Physiology:* Dr. H. J. Webber\*, University of California Citrus Experiment Station; Dr. D. D. Waynick\*, Association Laboratory, Anaheim; Dr. Henry O. Eversole, La Canada.

*Plant Propagation:* Mr. Theodore Payne, grower, Los Angeles; Mr. Fred H. Howard, grower, Montebello.

*Publicity:* Mr. Ernest Braunton\*, writer, Los Angeles; Mr. Terry E. Stephenson\*, historian, Santa Ana.

*Entomology:* Mr. R. S. Woglum, Chief Entomologist of California Fruit Growers Exchange, Pasadena.

*Law:* Mr. Irving M. Walker, Los Angeles, until he became a Trustee in 1939.

*Landscape Architecture:* Mr. Ralph Cornell, Los Angeles, since 1942.

*Education:* Mr. Ray Adkinson, Superintendent of Schools, Orange County, 1944-1945.

*Cytology:* Dr. John Milton Webber, United States Department of Agriculture, Riverside, since 1938.

*Horticulture:* Mr. Robert Casamajor, Pasadena, 1945-1947.

The third group of personnel connected with the Garden is the Staff. In giving an account of this group, no attempt is being made to list the many individuals who have served as assistants, nurserymen and the like. From the founding of the Garden in 1927 until her death on October 2, 1946, Mrs. Bryant devoted much time and thought to its development and care, serving as Managing Director. Until 1940, Mr. E. R. Johnson continued as Garden Superintendent and Construction Engineer, but since then he has acted only in the latter capacity and Mr. Percy C. Everett, who had begun in 1934 under Dr. Wolf as keeper of the Herbarium and corresponding secretary, has been Superintendent of the Garden and nursery. Mr. B. D. Stark had done much of this work in the early years and resigned October 26, 1934. Mr. R. V. Cavers of the Ranch office was secretary and draftsman until 1940. Dr. Carl B. Wolf resigned in 1945 as Botanist and was succeeded August 1, 1946 by Dr. Philip A. Munz. From time [7] to time services of men outside the regular staff have been secured to deal with special problems in planting and landscaping, for example Theodore Payne, Arthur Howard, and Ralph Cornell.

\* Deceased

#### *Physical Assets*

As has previously been mentioned, the Rancho Santa Ana Botanic Garden consists of some 200 acres, situated on the brow of the Puente Hills overlooking the Santa Ana River. It is approached by a two-mile drive through the Rancho Santa Ana between rows of gayly colored pomegranate trees, then between orange groves and eucalyptus so typical of the California landscape. Lying in a general west to east direction as one drives in from the Ranch, it has a main road which passes the nursery, picnic grounds, wild flower seed garden, Assembly Hall and Administration Building and then goes down through the east end passing the large reservoir and back into the Ranch. There is also an upper or high road which is connected at a number of places with the lower or main road and which keeps near the northern boundary. The Botanic Garden itself is both mesa and hillside and is dissected by deep narrow canyons which are oriented partly north and south and partly east and west, so that their steep slopes have very exposure. The altitudes run from about 450 feet near the river bottom to 1100 feet at the north.

The area was first studied for planting by Mr. Ernest Braunton. Mr. Frederick Law Olmsted laid out the original trails and roads and made a number of detailed studies for landscaping. Further work was done by Mr. George Gibbs. At present there are about five miles of roads and twelve miles of trails, rendering every portion accessible. The numerous walks along canyon and ridge, through pines and oaks and madronos, give the pedestrian a feeling of remoteness in distant mountains, rather than location in the heart of a busy ranch.

The entire area of the Garden has been divided into a [8] 100-foot grid with a numbering system based on north-to-south and east-to-west lines so that every point can quickly be located. Master maps have been made to show this grid, the contours, roads, trails and foundation plantings.

Not only is the property notable for its rugged topography but its diversity of soil conditions. Early in the development of the Garden a soil-survey was made by Dr. D. D. Waynick who kindly donated his time and service. Soil samples were taken to depths of one to five feet and in duplicate, one set being conserved at the Garden. Analyses were made and 87 types of soil were found. A soil map was made showing about twenty principal types, with various clays predominating. After a period of years of irrigation and accumulation of humus a comparison of the soils then found with those originally in the Garden should be of considerable interest.

One of the principal reasons for establishing the Botanic Garden was to bring together growing plants from all over the state, thus making it possible for the student to see in close proximity the various species of a group and to observe their similarities and differences under the same growing conditions. In order to know each species at all stages, it has been the policy to grow the plants from the seed collected by members of the Staff rather than cuttings from mature individuals. Furthermore, it is possible in such a Garden to grow a number of plants from a given locality and to show the range of variation for different localities. In the Garden as a whole, plantings have been made from two general points of view: (1) *cover plantings* of various species such as pines, cypresses and oaks for general beautification, to furnish humus and shade, and thus gradually to develop areas for better garden purposes; and (2) *bed plantings* of single species with each individual plant bearing its propagation number and with maintenance of yearly record on each bed as to number of plants surviving, their size and condition. Metal tags are used for numbering such plants and their names are posted along the roads and trails by means of metal strips. At the present time [9] the cover plantings consist of perhaps 100,000 individuals and bed plantings of 40,000. These are of course largely trees and shrubs, although many perennial herbs are also represented. In fact, a large percentage of the truly woody species of California is now growing in the Garden. Especially noteworthy are pines, cypresses, oaks, ceanothi, Catalina ironwood, mountain mahogany, currants and gooseberries, ashes, maples, sumacs, cacti and also some of the softer-stemmed species such as lupines, sages, buckwheats, woolly blue-curls, and sage-brush.

The general plantings for study and scientific work have necessarily to be scattered over a considerable territory and are available to the person who has time and energy to visit them. But it is perfectly obvious that for many visitors it is desirable to have a small number of many different kinds of plants close at hand and easily accessible. Accordingly, the planting about the central buildings has been done for display and to enable visitors to see as many species as possible in a short visit.

### *Special Gardens*

Because of the unusual interest in certain groups of plants, attempts have been made from time to time to develop *Special Gardens*. These have met with varying degrees of success, partly because of the war conditions with resultant labor shortage, since such gardens tend to require constant care and much labor:

[1] *Cactus Garden*. This was the first and most successful special garden. It is situated along the crest of a knoll southeast of the Administration Building and on down the slope to the south. Here there is the drainage so important to cacti. Gradually the members of the family which had been planted in other parts of the Garden have been brought together in an attractive setting, with rock-bordered walks and interplanted with agaves and various desert shrubs and annuals. Most of the cacti grow well, their chief disadvantage being a dark coloring on the old shoots due to a fungus growth. Some of them are

vigorously attacked by rabbits and rats and need [10] some protection. At the present time most of the California cacti are assembled here.

[2] *Succulent Garden*. The native leafy succulents such as *Dudleya*, *Stylophyllum*, and *Sedum* have given some difficulty. Many cannot withstand exposure to intense sun, nor can they endure much moisture. A rather happy solution seems to be the use of dry, well drained banks in partial shade, such as that at the edge of a grove of Santa Cruz Island pines.

[3] *Penstemon Garden*. One of the most colorful genera in California is *Penstemon*. In a Garden of natives seeking to exhibit showy flowers it finds a proper place with its reds and blues and other colors. In the Rancho Santa Ana Botanic Garden the special collection of *Penstemons* has called forth much comment. For some years botanists have been aware that species in this genus tend to hybridize and *Penstemon Parishii* has long been thought to be a cross between the common scarlet bugler (*P. centranthifolius*) and the large blue penstemon (*P. spectabilis*). It is not surprising that other hybrids should occur in a living collection from all parts of that state, a very beautiful one, *P. Bryantae*, combining the characters of the coastal *P. spectabilis* and the desert *P. Palmeri*.

[4] *Bulb Garden*. At one time an attempt was made to assemble many of our native bulbous species, particularly *Calochortus*, in a special garden. Heavy soil, rodents, weeds and scarcity of labor made it a difficult matter, and the construction of a new road eliminated the Bulb Garden as it had been developed. At present a few bulbous plants are scattered about in the Garden as a whole, such as *Lilium Humboldtii*, *Calochortus catalinae*, and *C. Weedii* var. *intermedius*, but there are no real plantings of *Allium*, *Calochortus*, *Brodiaea*, *Fritillaria*, *Lilium* and the other attractive California bulbous groups. It is planned to assemble such a collection again.

[5] *Water and Bog Gardens*. Artificial pools have been constructed and beds arranged for swamp-loving plants, but these are not now being maintained. [11]

[6] *Fern Garden*. With the exception of such ferns as *Woodwardia* and *Pteridium*, attempts made to grow ferns have not succeeded well, a large part of the difficulty being due to rodents. Increased shade in the Garden due to better tree development should make such a collection more easy to maintain in the future.

[7] *Wild Flower Seed Garden*. In the spring one of the most interesting parts of the Garden is the area being devoted to raising wild flowers both for display and for seed production. It contains many of the showier annuals such as *Godetias*, *Gilias*, and *Phacelias*. The seed is used from known sources and by careful selection is standardized so far as possible so as to develop satisfactory strains for horticultural purposes. Many pounds are harvested each year and constitute one of the chief sources of seeds that have been distributed to other institutions, although as they become available and are needed seed are gathered from all plantings throughout the Garden and kept for propagation purposes.

### *Buildings*

The first structure erected in the Botanic Garden was the Administration Building. Constructed of adobe and concrete, with tile roof and steel reinforcing, it is both commodious and sightly, and is almost fireproof. Of early California architecture and conforming to the contour of knoll and mesa on which it stands, this first building is a noble one. It has a most commanding position both with reference to the Garden itself and to the valley below. Through much of the Garden, planting has been arranged so as

constantly to create vistas that focus on the lofty tower of this central building. In part, during the lifetime of Mrs. Bryant it was her country residence; and in part, it housed the botanical collections. It has a large Herbarium room with various supplementary rooms for storage of duplicate and pickled materials, as well as a photographic dark room. In 1940 a special fireproof addition was erected to house the library. Although the main floor is [12] often used for conferences and for entertainment of guests and special visitors to the Garden, it has not been open to the general public.

As has previously been indicated, the original glass and lath houses were not on Garden property, and it seemed best to construct a nursery which would be entirely in confines of the Botanic Garden. A knoll was chosen at some distance west of the Administration Building and in 1940 this area was conveyed to the Garden Foundation and a road was built from the Ranch, so that at present the Garden has two roads to the Ranch, one at its east end and one at the west. In addition to the glass house and lath house, the nursery has a potting shed with soil sterilizer; a cold frame part of which is electrically heated from beneath; a general service building with tool room, storage space and garage for the Garden work cars; and a nurseryman's cottage and garage. All these were built in 1940.

Except for the interruption caused by the war, one of the features of the Garden's program has been to have special visiting days particularly during the months of April and May. To accommodate the visitors at such times, there was begun in 1940 a picnic ground with grove and tables; in 1941 was added a restroom cottage. It should be emphasized, however, that the Garden is not a recreation park. Southern California in general and Orange County in particular do not lack provisions for picnics and recreation. Since the Garden is a scientific and educational enterprise, its picnic facilities are available only to those visitors who have made special arrangements to visit the Garden and obtained the necessary admission cards. Such cards are free and are for certain visitors' days when the Garden staff can be on duty and serve as hosts to the public.

In the same manner, since the Herbarium must necessarily be a place for scientific work, where scholars and students can study specimens without too much disturbance, it was found wise to provide special accommodation for the flower shows and the talks given on visitors' days. In 1939 an Assembly Hall was completed near the Administration Building and toward the nursery. In addition to the auditorium which it contains, there are restrooms and space for seed storage. It is of concrete with tile roof and conforms in external appearance to that of the other buildings.

A smaller building is a garage for the storage of the GMC collecting truck and a trailer. These units are worth mention, since they show the detail to which the various facilities have been perfected. The truck is fitted with special water tank and with built-in cabinets for camping materials, books, maps, drying equipment, food, clothes, and the like. It contains a refrigerator, bed and other camping equipment. The extra water enables the Botanist to camp anywhere, while the special low gear is of great value in negotiating difficult sand and steep slopes. The trailer is for transport of living plants from the field to the Garden, and the use of truck and trailer have greatly facilitated the assembling of Herbarium and living collections.

At the time of writing, a house is being constructed which is to serve as residence of the Botanist; it is on the brow of the mesa to the west of the Administration Building. The Garden possesses also equipment for weather observation: a rain gauge and two thermographs that record 24-hour charts of temperature. These thermographs are located at widely different stations.



### *The Herbarium*

Since many species of California plants extend into adjacent states or have close relatives in them, it is obvious that to understand the plants of our own state we must have material from a larger area. The policy therefore in building up an Herbarium emphasizing plants of California has been to admit also other specimens, so that the collection is really one of the West and Southwest centering about California. Beginning in 1927 botanizing was done by John Thomas Howell on the Rancho Santa Ana and nearby areas, then further afield. Mr. Johnson and Mr. Stark also added speci-[14]mens. During his many years as Botanist, C. B. Wolf collected most extensively and covered every portion of the state. There have been smaller accessions by P. C. Everett, Mrs. Calvert Norland and others. All collections made by members of the staff have been given one series of numbers which have run thus far from 1 to 11518, this series being known as the Collection Numbers. Many of these have been collected with many duplicates, so that exchange specimens have been available. Other acquisitions have been by purchase and gifts of which a detailed record is available, the most notable of the latter being the private herbarium of Carl B. Wolf assembled during his days as a graduate student and consisting of 3736 numbers. As of October 1, 1946, in exchange with other institutions 13835 specimens have been received and 14738 distributed. The total number of mounted herbarium specimens is now 31174; some hundreds of others are waiting to be mounted and about 32000 duplicates are ready for distribution.

The herbarium material is mounted in the standard way by means of glue on sheets of standard size, different weights of mounting paper being used according to the character of the specimen each is to receive. The chief departure from the usual method lies in the manner of reinforcing, stapling by means of a machine being used instead of the customary strips of gummed linen. Stapling is rapid and the narrow metal bands seem to give a more permanent and firm fixation. Every sheet receives an envelope for loose fragments and extra parts and is also stamped with the name of the institution and with a serial number in order of being mounted. Four colors of genus covers have been used: manila for general California, orange for Orange County and environs, gray for beyond the state, and green for those numbers grown in the Botanic Garden. The arrangement of families follows that of Dalla Torre and Harms, but the genera within the family and species within the genus are alphabetical. The Herbarium is housed in cases of cedar covered with metal sheeting. [15]

Perhaps the most distinctive feature of the Herbarium is the elaborate supplementary material. Collections of seeds are made either at the time the original specimen was taken and/or are followed up by seed samples made later from plants grown in the Garden. Fruits and wood samples are also filed in the Herbarium in special drawers with the seed samples. There are over 2600 such seed samples in glass bottles and 226 wood samples. Much photographing has also been done and a file of 5880 negatives is kept. Thus more complete data are obtained, particularly for woody plants, than is usually the case in herbaria.

Due to the inadequacy of dried specimens in revealing the characters of many fleshy plants like cacti and sedums, particular effort has been made to preserve these in liquid and 300 jars contain such collections. But special mention must be made of the large number of seedlings reserved in liquid. Since the species were being grown in the Garden and from known sources, the opportunity for the preservation of younger stages of the plants has been used. This special collection of seedlings consists

of about 1000 8-ounce bottles and has reached the stage where the possibility becomes apparent of showing relationships of groups of species in a large genus or of one genus to another.

While the Herbarium is still small, its careful preparation and its special collections in the ways of photographs, seedling-stages, wood-samples and seeds render it unique and make it unusually valuable for the study of California species. Furthermore, special attention has been given to collecting in the more remote and inaccessible parts of the state, and many rare species have thus been obtained.

#### *The Library*

The book collection for the Botanic Garden has been assembled though many years and while not large, has been carefully selected and contains some exceedingly rare and important items, as well as the more usual manuals and floras [16] of the western United States. It centers around two fields of interest: botany and horticulture on the one hand and Californiana on the other. There are about 3000 volumes as well as numerous reprints and pamphlets, these latter obtained partly as gifts and partly as exchanges for the Garden publications. Most of the leading American botanical journals are received and a few foreign ones. The files of periodicals such as Curtis Botanical Magazine, Annals of the Missouri Botanical Garden, Rhodora, and Bulletin of the Torrey Botanical Club are practically complete. These books are housed in a commodious and comfortable room of fireproof construction added to the Administration Building in 1940.

#### *Records*

At the very beginning of the Rancho Santa Ana Botanic Garden, Mrs. Bryant gave painstaking attention to planning a set of records that would make it possible to have access to any sort of information as to the origin of the plants grown in the Garden, their history and their performance, as well as to correlate Herbarium and Garden specimens where such correlation existed. As time has passed, the system of keeping the records has been modified slightly with the experience gained, but on the whole the records themselves have remained very complete and workable. Indeed, to a newcomer one of the most impressive facts regarding the whole institution is the completeness of such information.

To begin with, when a plant is collected in the field, data regarding it are recorded on a Field Label, with collection number, name, date, locality, elevation, life-zone, habitat, associated species, height and flower-color. This information is later copied in ink on a more permanent form and filed in loose-leaf books called Collection Record Books. A somewhat different form, of the same size so that it can be filed in the same series, is used for a cultivated specimen collected in the Botanic Garden. Herbarium labels are made up, using the collection number and data obtained from the [17] Field Label. The Specimen Record Book is another loose-leaf book which gives the collection number taken from the Field Label, a propagation number if such is assigned to seeds or propagation material obtained from the same collection, as well as information concerning photographic negative numbers if pictures have been made, whether seeds, cones or wood samples are on file, whether pickled material has been kept, the actual number of specimens collected and the names of herbaria to which duplicates have been distributed. Thus complete data are available for a given collection number by consultation with these two sources (the Collection Record and the Specimen Record Book) which together constitute a master record.

In similar fashion, Propagation Records are kept for the plants being grown. Seed collected in the wild are brought in, cleaned, weighed, given a propagation number (which is recorded also with the collection number), and stored. All this information is recorded on the Seed Record Card which has spaces for usage (date, amount, etc.). Seed planted in the nursery are handled on a Propagation Record with date, amount planted, soil, treatment, location and the like. Later a Transplanting Record is made for number of individuals, date transplanted, location, soil, etc. Then when set out in the Garden, there is begun the Planting Record on cards giving age, date, quantity, condition and size. In the office of the Superintendent of the Garden is the Master Propagation Record, again in the form of a loose-leaf book, in which is copied all pertinent information: Collection Record, Propagation Record, Transplanting Record, Distribution Record, and Garden Planting Record. With each number is filed a map of the Garden on which is indicated the location of the planting. Each year an inventory is made of the plantings, and the number of plants still living, their size and their condition being recorded. All information is thus accumulated for each planting, the arrangement (in the twelve volumes) of the Master Record being alphabetical by the names of the plants. [18]

In the Garden each plant has beside it a metal stake with a small aluminum label bearing its propagation number, so that the actual plant or plants can be checked against the office records.

#### *Things Accomplished*

For many years those interested in the culture of California native plants have learned through their own attempts to bring wildings into their gardens, that some species thrive in cultivation, others soon die. Some seeds germinate readily, other equally good and mature lots remain completely dormant or rot in the ground. Such problems were naturally among the first faced by an institution dedicated to the study of the native flora. During the two decades since the founding of the Rancho Santa Ana Botanic Garden, much information has been obtained both in the way of success and of failure. Indeed, enough knowledge is at hand to warrant the publication of a paper on the subject.

Experimentation in methods of germination has been to break dormancy by several ways: hot water treatment, scarification, soaking in lye solution, hot and cold treatments, sulphuric acid, use of wood-ashes in the soil, and burning straw over seed flats. Then for the medium in which the seed is planted, various soil mixtures, sterilizing the soil by heat, treatment with various chemicals, use of peat and sphagnum have all been tried out. In some cases sphagnum has proved very useful in prevention of damping off of seedlings. Time of year has likewise made great difference with some seeds, as for example, with palo verde (*Cercidium*) for which the planting of seed in early summer is much more successful than at other seasons. Various types of potting soil have been used: for many plants a successful one is a mixture of sand and activated sludge, an organic fertilizer made from sewage. With many plants great difficulty is experienced after transplantation to the potting soil because of a stem rot fungus. Use of various fungicides as bordeaux mixture has not proved [19] so beneficial as to withhold watering, thus keeping the upper layers of soil fairly dry. The inducing of germination to begin with, the prevention of damping off of seedlings and then of stem rot at a somewhat older stage, the best soil and fertilizer for promotion of vigorous growth--all these vary tremendously with different species, and optima for each plant can be established only by experience and experiment to which Mr. Everett, the Garden Superintendent, has devoted much thought and time.

One of the interesting things to be expected in the growing of thousands of plants is the appearance of occasional individuals of unusual character, whether by hybridization, mutation, or what not. Where

such a plant is woody or perennial, it can often be propagated by vegetative means and thus continued indefinitely. In such cases the rooting of cuttings is often a satisfactory method of propagation. For many woody plants this process is difficult and such is the case with many native species. But with some, such as *Chilopsis linearis* and *Baccharis pilularis* some success has been obtained. So far the use of root-promoting substances has not proved very fruitful. Experimentation is still under way.

Bringing the plants to the size which makes it possible to plant them in the Garden is one step; to maintain them in the Garden is another. Here again various degrees of success have been obtained. In the early plans for the Garden, the areas assigned to certain groups were not always satisfactory: for example, the oaks were put on a hot slope of southern exposure with very little soil, the sandstone beneath coming almost or quite to the surface. As the years have passed and the various soil conditions become better known, as more has been learned about the requirements of the different kinds of plants, as shade and soil have improved with the development of a more adequate plant cover, life has proved less hazardous for plants from the cooler parts of the state. Sufficiently acid conditions seem to be one of the limiting factors. Then too, for plants from the more desert regions which often require well-drained soil, some of the southern slopes below [20] the cactus garden are found to be suitable. As yet, perhaps the truly montane plants are most difficult to handle in the climatic and soil conditions prevalent in the Garden. In general, the pines and oaks and ashes and other woody groups from below the zone occupied by the yellow pine are most successful, but both species of Sequoia, Sitka spruce, incense cedar, giant cedar, the Alaska and Lawson cypresses (both members of the genus *Chamaecyparis*), and California nutmeg are all growing in the Garden and are evidence of some success with plants from cooler places. Notable is that obtained with many of the flowering shrubs, such as *Ceanothus*, *Eriogonum*, *Lupinus*, *Carpenteria*, *Philadelphus* and many others that add color to the California landscape in the spring.

The most ambitious single project undertaken thus far by the Rancho Santa Ana Botanic Garden has been a monographic study of the southwestern species of the genus *Cupressus*. For many years the Monterey cypress in particular has been a very useful plant for hedges and as a windbreak and has been extensively planted. Some time ago these trees began to die and were discovered to be infected with a canker or *Coryneum* fungus. From the time of his arrival at the Garden in 1930, Dr. Wolf interested himself in the study of California cypresses with special reference to their classification and horticultural possibility. He brought to the Garden seeds for all known kinds native to the state. In 1933 Dr. Wagener of the United States Department of Agriculture visited the Garden and found cypress canker in the plantings of Monterey cypress. With the hope that perhaps some species might be immune to the disease, it was decided in 1934 to carry on more extensive studies in the group, to enlarge the plantings in the Garden and to develop test plantings in other areas, as well as to obtain all possible information as to the best species for horticultural use. Dr. Wagener agreed to cooperate in a long-time program of study. This has recently been completed and put into manuscript form and will soon be published. It consists of three parts: the first by Wolf on the botany and classification of the cypresses, the second by Wagener on the [21] diseases, and the third by Wolf on the horticulture. For these studies some 7500 plants were used which were tested in 18 separate blocks widely distributed in the state, and which involved 72 different strains of trees comprising 15 species or subspecies.

In addition to the projected cypress monograph mentioned in the above paragraph, there have been other publications by the Rancho Santa Ana Botanic Garden. These have fallen principally into two sorts: technical and popular. Among the former have been two issues of a series known as "Occasional

Papers." These were by C. B. Wolf and presented the results of studies on the Playa del Rey saltbush, on *Baccharis pilularis*, and notes on many different plants such as cacti, oaks and poppies. There have been published also a monograph on "Growing Calochortus" by A. L. Chickering and the "North American Species of Rhamnus" by C. B. Wolf. During the war an investigation was made on the quantity and nutritive or other value of the crops produced by some of the native trees and published as "California Wild Tree Crops." In recent years a special Committee on Publications made up of three Councillors [sic], Dr. Jepson as Chairman, Drs. Abrams and Munz, has served in an advisory capacity concerning some of the more technical papers.

Among the less technical Garden publications have been the series called "Leaflets of Popular Information." These were written primarily for information and distribution of various flowering plants exhibited each week in the flower shows of our Spring Visiting Days. Of these leaflets seventy-three have been issued between 1938 and 1944, each being devoted to a single species and giving a description of the plant as well as items of general historical and horticultural interest. There has also been published from time to time a small pamphlet describing the Rancho Santa Ana Botanic Garden and giving information about visiting days and how to reach the Ranch.

Of more restricted distribution have been the mimeographed papers prepared by Dr. Wolf largely for special lectures or talks at scientific or other meetings. Some of these were: "A List of the Native Trees of Orange County, California"; "A Guide to the Vegetational Regions of California"; "Hybrids of the California Flora"; "Native Plants for Riverside Gardens"; and "Plants of Clark Mountains of San Bernardino County." Since 1933, semiannual or other reports describing the activity of the Garden staff during the preceding period and the development and condition of the Garden plantings, have been mimeographed. These have been sent only to the Trustees and Councilors.

In addition to the papers published by the Garden itself, others were written by Dr. Wolf during his years on the staff for publication elsewhere. Often these were invitation papers. Here may be cited: "Other Species of California Cupressus as Substitutes for Cupressus macrocarpa (Monterey Cypress)," in Proceedings of the 5th Western Shade Tree Conference, April 28-29, 1938, pp. 34-42; "Other Species of Cupresses as Substitutes for the Monterey," in California Citrograph for April, 1939; "Natives for San Diego," in California Garden, 33:1-4, 1942; "Channel Island Plants," in Golden Gardens, 10:339-340, 351, 1944; "California Native Plants for Hedges, Windbreaks and Background Plantings," in 13th Annual California Spring Garden Show Yearbook, pp. 55-57, April 27-May 3, 1942; "The Gander Oak, a New Hybrid Oak from San Diego County, California," in Proceedings California Academy of Sciences, series IV, 25: 177-188, 1944.

One of the functions of a Botanic Garden is naturally educational and may be achieved in various ways, depending on location, staff and other factors. At the Rancho Santa Ana Botanic Garden, this function has been achieved principally by: (1) lectures by the staff (away from the Garden), (2) by displays of flowers (away from the Garden), and (3) by having visitors come to the Garden. Because of the small staff and the need of guarding their time so as to enable them to carry on their regular work, it has been necessary to curtail talks and displays at other places. The general policy has been to limit these to gathering of a more or less scientific or horticultural nature, such as the Food and Drugs Conference, Park Administrators of California, Shade Tree Conference and Garden Clubs. Occasionally talks have been given in schools and small displays made at the Pasadena Flower Show.

But for the most part, it has seemed that what the Garden has to offer can best be given by having visitors come to it. Accordingly, until interrupted by the war, regular visiting days were maintained during the months of greatest bloom: April, May and early June. At first one day a week, later as interest increased, two days each week, Friday and Saturday, were used. It is planned to resume this schedule in 1947. Admission is by card to individual or group and is free. A wild flower show is arranged in the Assembly Hall, the members of the staff are available for questioning, trails are open, picnic grounds are ready for those who bring their lunch, and in the afternoon a short talk is given on some subject opened up by the first flowering of some plant of unusual interest or by other special reason. These flowers on special exhibit are the subject of weekly "Leaflets of Popular Information" referred to earlier. In April and May of 1940 there were 1736 visitors, in the same months of the next year 2210; then as war conditions interfered, the number fell to 1060 in 1942. Many teachers of botany brought their classes on these field days, coming from high schools, junior colleges and colleges. Garden Clubs, Nature Clubs, Girl Scouts, the Sierra Club, the Farm Home Department of the Riverside County Farm Bureau, the Faculty Club of Orange High School, Los Angeles Audubon Society, Synopsis Club of the Citrus Experiment Station, Southern California Botanists, and many other organizations have been among the visitors.

In addition to the above activity of a more popular sort, there has become increasingly noticeable a more technical type, as the experience of handling native plants and the richness of the collections have grown. In recent years there has been a continuous series of visits from botanists, landscape architects, horticulturists and others throughout the twelve months of the year. They have been from California, from [24] many other states, from abroad. Some have merely wished to see the work being carried on; others have come with specific problems and with requests for material. Thus cooperation has been established with many institutions and individuals and in many ways. Seeds and living plants have gone to parks and municipalities for planting, as well as to students and specialists in institutions from California to the Atlantic Coast for research purposes. These investigations cover many fields: methods to induce germination, cytology, genetics, horticultural breeding, experimentation with root hormones, chemical studies such as carotinoid pigments, insecticidal and antimalarial work, work in seed laboratories, camouflage during the war, studies in length of day as affecting various plants. Advice, and often material, has been given in problems involving planting of natives about military installations and hospitals, for protection coverage for quail, for planting about reservoirs and holdings of the Metropolitan Water District. Cooperative field work has been carried out with the United States Department of Agriculture on Yucca fiber. Members of the staffs of several of the nurseries offering native plants have visited the Garden for advice and to see native species unfamiliar to them. Officers of military hospitals and bases and California Highway Engineers have done likewise. Park executives have received help as have innumerable private individuals. Herbarium specimens have been loaned to many institutions in connection with revisional and monographic studies; many botanists have consulted the collections in the Garden itself. In short, though an independent institution, the Rancho Santa Ana Botanic Garden has given aid, technical and otherwise, in many different ways and to many individuals and has shown that, although a young institution, it is serving the people of California and beyond.

#### *Special Problems*

Under this heading are grouped for special mention some of the principal difficulties that have been faced in the culture of native plants, partly because of their own interest and [25] partly because of their applicability in much of California. Many of them will be presented fully, telling of the nature of the work

done and of the results obtained, in a paper which it is hoped may be issued on propagation and culture. Others can be mentioned briefly to indicate something of their diversity and type:

[1] *Soil*. Much of the soil in the area of the Garden is a very heavy clay and requires special treatment for special cases. For example, in the picnic ground it was desirable to plant sycamore trees for a shady grove to shelter the picnic tables. The heavy adobe made procedure very difficult, but by blasting and digging holes and then filling with good soil, better conditions were created. In the wild flower garden the same heavy soil has been much improved by treatment with heavy applications of manure, sulphur, and by conserving the organic matter of each season's growth.

[2] *Irrigation*. This has been largely an engineering problem requiring laying of pipe over very difficult terrain because of the steep slopes. But as an example of other questions that have entered in may be cited the special attempt to insure the right kind of water for use with nursery seedlings. It had been felt that perhaps the ordinary water was too alkaline for some species. A tank was erected to receive rain water from the nursery roofs, but experience has not shown it to be superior to the river water of the ordinary irrigation supply. Apparently the dust which collects on the roofs and washes into the tank carries soluble substances with it.

Efforts are made continuously to grow as many plants as possible without irrigation after they are once established, as many of the California natives will continue to thrive under such conditions. Under the frequent drought conditions in California, this is an important problem.

[3] *Erosion*. The combination of steep slope and fine clay soil make erosion rather serious in some parts of the Garden and along roads and trails. Depositing cut brush at the head of canyons and in places or erosion and especially the planting of shrubs which root rapidly with a minimum of irrigation have proved of chief benefit. Noteworthy among such shrubs are several species of *Baccharis*, some of which retain an attractive green color the year around. Then of course the rapidly growing pines and cypresses have tremendous root systems and are very useful on steep slopes.

[4] *Fire Control*: [sic] This is an ever-present problem in California during the dry season. At the Botanic Garden every precaution is observed as to smoking by the working crew and by visitors. An irrigation reservoir has been constructed on the slope above the Garden and connected to a fire line laid along the Garden boundary to shoot water in to the adjacent pasture in case of fire. The whole Garden area is piped, and much of it is equipped with overhead sprinklers. But almost no type of precaution could be effective against such a fire as that of the autumn of 1943 which raced down the Santa Ana River Canyon for many miles, fanned by a high wind. It leaped literally hundreds of feet at a bound. At that time considerable damage was done to cypress, juniper and other plantings on the higher north slopes.

[5] *Pests*. Removed by some distance from horticultural plantings, the Garden has been fortunate in its isolation so far as insect pests have gone, but the concentration in one small area of many individuals of a species and of many species of a genus offers rich feeding ground to the insects infesting that group. Fleabeetles on *Godetias* in the wild flower garden, thrips on *Heuchera*, psyllids and scale on *Rhus*, and other insects have had to be fought. However, not all pests are insects. Deer are sometimes so numerous as to be a real menace and have to be driven away by various means. One of the most serious and continuous enemies is the rodent group. Rabbits eat the young growth of many herbs and bulbs. Moles burrow around the young plants soon after watering and do considerable damage in new plantings. Gophers are always present. But probably the most harmful rodents are the field mice and

rats, the latter finding ideal living conditions in the brush in the deep canyons. They invade the nursery, attack older plants in the Garden and even consume bodily the large flat joints [27] of the prickly pears. So far no very satisfactory method of destroying them has been found. Ground squirrels and rabbits can apparently be combatted by poison grain. Rabbits can be shot: moles and gophers can be trapped. With so many rodents about, it has been found necessary for many young plants to be protected with cages of fine chicken wire. In the whole struggle with these enemies of the Garden, excellent cooperation has been had from County and other officials.

[6] *Diseases.* Mention has been made of those diseases of the young stages of plant growth: damping off and stem rot, which occur in the nursery. In the more mature individuals in the Garden, other fungus diseases have appeared from time to time. One of the most serious of these was a Phytophthora attacking the madronos. These had been making excellent growth and were well-established young trees. Expert advice was obtained from Dr. H. S. Fawcett of the Citrus Experiment Station at Riverside and a treatment elaborated involving much work about the roots and with the soil adjacent to insure better drainage and aeration. Other plants suffering from diseases which have not been so readily identified are the strawberry (*Fragaria chiloensis*) and manzanitas (*Arctostaphylos spp.*). Ceanothus is also badly attacked by the Phytophthora.

[7] *Climatic Conditions.* It is obvious that no attempt can altogether succeed to bring together in one place the plants growing wild in many types of climatic conditions as are found in a state as large as California and with as great a diversity of topography. With the hot summer days and drying autumn winds of a locality some miles inland, many species from the colder and more moist sections of the state will suffer. On the other hand, the winter humidity and rainfall of an area as near the coast as Rancho Santa Ana is not the most favorable for many desert plants. But it must be remembered that such an intermediate site offers greater possibility to plants in general than would either extreme. Perhaps one of the most difficult problems to meet is the dry fall wind known locally as the "Santa Ana" which sweeps down from the [28] desert and across the western end of the San Bernardino Valley into Orange County. It is partly offset by windbreaks of such plants as cypresses, pines and live-oaks. Protection by lath or other construction would undoubtedly aid many small and delicate species. Thus by plantings and other means success is gradually being obtained with coastal species; and by using well-drained spots with warm exposures, more of the desert plants can be accommodated. As the years go by, the total number of species that can be grown successfully will undoubtedly gradually be increased.

[8] *Ground Covers.* In the arid Southwest many plants have been tried as suitable ground covers in areas where the traditional blue grass and clover are not good because of inadequate water supply or difficult terrain. English ivy, periwinkle, Lippia and many other substitutes are in use. There should be some of the native plants that can be utilized. One of the most successful yet demonstrated at the Rancho Santa Ana Botanic Garden is the prostrate form of *Baccharis pilularis*, which maintains a pleasing green color and succeeds with a minimum of water and trimming. *Fragaria chiloensis*, the coastal strawberry, is satisfactory where the exposure is not too hot, hence can be recommended for near the coast or in partial shade. The native *Dicentra* probably needs similar conditions. Other plants are being tested.

### *Gifts*

During the short period of its existence, the Rancho Santa Ana Botanic Garden has been the recipient of a number of gifts of one sort or another, and no account of the development of the Garden would be complete without their mention. In general, these gifts have fallen into three groups:



[1] *Plant Materials*. These have been living plants, seeds, and dried specimens for the Herbarium.

[2] *Books and Pamphlets*. A number of notable additions to the library have been given, many being of the nature of reprints or monographs and other technical articles. [29]

[3] *Funds*. Although not large, several gifts of money have been received and have been of especial help in meeting cost of publication of the Leaflets. As time goes on and the activity of the Garden becomes better known, it is to be expected that interest in it will increase and that gifts to maintain its work will be forthcoming.

### *Conclusion*

During the period of approximately twenty years in which the Rancho Santa Ana Botanic Garden has been in the forming, it has developed a notable collection of growing plants native to California; it has amassed resources in the way of Herbarium and library which can be used in the study of these native plants; it has published results of scientific work and has accumulated other data for publication; it has given pleasure and information to many thousands of persons who have spent some hours in its bounds; it has furnished material and information for many research projects; it has stimulated interest in and an appreciation of the flora of the state. In many of these activities the institution has pioneered.

It was Mrs. Bryant's wish that some sort of account be made available of the early years of the work of the Garden; and shortly after the coming of the new Botanist on August 1, 1946, she suggested to him what she had in mind. But with her characteristic modesty she desired that her own name be kept out of the history so far as possible. On October 2, 1946, while on vacation in Santa Barbara, Mrs. Bryant died very unexpectedly and suddenly. Just before leaving for her vacation she had received a copy of the history as it then stood; and in general, approved its content and form. Now that she is gone, the Garden more than ever comes to a change in its personnel and development. Not only has its botanist of many years given way to a new one, but its founder and director has gone. In every way Mrs. Bryant was the creator of the institution; it was her concept to begin with and it was her wealth that gave it form and substance. She created its [30] foundation, donated its land, built its buildings. But beyond all that, it was her keen mind with its capacity for detail that formulated its system of records from the very beginning, a system still largely in use after twenty years of trial. It was her devotion to its interest that followed the planting program year by year and delighted in the development of its beauty. But above all must be emphasized the importance of her realization that to succeed, such an institution must be truly scientific. One needs only to read the Object and Purposes of the Foundation, as stated on pages 4 and 5 of this paper, to realize how clearly conceived was the importance of the scientific side from the very founding of the institution. Indeed, those who have had contact with Mrs. Bryant and her plans and hopes for the Garden cannot be otherwise than impressed by her wisdom and by the perspicacity in the many ways in which her foresight laid excellent foundations.

A native Californian, Susanna Bixby Bryant felt the love for the natural beauty and charm of her state which comes to a person of keen sense of delight in nature. This love was the urge that led to the creation of the Garden. In addition to her many public-spirited activities in and about metropolitan Los Angeles, Mrs. Bryant devoted the needed time and energy to its development. Without being aware of it, she has created in the Rancho Santa Ana Botanic Garden a memorial not only to her father, but one to herself in the minds of her friends and of those who enjoy the Garden, its visiting days, its wild flowers and its beauties.

