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THE DIRECTOR'S REPORT

RANCHO SANTA ANA BOTANIC GARDEN

1969

In the Director's report for 1968, mention was made of the destruction of life and property caused by one of the heaviest rainstorms recorded in a century. In writing this report, it is necessary to record the great devastation caused by the most violent windstorm to hit the area in many years. Damage to the plantings of trees and shrubs at the botanic garden was heavy and is detailed in another place. It is to be hoped that next year it will not be necessary to report still another environmental extreme.

There were two major developments in 1969 that set the year apart from the ordinary. During recent years leaks in our primary four-inch water main have caused considerable concern. During 1969 they occurred in such numbers that a decision was made that something would have to be done to resolve the problem. One solution would have been to replace the pipes, but this would have caused considerable damage to the plantings and a disruption of garden activities. Another solution, and the one accepted, was to line the pipes. This technique requires that the inner surface of the pipe be thoroughly cleaned of all rust and corrosion after which it is lined with a thin layer of cement. In all, over 9,000 feet of pipe were lined. Although a relatively new development, the process has proven to be very effective and to cost considerably less than new pipe. Plantings are damaged only slightly since as much as 600 feet of pipe may be lined between excavations. The work was done by Pipe Linings, Inc., Wilmington, and the method can be used on any pipe four inches or more in diameter. Since the work was completed, there has been a notable increase in water pressure. This is due to the smooth ceramic surface which allows the water to flow more freely than it did when the pipes were coated with rust.

During recent years available space in the administration building has become increasingly more crowded and at the present time there is insufficient room to carry on all the research activities. During the summer a proposal was prepared for presentation to the National Science Foundation for funds for an addition to the present building. The proposal was submitted by the Claremont Graduate School and any funds granted by the National Science Foundation were to be matched by funds from the botanic garden. Early in January we were notified that the proposal had been approved and funded. The final drawings are now being prepared and it is hoped that the new laboratories will be ready for occupancy by the beginning of the 1970-71 academic year.

The floral displays during the spring were exceptionally fine, one reason being that many plants that normally bloom at slightly different sea-

sons all came into flower at the same time and provided color contrasts seldom seen. One example was the bright magenta of the redbuds alongside the clear blues and purples of the ceanothus. Visitors took advantage of the fine displays and the turnstile recorded 72,281 visitors for the year compared with 61,285 the year before and 55,373 in 1967. It has been estimated that about 60% of the visitors are students. This would indicate that the garden is filling an important function in education; and as interest increases in ecology, conservation and the quality of the environment, so will the use of the garden as an outdoor laboratory.

ADMINISTRATION:

On June 9 we were saddened by the death of Mr. Irving M. Walker, a member of the Board of Trustees. Mr. Walker had served as a trustee since the garden was founded in 1927. A new member of the Board of Trustees is Mr. James D. Macneil of Los Angeles.

Two staff appointments were made during the year; Mrs. Bertha Makow resigned in November and Mrs. Ardra FitzGerald was appointed Librarian to replace her. Mrs. FitzGerald was formerly a librarian at the Stanford Research Institute. In March, Mr. Clarence Tilforth joined the staff as Horticulturist. He was formerly Assistant Superintendent at the Los Angeles State and County Arboretum and replaces Mr. Nick Lolonis who earlier had accepted a position in central California.

During the year members of the staff traveled to many areas in connection with their research interests. Dr. Carlquist spent a portion of June in Puerto Rico where he had been invited to present a paper at a symposium on adaptive aspects of insular biology held under the auspices of the Association of Tropical Biology. He also spent a month in the spring on a lecture tour to eastern institutions where he spoke to biologists at the University of North Carolina, Duke University, North Carolina State University, University of Maryland, the Smithsonian Institution and Indiana University. Drs. Carlquist and Thorne attended the 16th annual symposium on systematics at the Missouri Botanical Garden in October where the subject of tropical island biogeography was discussed. Dr. Carlquist presented the after dinner address at the closing session of the meeting.

In May, Dr. Thorne presented a series of lectures at the University of Connecticut on plant geography and phylogeny of the seed plants. In April, Dr. Benjamin participated in a meeting of the Advisory Committee on Fungi, American Type Culture Collection, held at Rockville, Maryland. Before returning to California, he also visited the facilities of the National Fungus Collections, Bureau of Plant Industry, Beltsville, Maryland. During the summer Dr. Benson visited Israel, Turkey, Greece and Yugoslavia on a trip sponsored by the Commonwealth Club of California. This provided an opportunity for observation of the vegetation of these Mediterranean regions.

Of special interest in 1969 was the XIth International Botanical Congress held in Seattle, Washington. Participating in this international gathering of botanists were Drs. Benson, Carlquist, Lenz, Simon and Thorne. Dr. Simon

presented a paper on the serological relationships among several genera of Leguminosae. Dr. Thorne organized a symposium on floristics in the North Temperate Zone for the American Institute of Biological Sciences, *Flora North America* Project, he also convened one of the systematic sessions. Dr. Carlquist presented a paper on the anatomy of insular woods; and Dr. Lenz participated in the meeting of the International Association of Botanic Gardens and one of the sessions devoted to ethnobotany.

Two honors were accorded members of the staff during the year. Dr. Munz was one of 11 American botanists to be named an Honorary Vice President of the XIth International Botanical Congress. Dr. Lenz was awarded the Foster Memorial Plaque for 1969 by the British Iris Society. The award was in recognition for his work on the Pacific Coast irises, the results of which were published earlier in *Aliso*.

WEATHER:

Rainfall for the 1968-69 season was 34.81 inches, slightly over twice the normal, and 20.24 inches above the season 1967-68. Our records show the last season of heavy rainfall was 1957-58 when almost 34 inches of rain were recorded.

RAINFALL REPORT
(Monthly Totals—July 1—June 30)

	1967-68	1968-69	Average
July	0.00	0.30	0.01
August	0.00	0.03	0.05
September	0.23	0.00	0.25
October	0.00	0.34	0.66
November	5.01	0.65	1.39
December	1.83	1.18	2.90
January	1.32	16.69	3.43
February	1.06	13.48	3.63
March	3.79	0.99	2.72
April	1.07	1.02	1.69
May	0.13	0.13	0.45
June	0.13	0.00	0.11
	<hr/> 14.57	<hr/> 34.81	<hr/> 17.29

On August 22, 1969, the temperature rose to 107° F, the highest recorded during the year. The lowest temperature of 32° F was recorded on December 22 and 30. In comparison, the high for 1968 was 103° F and the low was 23° F. In 1968 there were 58 days with temperatures above 90° F, and in 1969 we had 66 days—one in May, two in June, 22 in July, 26 in August and 15 in September.

Amounts of water used during the past five years

Year	Water Used (Cubic feet)	Rainfall for Calendar Year in inches
1965	1,287,700	26.98
1966	3,558,600	16.30
1967	2,816,800	22.62
1968	3,148,900	10.00
1969	3,910,500	34.81

SEEDS AND PLANTS:

The demand for seed from our 1969 Seed Exchange List was quite heavy. Although it was not always possible to fill all the requests, we did manage to complete 101, 32 of these from foreign countries and the remainder from institutions within the United States. Six hundred and sixty-one packets of seed were mailed. Sixty-six of these requests were for larger amounts of seed required for specific research purposes. Simon Fraser University, Burnaby, British Columbia, requested seed of *Baeria chrysotoma* ssp. *gracilis* for a pilot study in morphology. Thirteen packets of seed of species of *Haplopappus*, *Clarkia* and *Paeonia* went to the University of Saskatchewan for cytological study. Ten packets of seed were sent to Calcutta, India, for research purposes. The University of Helsinki, Finland, requested seed of *Gentiana* and *Coreopsis* species for study of developmental physiology. Seed of *Gentiana sceptrum* was sent to Nagano, Japan, for cytological study. The department of biology, Yale University, New Haven, Connecticut, requested seed of seven species of *Astragalus* for a study of the evolutionary significance of feeding behavior in *Colias* butterflies. The University of California, Davis, requested seed of *Fouquieria splendens* for an experiment in root temperatures. The United States Department of Agriculture Experimental Range, Coarsegold, requested seed of *Lupinus longifolius* and *Haplopappus parishii* to photograph for a revised edition of the *Woody Plant Seed Manual*. The University of California, Irvine, asked for seed of *Lupinus* sp. for electrophoretic research. Three ounces of seed of *Delphinium cardinale* were sent to the British Delphinium Society. A request for a large amount of seed of fast growing annuals was made by R. P. C. Corporation, El Segundo, for the study of weightlessness on plant processes. Large amounts of seed (principally *Ceanothus* sp.) were sent to Biologia U.R.C.B. Barquisimeto, Larra, Venezuela, for a newly established botanic garden, and to the University of Guadalajara, Mexico, for the same purpose. Twelve packets of seed, consisting of a selection of annuals and perennials were sent to George K. Porter Junior High School, Granada Hills, for a newly established native plant collection. A quantity of seed of a large variety of trees and shrubs, along with nine plants of *Fremontodendron mexicanum* and six plants of *Quercus chrysolepis* were sent to the Tucker Wild Life Sanctuary, Orange. This Sanctuary suffered severe damage by floods during the early part of the year. It is hoped that we can be of further assistance next year.

During the course of a year the garden receives many requests for plants and cutting material from other institutions and from commercial nurseries, and in most cases the requests are granted. It could be said that this is another phase of the garden's public relations and that if we are to encourage the use of the native flora whether for landscaping or for erosion control, there must be sources where such material may be obtained. This is the reason that we permit reputable wholesale nurseries to obtain cutting material. This year Diegaard Nurseries, Azusa, received cuttings of *Fremontodendron* 'California Glory', *Arctostaphylos edmundsii* and A. 'Point Reyes', *Ceanothus* 'Sierra Blue', and C. 'Hurricane Point', etc. Pomona Wholesale Nurseries received *Ceanothus* 'Hurricane Point' and *Arctosta-*

phylos 'Point Reyes', and Claremont Nurseries received *Heuchera* 'Santa Ana Cardinal' and Pacific Coast iris hybrids. The garden arranged with the United States Department of Agriculture Forest Department, Los Angeles, to root 200 cuttings of *Ceanothus maritimus* for their erosion control project. The Los Angeles Department of Forestry and Conservation received cutting material of *Ceanothus maritimus* and *C. divergens* ssp. *confusus*. The United States Department of Agriculture, Forest Department, Pasadena, received cuttings of *Arctostaphylos* 'Point Reyes', *A. media*, *Ceanothus divergens* ssp. *confusus*, *C. prostratus*, *C. maritimus*. San Fernando Valley State College, Northridge, requested cuttings of several species of *Arctostaphylos* and *Ceanothus*. Mount San Antonio College, Walnut, received plants of the following: *Fremontodendron* 'California Glory', *Calocedrus decurrens*, *Tetracoccus dioicus*, *Ceanothus griseus* 'Santa Ana', also a large quantity of seed of annuals. This was a contribution to the new nature preserve that has recently come into being in the vicinity of the college.

The garden also contributed plants to the Los Angeles County Fair: *Rosa californica*, *Ceanothus* hybrids, *Ceanothus exaltatus*, *Ceanothus rigidus albus*, *Dendromecon harfordii*, *Arctostaphylos standfordiana* 'Trinity Ruby', *Arctostaphylos cinerea*, *Fremontodendron* 'California Glory', *Ribes sanguineum* 'King Edward VII'.

During the year 80 collections of plants and seeds were accessioned. Three species were new to our collection. The staff accounted for 50 of these accessions, 22 came from other institutions and eight were privately donated. *Brodiaea* (sensu lato) was well represented. An additional 380 plants and seed have yet to be accessioned, of these there were 250 collections from the field and 130 from the garden.

Mr. E. K. Balls, former member of the garden staff now residing in Carmel, made 130 seed collections in the San Mateo and Monterey County areas for the garden and for this we are indeed grateful to him.

Seed was also submitted by Mary Coffeen, collected on one of her field trips, and from Dr. Philip Munz who brought in seed and live plant material. Fred Oettinger, one of our graduate students, collected seed while doing a floristic survey in the Marble Mountain Wilderness Area of northwestern California.

GROUNDS:

The year 1969 will most certainly be a memorable one in the history of the garden, being the wettest and most destructive in many years. Although we did sustain a certain amount of rain damage during January and February, it can be described as negligible in comparison to that suffered by nearby Glendora and Cucamonga. Our losses at this time were mainly due to inadequate flood control measures outside the garden's jurisdiction. Flood water originating in the foothills flowed down the smooth-surfaced road of Radcliffe Terrace to a natural fall at Abiline, gathered momentum as it flowed west then south through our north fence and plant communities, carrying with it much valuable soil and leaving deep gullies. It also flowed south along the east fence toward the Nurseryman's house. This happened twice during the two-month period and it was evident that something had

to be done as the Nurseryman's house was clearly endangered. The City of Claremont was contacted but they felt that it was not entirely their responsibility as the land north and east of the garden is college property. The problem was solved by the parties concerned sharing equally the cost of having a drainage ditch dug outside our north fence, thus diverting any future flood water westward toward Indian Hill Boulevard. It took about three weeks and 60 tons of soil to repair the damage in the plant community area. On January 24 we experienced gusty winds and as the ground was saturated we lost seven *Cupressus sargentii* in the communities while 25 large specimens were partially blown over and had to be straightened and staked. On the mesa we lost a large toyon, and a fine specimen of *Cupressus macnabiana* and two *Calocedrus decurrens*. Although there was much despondency on witnessing the washing out of many of our sowings of annuals, it certainly was most rewarding later to see many of the trees and shrubs — with complete disregard for flowering calendars — burst forth into bloom simultaneously. Even our annuals made a fine contribution to this magnificent display of color.

The excessively wet heavy soil in the mesa together with warm temperatures created ideal conditions for the acceleration of disease caused by *Phytophthora* sp. This disease was responsible for the death of several fine specimens of *Fremontodendron*, and at the present time three other specimens are showing signs of the disease. *Phytophthora* was also responsible for the loss of nine *Ceanothus* 'Julia Phelps'. These two genera are most susceptible to this pathogen.

From mid-June to October smog was often heavy and evidence of this can be seen in the condition of many of the conifers. Smog still takes a heavy toll of monterey pine, four young trees having succumbed to its affects. Losses have occurred among young *Pinus muricata*, and smog is believed to have been the contributing factor although the trees were in poor growing condition. *Pinus coulteri*, *P. jeffreyi* and *P. ponderosa* were damaged quite severely, slight damage was observed on *Pinus muricata* and *P. contorta*, but so far evidence of smog damage has not been detected on *P. sabiniana*, *P. torreyana* and *P. attenuata*. We are keeping a close watch on *Pinus remorata*, which thus far shows evidence of smog damage on only one tree.

Damage of a different nature appeared on *Pseudotsuga macrocarpa*, *Picea sitchensis*, *Abies grandis*, *Pinus murrayana* and to some extent on *P. contorta*. These plants had the appearance of being scorched. At one stage the plants appeared chlorotic but not in the way that characterizes smog damage, for usually the chlorosis appeared along the margin of the needles. There appeared to be no evidence of disease and it was thought to be physiological, possibly phytotoxic damage due, perhaps, to Simazine having been washed into the root system by the heavy spring rains. This is only speculation and it will require careful observation to determine the exact cause. Two of the plants affected have since died, *Picea sitchensis* and *Pinus murrayana*. A decision has been made to stop all use of chemical herbicides.

On December 27–28 the garden was subjected to high winds with such

devastating effects that over 70 trees and shrubs were totally destroyed and numerous others sustained damage. Included were many of our better conifer specimens. On the mesa we lost one fine *Pinus torreyana* while another was severely damaged. The north garden and coastal sand dunes appeared to have taken the brunt of the storm and it was in these areas that we sustained the greatest losses. Two fine specimens of *Pinus torreyana*, each 58 feet tall and with substantial girth were destroyed. Four equally large *P. radiata*, three *P. attenuata*, one *P. remorata*, one *Calocedrus decurrens* were lost. The winds blew down electric lines and shorted the transformer near the Nurseryman's cottage. When the fire department arrived sparks were flying and hoses were being played on shrubs that had caught fire. To list shrub damage would be too lengthy but in one area 12 fine specimens of *Ceanothus arboreus* were blown completely out of the ground. In the plant community area we lost three *Pinus radiata*, two *P. muricata*, five *Cupressus sargentii* and two *Pinus attenuata*. Other trees lost were three *Umbellularia californica*, three *Heteromeles arbutifolia*, two *Lyonothamnus floribundus*, one *Acer negundo* var. *californicum* and one *Fraxinus velutina* var. *coriacea*.

It is regrettable that we must continue to report acts of vandalism, most of which occurred in the first six months of the year. The redwood frames that house the valves for the irrigation system in the plant community area were destroyed and a nearby planting of *Opuntia* badly damaged. Two of our taller joshua trees, *Yucca brevifolia*, were pushed over and it was not possible to save them as the roots had been completely severed. Six redwood signs and many plastic plant labels were destroyed. The hygrothermograph in the plant community area was stolen and the small weather station that housed it was damaged beyond repair. Stakes from young plantings of *Pinus radiata* and *Cupressus forbesii* were removed and many of the young trees pushed over. The practice of naming a 'Plant of the Week' had to be discontinued because of vandalism. During the spring we had trouble with a group of students from the local high school who climbed the chain link fence and gathered under the pines to smoke. This was of daily occurrence and had to be stopped as it constituted a serious fire hazard. At one time we thought the problem had been solved only to find that the students had constructed a well concealed hideaway in another location. A number of the high school teachers were concerned because they use the garden as an outdoor laboratory. A meeting was called of representatives of the high school and botanic garden and it was decided that the high school proctor would patrol inside the garden area during certain hours. This arrangement has worked amazingly well and there have been no further incidents. We hope that the practice of faculty patrol will become a permanent procedure.

The amount of time spent on insect and disease control increases each year. In addition to spraying for the many kinds of insects reported in other years we had to contend with several new ones during 1969. The cypress twig borer, *Phlaeosinus cristatus*, severely attacked *Cupressus macnabiana*, *forbesii*, *bakeri*, and *macrocarpa*, also *Chamaecyparis lawsoniana* and *Calocedrus decurrens*. Damage could have been substantially reduced if we had known earlier the life cycle of the insect. The insect had been observed in

the garden in other years but damage was negligible. For control, 80% wettable Sevin has been recommended.

Several fine specimen maples, *Acer macrophyllum*, on the mesa showed symptoms of wilt caused by *Verticillium albo-atrum*. Maples and elms are known to be susceptible to this pathogen and infected trees suddenly wilt during the hottest part of the day. One of the trees showed severe wilt on the west side while leaves on the east side of the trees remained green and turgid. Leaves on infected branches turn bright yellow before complete defoliation occurs. Some measure of control is possible by avoiding excessive irrigation and by using sterilized cutting tools. As reported in the past, oak root fungus continues to take its annual toll of susceptible trees and shrubs.

Prunus fasciculata, *P. fremontii* and *P. andersonii* were badly infected with black knot, *Dibotryon morbosum*. Control is obtained by cutting out infected branches and spraying with Parzate at the rate of two pounds of fungicide to two hundred gallons of water with a sticker added. Bordeaux mixture is equally effective and will be used in the future. Although the trees had been sprayed, the sycamores were again badly affected by leaf blight, *Gloesporium apocrytum*, which caused three defoliations. The timing of the spraying is critical and apparently the trees were not sprayed at the proper time to control this very common disease. It was decided that we would discontinue spraying for this disease on a contract basis and instead do it ourselves.

Treatment for *Botryosphaeria ribes* on the sequoiadendrons as reported last year continues. It is still too early to determine how effective this has been, but it would seem that if we wish to continue growing these trees the treatment may have to become a permanent procedure. At the present the trees on the mesa are in a much healthier condition than those in the plant community area. This can be attributed to better soil conditions on the mesa and to the additional care the trees receive including both foliar and root feeding as well as better irrigation. We can assume that plant nutrition is an important factor in the control of *Botryosphaeria*.

It appears that after long intervals of heavy smog some of the low growing manzanitas become chlorotic. It has been thought that the chlorosis was due to iron deficiency, but it may be a symptom of nitrogen deficiency. A foliar application of 20-20-20 fertilizer has been made to many of our plantings of manzanitas with apparently beneficial results. The feeding should be made during the growing period, and early spring and late fall appear to be the best times for either foliar or root feeding.

The live oaks, *Quercus agrifolia*, usually show numerous witches'-brooms caused by a powdery mildew. For some unexplained reason the disease was entirely absent from the trees during the past year. This is surprising since the fungus becomes deeply imbedded within the host tissue and spraying has little effect in eliminating the parasite from the host.

The digger pines, *Pinus sabiniana*, which we reported last year as severely affected by needle blight have fully recovered and at present they are looking remarkably healthy. In the early spring the trees were sprayed with Par-

zate C plus sticker, three sprayings were made at ten-day intervals and this was followed by foliar feedings of a 20-20-20 fertilizer applied as the new candles appeared.

Following governmental recommendations, the use of DDT has been stopped as well as most of the other so-called hard pesticides. During the year over 9,200 plants were planted in the garden. A notable first blooming was that of the joshua trees. Of the nine trees that bloomed, five were from seed sown in 1956 and four from seed sown in 1950. The blooming plants ranged in height from four to six feet.

During the year the roof of our large water reservoir, which had partially collapsed, was repaired by our own men who installed new steel supporting pipes. The reservoir was also thoroughly cleaned for the first time in several years.

Other maintenance jobs completed during the year were the installation of a new misting system in the cutting room and the installation of new polypropine shading fabric on the west side of the greenhouse. Both jobs were done by the Southern California Greenhouse Company, Rosemead. The large illuminated botanic garden sign at Foothill Boulevard and College Avenue was sandblasted and repainted and the surrounding plantings pruned.

After nearly 12 years of usage, the Ford station wagon was replaced with a new six-cylinder Ford Club Wagon which has proven to be an excellent vehicle for field work. A used Cushman was also purchased and added to our existing fleet of two.

FIELD WORK:

Dr. Benjamin's field work during the year consisted mostly of short forays in southern California in his continuing search for insects bearing Laboulbeniales and substrata for the isolation of microfungi, mostly Mucorales.

Dr. Carlquist spent a portion of the month of June in Puerto Rico lecturing and making field studies. Later in the season he collected in the Olympic Peninsula portion of Washington and in December he joined Dr. James S. Henrickson in a field trip to Mexico for the purpose of collecting cytological materials of Fouquieriaceae. Messrs. Dourley and Tilforth made several trips into the San Gabriel, San Bernardino and Riverside areas collecting seed. On some of these trips they were accompanied by Dr. Thorne.

Dr. Lenz continued to concentrate his field work to the western slopes of the Sierra Nevada and later in the season to areas of the San Gabriel Mountains in his continuing study of members of the brodiaea alliance. The exact areas selected are determined in part by the pattern of winter precipitation.

In April Dr. Munz made a trip to Panamint Valley especially to collect in the sand dune area at the north end of the valley. In late summer he spent three weeks in the Payette Mountains of western Idaho where he botanized with Christopher Davidson, one of our graduate students. These two trips yielded some 500 herbarium sheets.

Dr. Simon made several trips to areas in Los Angeles, San Bernardino and

Riverside counties to collect seeds of *Elymus* and other grasses for his enzyme survey of natural populations. In June he accompanied Dr. Thorne and Sr. Carlos Muñoz P., leading Chilean taxonomist, in a collecting trip to the Sequoia National Park. He also carried on a limited amount of field work in Chile during July.

Dr. Thorne continued to concentrate his collecting on localities in southern California, especially in the San Gabriel and San Jacinto Mountains and the Santa Rosa Plateau of the Santa Ana Mountains. However, because of the favorable precipitation of the preceding winter, he did extensive collecting also in the Sierra Nevada, Owens Valley, White, Warner, and Salmon Mountains, and on Mount Shasta. For a week after the International Botanical Congress, with Dick Tilforth, he collected in northeastern and eastern California, with emphasis given to the Modoc Lava Plateau, the high lakes of Sierra County, and the areas near Tahoe, Mono, and Crowley Lakes.

SCIENTIFIC COLLECTIONS:

During the year nearly 10,000 herbarium sheets were inserted in the vascular plant collections by the curator and Dr. Munz. Thousands of new genus or species covers were prepared and filed in the herbarium and at the same time, mounted duplicates were removed for use in our exchanges. From the combined herbaria 2,488 sheets were sent on loan to 13 institutions in 15 shipments; 1,252 sheets in 15 loans were returned to us from 12 institutions; and 41 sheets were borrowed by us from three herbaria. During 1969 the graduate assistants mounted 8,260 sheets of vascular plants, bringing the total botanical garden collection to almost 205,000 and the combined herbaria to perhaps 520,000 sheets of vascular plants. Received on an exchange basis were 7,637 specimens from 27 institutions. The botanical garden sent out on exchange only 736 specimens to seven herbaria, for our very large exchange of 1968 had largely stripped us of duplicates. Another large distribution of duplicates is planned for 1970. At present the garden owes 13,059 sheets to 34 herbaria, and is owed 9,429 sheets by 45 herbaria. More than 1,745 specimens of vascular plants were received as gifts, some for determination, from 18 individuals or institutions.

Of the 8,260 sheets processed, about 2,300 were from California, nearly 900 from the rest of North America, more than 3,300 from Australia, Hawaii, and other Pacific Islands, 1,300 from Latin America and the West Indies, and 450 from Eurasia and Africa, many of these last being cultivated plants or vouchers for chromosome counts. The acquisition of the processed sheets included nearly 4,717 from exchanges; 3,038 by gifts; and more than 500 through recent staff collections.

Dr. Munz spent much time on large herbarium collections made by Dr. Janice Beatty at the Atomic Site in Nevada, Mrs. DeDecker in Inyo County, Gilbert Muth in the Marble Mountains, Siskiyou County, L. B. Zeigler in the San Jacinto Mountains and smaller collections made by other collectors. These have yielded about 1,000 sheets for our own herbarium.

Some 50 isolates of fungi were added to the culture collection. Among several important additions was the type culture of *Piptocephalis curvata* received from Dr. B. S. Mehrotra, Allhabad, India. About 350 slide-mounts

representing 154 accessions to the Laboulbeniales collection were prepared by Dr. Benjamin during the year. Routine maintenance of the culture collection required about 1,300 transfers of isolates to fresh media.

Twenty-one fungus cultures were distributed to five institutions for research purposes during the year.

LIBRARY:

The library continues both in its growth and its organizational improvement.

The number of serials currently received is 464, including three from new exchange agreements, one as a gift, and one from a new subscription. Three subscriptions have been discontinued. Although this figure remains virtually unchanged from last year, the actual number of individual issues received increased considerably to 1,834. Only 172 bound periodicals were added this year as compared with 274 in 1968. This decrease was partially caused by a reduction in Claremont Graduate School funding (only 29 volumes). Among the volumes deposited were eight specially purchased and bound volumes of *Phytochemistry*, a major addition to the serial collection.

New books added to the collection increased, and there was a total of 229 including 64 deposited items. The deposited titles included a second major addition to the collection consisting of ten bound volumes of the *Gray Herbarium Index*. Only 172 reprints were filed this year. Gifts included 117 back issues of the *Arnold Arboretum Bulletin of Popular Information*.

Distributions 255-256 of the *Gray Herbarium Card Index of American Plants* and 28-29 of *Index Nominum Genericorum* were received late in the year and filing was begun.

The microform collection now numbers 295 boxes including both microfilm and microfiche. Major microform holdings are Candolle's *Prodromi Herbarium* (83 boxes containing 17 volumes), *Linnean Herbarium* (20 boxes), *Flora Oder Allegemeine Botanische Zeitung* (29 boxes with 95 volumes), *Linnaea* (14 boxes with 43 volumes), and *Planta* (9 boxes with 24 volumes).

The project to provide complete and bibliographically more accurate records of serial holdings is finished. A total of 114 previously acquired periodicals was cataloged for better user retrieval. The project to verify serial sources and to claim lacunae or late issues has progressed, but is seriously hampered by lack of up-to-date subscription and exchange records within the library. Another problem area pointed out by this project is that many of the exchange institutions apparently are not honoring their exchange agreements, thereby slowing down our periodical binding program.

Eighty-four new books were cataloged; 36 previously cataloged books were re-classified; and 182 previously cataloged books were assigned subject headings in the continuing effort to make the subject catalog more accurately reflect the collection. Improper assignment of the author portion of a book's call number continues to plague us.

There were so many additions to the duplicate periodicals listing that it

has been completely revised. A major effort to sell these duplicates will be made in 1970.

The book inventory was completed and 86 books were listed as missing. Of these, 22 have been located. A large percentage of relocated books were either misfiled or the call number was incorrectly copied. During this project, it was discovered that many of the older books had not been added to the shelf list. It appears at this time that most of these are older deposit items. Shelf list completion, therefore, will be another major project for 1970, as will be the inventory of periodicals, rare books, reference books, folio-size books and microforms.

Capital equipment expenditures included a periodicals display rack, a kick stool, and book ends.

RESEARCH ACTIVITIES:

During the early months of 1969, Dr. Benjamin completed his *Introduction and Supplement* to Thaxter's monograph of the Laboulbeniales. This work, which will be published by J. Cramer, Lehre, Germany, includes a comprehensive key to the more than 100 genera of these fungi, a guide to collection and preparation of specimens, and a list of over 2,000 emendations and corrections. Dr. Benjamin also completed studies and drawings for a shorter paper on Laboulbeniales, a second contribution to knowledge of these fungi parasitizing semiaquatic Hemiptera.

Lyman Benson's research during the year has concentrated again upon the Cactaceae. The Third Edition of *The Cacti of Arizona* was published by The University of Arizona Press on October 22, 1969. A new book, *The Native Cacti of California*, was published by the Stanford University Press on October 30, 1969. The treatment of the Cactaceae of C. L. Lundell's *Flora of Texas* consisting of about 100 pages, is expected to appear in February 1970. The manuscript for *The Cacti of the United States and Canada* will go to the publisher, The Ronald Press Company, about March 1970. *Evolution in Action*, D. C. Heath and Company, is with the publisher awaiting printing.

Dr. Carlquist's research activities of 1969 focused on wood anatomy, with particular emphasis on families or genera of dicotyledons which have probably evolved greater woodiness on insular and island-like areas. He produced manuscripts on wood anatomy of the subfamily Lobelioideae (Campanulaceae), Goodeniaceae, *Echium* (Boraginaceae), Macaronesian and Hawaiian species of *Euphorbia*, and *Plantago*. Projects being initiated by Dr. Carlquist include studies on leaf anatomy of Rapateaceae, comparative anatomy of *Robinsonia* (Asteraceae), wood anatomy of Macaronesian species of *Sonchus*, and wood anatomy of Macaronesian species of Brassicaceae. Dr. Carlquist is now planning a book tentatively entitled *Evolutionary Plant Anatomy*, to deal with phyletic of anatomical characteristics and problems in their interpretation.

Dr. Lenz continued his research on members of the brodiaea alliance with special emphasis being placed on the members of the section *Calliprora* of the genus *Triteleia*. Two short manuscripts were prepared describing new taxa. An investigation was made of the chromosomes of the Mexican *Allium*

erotophilum, the only species in the genus known to have recurrent flowering, and a report was prepared for publication in *Plant Life*.

Dr. Munz continued to make steady progress on the proposed *Southern California Botany* which he hopes can be finished in about a year. He also spent considerable time working on the Onagraceae collection made by Baron Sparre in Ecuador. This is in connection with a proposed *Flora of Ecuador* which is being prepared by some Swedish botanists.

Dr. Simon is continuing his survey for isozyme polymorphism in several natural populations of *Sitanion hystrix*. Experiments are in progress to ascertain the genetic basis of isozyme variability among and between the populations sampled. Dr. Simon also initiated a comparative serology study of the aquatic Order Nymphaeales. He is presently investigating the relationships of *Nelumbo* and a preliminary account of this research is in preparation. A long-term experimental systematic study aimed at investigating the relationships of species or species-pairs having a disjunct pattern of distribution, primarily in California and Chile, has been initiated. At present, the serological relationships of *Prosopis juliflora* (sensu lato) and *P. chilensis* are being investigated.

Dr. Thorne has continued his studies of the flora of the California islands and the Santa Rosa Plateau of the Santa Ana Mountains, with two papers published on these areas in the past year's number of *Aliso*. Field work in the San Gabriel Mountains has been extensive, and the study of California plant communities has been continued with investigation and photography particularly of those in higher elevations in the northern and eastern parts of the state. He has continued work on his new system of classification of the Angiospermae. He has also continued work on the identification and labelling of the thousands of his collections from the Australasian area, and has published a paper on the relationships of the flora of New Caledonia with that of the Solomon Islands.

GRADUATE INSTRUCTION:

The graduate program presented jointly by the Claremont Graduate School, Pomona College and the botanic garden was continued as in the past. Due in part to the draft, fewer graduate students have been working for their degrees than in recent years. During 1969 only two advanced degrees were awarded. Mr. Larry Kistler received the M.A. degree in February in absentia as he was at that time enrolled in a graduate program at Harvard University. Mr. Kistler's thesis was an ethnobotanical study of baskets made by the Pima, Pagago and Chemehuevi Indians of southwestern United States. The work was carried out under the direction of Drs. Carlquist and Lenz. In June, Mr. John A. Adams was awarded the M.A. degree. His thesis was on the leaf and spine anatomy of *Tetradymia* and was carried on under Dr. Carlquist's direction.

Students presently working toward advanced degrees include Miss Ruth Wilson and Messrs. Homer Metcalf, Theodore Mortenson, Christopher Davidson, Gerald Benny and Fred Oettinger. Students enrolling for the first time include Mr. Gary Cromwell formerly at the University of California, Davis, and Mr. Arthur Gibson, a graduate of Miami University,

Yellow Springs, Ohio. At the present time all full time students hold re-search traineeships.

The National Science Foundation grant made to the Claremont Graduate School and matched by equal funds from the Rancho Santa Ana Botanic Garden will provide for two new laboratories to be built at the botanic garden. One laboratory will be used by Dr. Carlquist and his students and the other one will be devoted to biochemical systematics and will be occupied by Dr. Simon and his students. Space in the present building will be reallocated providing Dr. Benjamin and his students with a mycological laboratory and Drs. Simon and Lenz and their students with a cyto-genetic and cyto-taxonomic laboratory. The additional laboratory space will make it possible to expand the graduate program in botany and more students can be admitted to the program than in the past when space was a limiting factor.

YOUTH EDUCATION:

During 1969, a volunteer guide program was inaugurated with Mesdames Mary Andrews, William Case, Bryon Crader, William Hendricks, Richard Johnson, William Russell, George Shipway, George Vennedge, Harold Weber and Mr. Bancroft Benner participating. During April, May and June, these volunteer guides joined Mrs. Coffeen in providing interpretive service to approximately 2,300 elementary school children. During the winter months the volunteers spent many hours at the garden attending the guide training class and in auditing tours. We are most fortunate in that most of the volunteers have agreed to participate in the program during 1970. Without their valuable assistance the youth education program would not have been as successful as it was during the past year.

Supervised use of the garden by junior and senior high school students more than doubled during the year. Organized youth groups coming after school continued at approximately the same level as in the previous year. The afternoon junior ecology group, co-sponsored by the garden and the local Audubon Society continued under the volunteer leadership of Mrs. Charles Vogel and Mrs. Jack Housely. During the fall, a junior high school ecology study group was organized with Mr. Dave Powelson, a Pomona College student, and Mrs. Neal Cornell as leaders.

During the year, 5,721 young people were involved in the youth education program. This figure is slightly lower than for the previous year and is due in part to the heavy spring rains and public school budget cuts. During 1969, the student to guide ratio was improved with an average of 16 students per guide compared with 32 per guide for the previous year.

During the fall, a new adult group was formed which came to be known as the Friday Foragers. This informal nature study group under Mrs. Coffeen's supervision met at the garden on three Fridays each month and in the field on one Friday where they applied their garden experience to natural situations. One field trip included an examination of the Santa Ana River where they observed post-flood plant succession. The activities of this group had two important side benefits in that it helped the volunteer guides to keep in touch with one another and it was an opportunity to recruit in-

terested people for the new training course. Mrs. Richard Johnson, a volunteer guide and a regular member of the Friday Forager group, is this year assisting Mrs. Coffeen in teaching the guide class.

PUBLIC SERVICE:

The public service aspects of the garden's operation continue to increase each year and at times place a specially heavy load on the staff, this in addition to their regular duties. The Director, Superintendent and Horticulturist share the responsibility of answering questions of a horticultural nature either by telephone, by people calling at the office or through correspondence, the latter has become quite heavy at times. In addition to gardeners, students and nurserymen, we are regularly consulted by landscape architects or land developers interested in the ecology of certain areas or wanting advice on suitable plants for specific purposes such as erosion control, right-of-way plantings, etc. Drs. Munz and Thorne spend many hours identifying plants either brought in or sent in for determination. Occasionally new records for the state are obtained in this way, especially new weed records. Lectures presented by staff members included one by Dr. Simon given at the annual meeting of the Southern California Academy of Sciences on the comparative serology of the *Rhagoletis pomonella* species complex. He also presented seminars on protein taxonomy at Pomona College and the Genetic Society, Universidad de Chile. Dr. Munz lectured at the University of California, Irvine in November on the flora of southern California. In addition to addressing botanic garden groups, Dr. Lenz presented a seminar at Pomona College on opportunities in ethnobotany. Dr. Benjamin also took part in the Pomona College seminar where he spoke on the Laboulbeniales.

Dr. Benjamin has been reappointed to a three-year term on the Board of Editors, *Mycologia Memoirs* of the Mycological Society of America. He is in his third year as the Department of Botany's representative on the Graduate Council of the Claremont Graduate School. Dr. Thorne is now Secretary-Treasurer of The Claremont Colleges Sigma Xi Club, and he continues to serve as a member of the Council of Southern California Botanists and as Chairman of the Advisory Council and ex officio member of the Steering Committee for the *Flora North America* Project. In October, Mr. Dourley presented an illustrated lecture on California natives at the Pomona Chamber of Commerce Four Seasons Awards luncheon.

Dr. Lenz continued to serve as Chairman of the Department of Botany of the Claremont Graduate School and as a member of the Field Committee for the Life Sciences and the Claremont Graduate School's Academic Programs Committee.

As in the past, staff members serve as reviewers of National Science Foundation proposals and in reviewing manuscripts submitted for publication in various scientific journals.

Mrs. Coffeen accompanied by Mrs. Gertrude Woods, Coordinator of youth education at the Los Angeles State and County Arboretum, attended the outdoor education conference at San Mateo in April. In June, she participated in the California Department of Fish and Wildlife census of the

desert bighorn sheep population. Later in the summer she attended a biology workshop at Mendocino and served as the staff naturalist on a two week Sierra Club knapsack trip.

The Sierra Club trip gave her an opportunity to make seed collections for the botanic garden at high altitudes on the western slope of the Sierra Nevada. Mrs. Coffeen continues to serve on the board of directors of the Pomona Valley Audubon Society.

PUBLICATIONS:

The first number of Volume 7 of *Aliso* was edited by Dr. Benjamin. This issue was published on April 18 and consisted of 144 pages constituting six scientific papers and the Director's Report. Except for a short paper on a long-term test of seed longevity by Dr. F. W. Went, Desert Research Institute, Reno, Nevada, and a paper on the Fouquieriaceae by Dr. James Henrickson, a former student at the botanic garden, these contributions were by staff members as listed below.

PUBLISHED WRITINGS OF THE BOTANIC GARDEN STAFF:

- Benson, L. B. 1969. The Cacti of Arizona. University Arizona Press. 218 pp.
- 1969. The Native Cacti of California. Stanford University Press. 243 pp.
- Carlquist, S. 1969. Rapateaceae. In C. R. Tomlinson, Anatomy of the Monocotyledons. III. 130-145.
- 1969. Hawaii's Exotic Wildlife. World Book Year Book. 128-145.
- 1969. Morphology and Anatomy. In Joseph Ewan, ed., A Short History of Botany in the United States. 49-57. Hafner Publishing Co., New York.
- 1969. Studies in Styliaceae: New taxa, field observations, evolutionary tendencies. *Aliso* 7(1): 13-64.
- 1969. Biology of the California Islands. (Book review) *Evolution* 23: 724.
- Lenz, L. W. 1969. The Director's Report. *Aliso* 7: 127-144.
- 1969. The Rancho Santa Ana Botanic Garden. *Horticulture* 47: 32-33.
- 1969. The chromosomes of *Allium erotophilum*. *Plant Life* (in press).
- Munz, P. A. 1969. California Miscellany VII. *Aliso* 7: 65-71.
- Simon, J. P. 1969. Esterase isozymes in the *Rhagoletis pomonella* species complex (Diptera, Tephritidae). *The Isozyme Bulletin* 2: 27-28 (Abstract, Isozyme Conference, Galveston, Texas).
- 1969. Esterases in *Culex pipiens fatigans* (Diptera, Culicidae). *The Isozyme Bulletin* 2: 28.
- 1969. Comparative serology of a complex species group of food-plant specialists: The *Rhagoletis pomonella* complex (Diptera, Tephritidae). *Systematic Zoology* 18: 169-184.
- 1969. Serological studies in *Medicago*, *Melilotus*, *Trigonella* and certain other genera of the Leguminosae I. Quantitative precipitin tests and immunodiffusion techniques. *Bot. Gaz.* 130: 127-141.
- 1969. Serological studies in *Medicago* (Leguminosae) and related genera XI International Botanical Congress, Seattle, Washington p. 200 (Abstract).
- 1969. Esterase isozymes in the mosquito (*Culex pipiens fatigans*): Development and genetic variation. *Ann. Ent. Soc. Amer.* 62: 1307-1311.
- Thorne, R. F. 1969. A supplement to the floras of Santa Catalina and San Clemente islands, Los Angeles County, California. *Aliso* 7(1): 73-83.

- , 1969. (with E. W. Lathrop). A vernal marsh on the Santa Rosa Plateau of Riverside County, California. *Aliso* 7(1): 85-95.
- , 1969. Floristic relationships between New Caledonia and the Solomon Islands. 595-602 in E. J. H. Corner (ed.), A discussion on the results of the Royal Society Expedition to the British Solomon Islands Protectorate, 1965. *Phil. Trans. Roy. Soc. B* 255.
- , 1969. Some problems and guiding principles of Angiosperm Phylogeny. 415-433. Reprinted in P. R. Ehrlich, R. W. Holm, & P. H. Raven (eds.) *Papers on Evolution*. Little, Brown. 564.

GIFTS AND GRANTS:

- Baker, Dr. Herbert, University of California, Berkeley, 2 herbarium specimens.
- Balazuc, Dr. J., Eaubonne, France, collections of insects bearing Laboulbeniales, mostly from France.
- Balls, Mr. E. K., Carmel Highlands, 130 seed collections and 90 herbarium specimens.
- Beal, E. O., Western Kentucky University, Bowling Green, Kentucky, seed of *Nelumbo lutea*.
- Beatley, Dr. Janice, Nevada Test Site Herbarium, 600 herbarium specimens.
- Bell, Dr. C. R., North Carolina State University, Chapel Hill, North Carolina, seed of *Asimina triloba*.
- Boutin, F., Huntington Gardens, San Marino, seed of species of Magnoliaceae.
- Carlquist, Dr. Sherwin, Claremont Graduate School, ca. 1,000 herbarium specimens.
- Chien, Dr. Chiu-yuan, University of Georgia, Athens, 2 fungus cultures.
- Clarkson, R. B., West Virginia University, Morgantown, seed of Nymphaeales and *Alisma*.
- Cook, C. D. K., Director, Botanic Garden, University of Zürich, Switzerland, seed of *Euryale ferox*.
- Davidson, Christopher, Claremont, 2 herbarium specimens.
- Ernst, Dr. W. R., Smithsonian Institution, Washington, D.C., 1 herbarium specimen.
- Everett, Percy, Claremont, *Vaccinium ovatum* seed (prostrate form).
- Fuller, Richard, Pomona, 5 clumps of *Fritillaria biflora*.
- Fuller, Dr. T. C., California Department of Agriculture, Sacramento, 24 herbarium specimens.
- Gibson, A. C., Claremont, 117 issues of Arnold Arboretum Bulletin of Popular Information.
- Godfrey, R. K., The Florida State University, Tallahassee, seed of *Nelumbo* and *Nuphar*.
- Graves, Dr. R. C., Bowling Green State University, Bowling Green, Ohio, 9 collections of insects bearing Laboulbeniales.
- Hall, Brower, Fort Lauderdale, Florida, cash donation.
- Henrickson, Dr. James, California State College, Los Angeles, 210 herbarium specimens.
- Higgins, Mr. Larry, Brigham Young University, Provo, Utah, 21 herbarium specimens.
- Hudson, Charles F., Department of Forests and Conservation, Los Angeles, seed of *Calocedrus decurrens*.
- Komarek, E. V., Tall Timbers Research Station, Tallahassee, Florida, seed of *Nelumbo*.
- Lathrop, Dr. Earl, Loma Linda University, Loma Linda, 89 herbarium specimens.
- Leech, H. B., California Academy of Sciences, San Francisco, collections of insects bearing Laboulbeniales.
- Lenz, L. W., Claremont, Geologic Map of the United States, by A. K. Lobeck, 1941.
- Longwood Gardens, Kennett Square, Pennsylvania, 2 plants *Sequoiadendron giganteum* from seed collected from General Grant tree.
- Los Angeles State and County Arboretum, Arcadia, seed of Lauraceae.
- Los Angeles State and County Arboretum, Arcadia, 100 herbarium specimens.
- Martins, Otto, Deigaard Nurseries, 12 *Washingtonia filifera*.
- Mathias, Dr. Mildred, University of California, Los Angeles, seed of *Drimys winteri* and 3 herbarium specimens.
- Mehrotra, Dr. B. S., Allahabad University, India, 1 fungus culture.
- Missouri Botanic Garden, St. Louis, Missouri, seed of species of *Nuphar*, *Nymphaea*, *Victoria*, *Euryale*.

- Mortenson, Theodore, Claremont, 3 seedling plants of *Cercocarpus*.
 Muhmood, Sultan, University of Lyallpur, West Pakistan, 3 fungus cultures.
 Munz, Dr. Philip, Claremont, plants of *Echinocactus polycephalus*.
 Nutt, P. A., Longwood Botanic Garden, Kennett Square, Pennsylvania, seed of *Nelumbo*,
Victoria, *Nymphaea*, *Nuphar*.
 Oettinger, Fred, Claremont, 14 *Lewisia* plants.
 Oregon State University, Corvallis, 243 herbarium specimens.
 Parham, John, Department of Agriculture, Fiji, 61 herbarium specimens and seeds of
Degeneria vitiensis.
 Richmond, Stanley, Monterey Park, 1 plant *Calystegia macrostegia*.
 Rochfort, Martin, Claremont, 269 herbarium specimens.
 Rzedowski, J., Mexico City, Mexico, seed of *Prosopis* spp.
 Sanderson, Dr. M. W., Illinois Natural History Survey, Urbana, 2 large accumulations
 of insects preserved in alcohol from which many specimens bearing Laboulbeniales
 were removed.
 Slattery, John, Coos Bays, Oregon, 2 iris plants.
 Solbrig, Dr. Otto, Harvard University, seed of *Prosopis juliflora*.
 Stephens, Trow, 2 *Opuntia* plants.
 Stone, Dr. D. E., Duke University, Durham, North Carolina, seed of *Schisandra* and
Kadsura.
 Straw, Dr. Richard, California State College, Los Angeles, 4 herbarium specimens.
 Strybing Arboretum, San Francisco, seed of 4 *Magnolia* spp.
 Tavares, Dr. Isabelle, University of California, Berkeley, 44 fungus specimens.
 Templeton, Dr. Bonnie C., Curator, Los Angeles County Museum, cash donation and
 seed of *Pinus jeffreyii*.
 Thieret, Dr. J. W., University of South Western Louisiana, Lafayette, seed of *Nelumbo*.
 Thomas, Dr. Dale R., Northeast Louisiana State University, Monroe, seed of several
 species of the Order Nymphaeales.
 Thorne, Dr. Robert F., Claremont, 1,412 herbarium specimens.
 Tilden Park, Berkeley, seed of *Abies bracteata*.
 Treas, Mrs. Benjamin, Claremont, cash donation.
 Triem, Peter, Ventura County, seed of *Calochortus catalinae*, *C. clavatus*, *C. weedii*.
 Wager, R. E., Panama City, Florida, seeds of *Brasenia*.
 Wallace, Gary, Claremont, 3 plants.
 White, Lawrence, Palo Alto, 5 plants *Dirca occidentalis*.
 Wiens, Dr. Delbert, University of Utah, Salt Lake City, 27 herbarium specimens.
 Women's Club of Claremont, cash donation.

LEE W. LENZ

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*Resigned December, 1969

**Resigned January, 1970

RANCHO SANTA ANA BOTANIC GARDEN

Dedication of Garden Foundation to the Board of Trustees for the Rancho Santa Ana Botanic Garden of the Native Plants of California:

"The Nature, Object and Purpose of the Institution hereby Founded and to be Maintained 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 and education with reference to plant life indigenous to the State of California.

"Its Purpose: (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 this 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 thereof."