

Fifth World Orchid Conference (“Souvenir Program”)

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PDF edition prepared by John W. McCoy (RealMac@aol.com), South Coast Orchid Society, Inc., Long Beach, CA.

Although this booklet describes itself as a “souvenir program” on page 7, in fact it contains very little information about the **Fifth World Orchid Conference, held at Long Beach, California, April 13-22, 1966**, and nothing at all about the program. The dates of the conference appear once, on the inside of the back cover, and the body of the volume includes an organizational table, a list of donors, a notice about the “designer” of the conference (Victor H. Pinkney Jr.), and a few advertisements from “official” vendors, such as American Express Travel, etc. The booklet might have been intended for inclusion in the pre-conference information packet mailed to registrants. The “organization chart” on [page 5] lists Mr. Melville M. Strann in charge of “Advertising & Souvenir Program”. The limited information about the conference is similar to that included in a three-fold registration mailer dated in July, 1965, of which two copies are preserved in the Arboretum collections.

One remarkable feature of the booklet is that it contains some very significant articles by well-known experts that seem not to have been published elsewhere. Foremost in this category is the article on Modern *Phalaenopsis* by Robert Ernst [pp. 47-54], whose contributions to orchid biology and in vitro culture are well known. Less well known is the fact that he served as an Orchid Digest Corporation judge, notably at the South Coast Orchid Society judging site in Long Beach. He clearly knew his *Phalaenopsis*, including chromosome numbers and their significance in the development of superior hybrids, pedigrees of important hybrids, and recent awards.

Another feature of note is the inclusion of a great number of advertisements from orchid nurseries and related specialties, some of national or international importance, but many from Southern California that have long since disappeared. Of these, we recognize some from the early newsletters of South Coast Orchid Society – such as Clark Day Jr., the Frickers, Arthur Freed Orchids, etc. But there are some we had never heard of before.

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[Front cover – outside]



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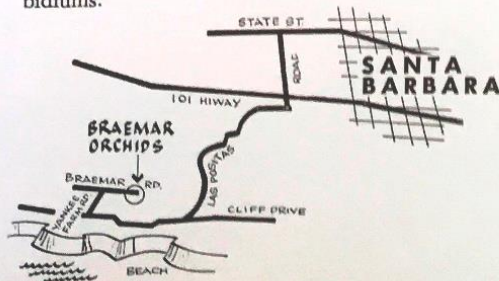
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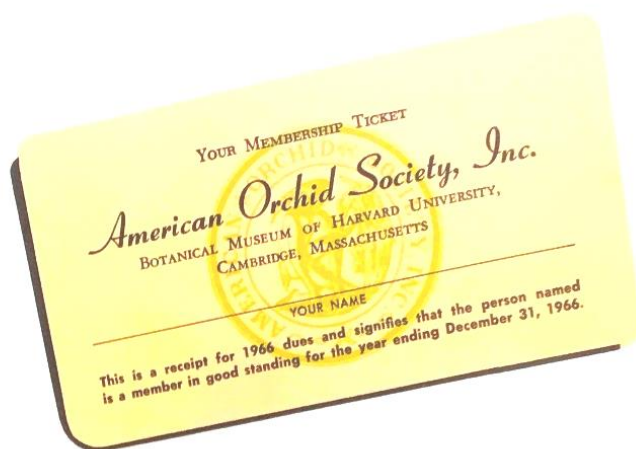
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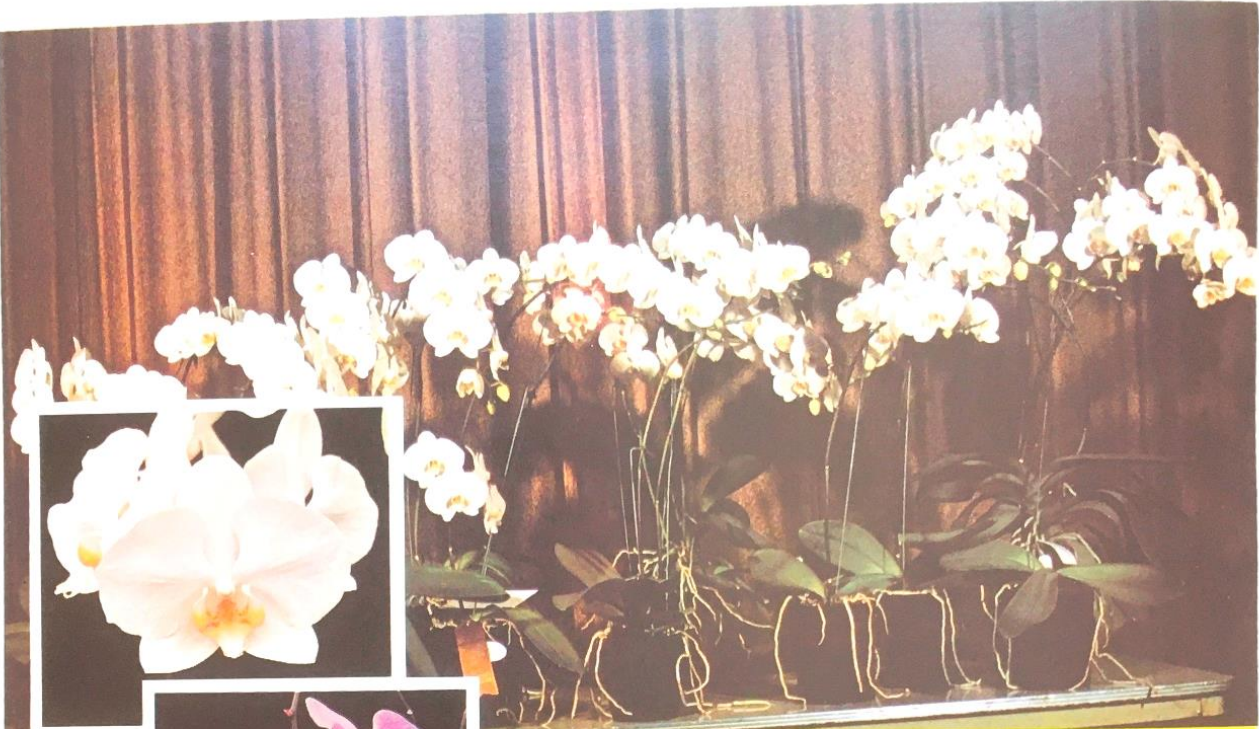
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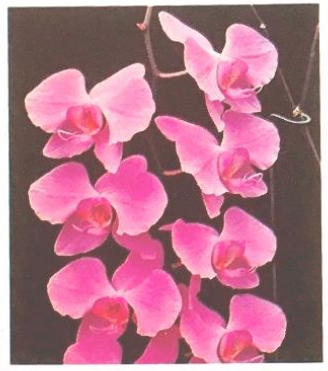
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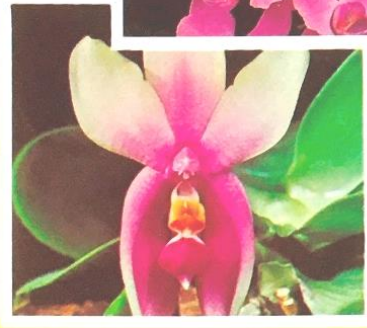
BULLETIN



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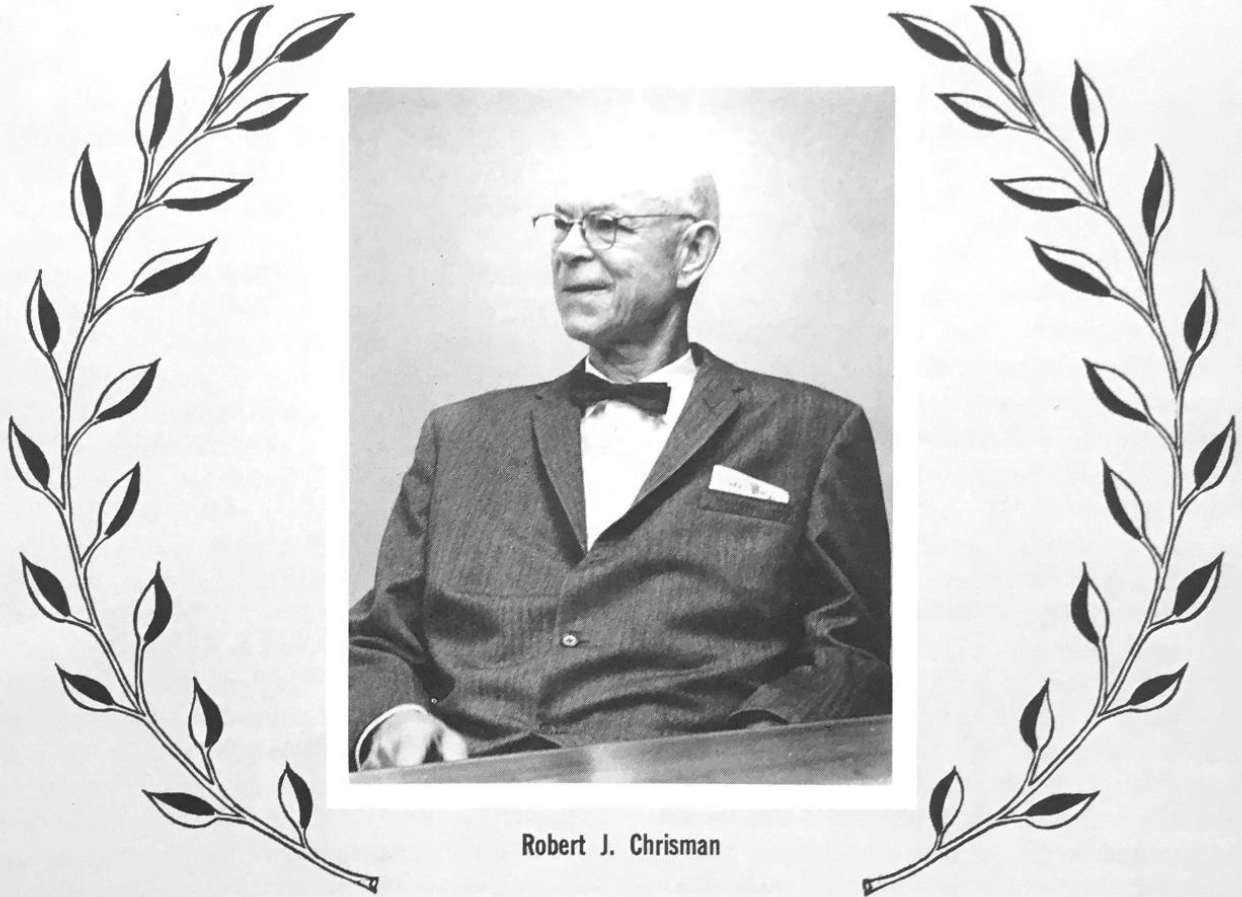
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IN MEMORIAM



Robert J. Chrisman

This Fifth World Orchid Conference Souvenir Program is appropriately dedicated to **Mr. Robert J. Chrisman**, who died June 23, 1965. Mr. Chrisman was an A. O. S. Trustee and owner of Santa Barbara Orchid Estate. He was instrumental in bringing the Fifth World Orchid Conference to Southern California and was a member of the Conference Steering Committee. Mr. Chrisman exemplified the uncommon man; as an outstanding athlete in his youth, as a citizen soldier in World War I, and later as a distinguished business man. He epitomized the highest attributes of ethics, integrity, and leadership in all phases of his life. The Orchid World has truly lost a friend and associate with his passing.

WHAT IS A *World Orchid Conference?*



GORDON W. DILLON

As you wander around the Long Beach Arena, enjoying the magnificent spectacle of the Fifth World Orchid Conference Show, you will be impressed by the beauty of the orchid flowers, amazed at their variety of colors and shapes, and filled with admiration for the superb horticultural achievements of the exhibitors who come from many different lands. Like bubbles in champagne, many questions about orchids will form in your mind, sparkling your pleasure with excitement and wonder. One of these questions inevitably will be, "What *is* a World Orchid Conference?" To answer this, we must provide you with a little understanding of the "orchid world" itself.

First of all, orchids are members of the Orchidaceae, the largest family of plants in the Vegetable Kingdom. They are found in Nature in almost every part of the world, reaching their greatest development in the tropical regions of both hemispheres. They are among the most highly evolved plants and, for this reason, have attracted the attention of botanists for several centuries. Their beauty and their fascinating structure have also brought them into prominence in horticulture for nearly two centuries; in fact, in areas where they occur naturally, they have been cultivated for many hundreds of years. There are literally thousands of different kinds of orchids; estimates of the number of orchid species occurring in Nature range from 20,000 to 30,000, with many varieties and natural hybrids, as well. In turn, more than a century of hybridization by man has produced another 30,000 or more artificial hybrids. Thus orchids have become an important concern to botanical scientists, florists, commercial growers, hobbyists, artists, collectors and students throughout the world, with development of such interest particularly evident in the last few decades.

Although orchids have many features in common with other plants, there are enough aspects about them to set them apart as a world of their own. Of course, the number of people interested in orchids is not large in comparison with the population of the

world, but orchidists span the globe in a gossamer network of mutual interests. Hobbyists in Southern California, for instance, may be growing orchids originally imported from Brazil, India, Thailand, the Philippines, Japan, Australia and Venezuela, all in one small greenhouse. Other growers in Singapore, South Africa, England or Florida may be enjoying hybrid orchids that first saw the light of day in Santa Barbara, California. A botanist in Cambridge, Massachusetts, may be studying the orchids of Peru; a cytogeneticist in Honolulu may be working on problems dealing with orchids from Colombia, Indonesia, or Burma. In San Francisco, a florist may be selling orchid blooms shipped by air from Australia and Hawaii, as well as those grown right in his neighborhood. A commercial grower in France may be multiplying by meristem propagation a hybrid orchid clone that originated in Taiwan for a grower in Florida to retail throughout the United States. And an orchid society in Sweden may affiliate with the American Orchid Society so that it can receive information and instruction from orchid experts from all over the world!

For many years the author, as Executive Secretary and Editor of the American Orchid Society, recognized the intricate relationships among the varied interests within the world-wide community of orchids, at the same time knowing all too well the frail lines of communications that bound this community together. Extensive travel on his part enabled him to meet a large segment of this orchid-minded population, but he realized this opportunity was denied to all but a few fortunate orchidists. "If only we could get all the orchidists together to discuss their common problems and interests," he thought many times, "we might accomplish most of the things that orchid growers can now only dream about."

The answer came one sleepless night in November, 1952, while he was attending a meeting of the Trustees of the American Orchid Society in Houston, Texas. Since each orchidist could not travel around the world to visit every other orchidist, why not

plan a world-wide meeting every few years so that all who attended could, at one time, meet people of similar interests from all parts of the world? Further, sessions could be held to discuss the many aspects of orchidology that would apply to amateurs, commercial growers, breeders, editors, botanists, collectors and the like. Thus the idea was born and the basic pattern developed by the time the sun rose the next morning.

That day, during a boat trip on the Houston Ship Channel, the idea was broached to several of the attending Trustees. Mr. George H. Pring, then Superintendent of the Missouri Botanical Garden and a Trustee of the American Orchid Society, was enthusiastic; he suggested the Missouri Botanical Garden would be ideal for the accompanying Show. Mrs. Gladys Read, as President of the Orchid Society of Greater St. Louis, offered the cooperation of her Society as local sponsor. The proposal was subsequently approved by the Board of Trustees, and the rest is history. The First World Orchid Conference was held in St. Louis, Missouri, on October 15-17, 1954, with a total registration of 601 persons (planning had been for a maximum of 600!). Eleven countries were represented at the Show and in the roster of speakers. The program included not only sessions for Amateurs, Professionals and Scientists, but a major session on the theme, "What is a Fine Orchid?" This session led to the subsequent development of the American Standard Orchid Judging system, which has done much to unify the judging of orchids throughout the world.

At the closing Banquet, an invitation was extended by Dr. J. Herbert Beaumont in behalf of the University of Hawaii for the next Conference to be held in Honolulu, Hawaii. The invitation was accepted, and the Second World Orchid Conference was held in Honolulu, Hawaii, on September 19-23, 1957, under the sponsorship of the American Orchid Society, Inc., the University of Hawaii and the Hawaiian Orchid Societies, Inc. Mr. H. Chadsey Penhallow was General Chairman of the Joint Planning Committee, having filled the post left vacant by the sudden passing of Dr. J. H. Beaumont some months prior to the Conference opening. Nearly a thousand registrants attended the seventeen sessions and numerous social activities. A splendid show of breathtaking beauty was staged by the cooperative efforts of the fourteen Hawaiian societies that made up the Hawaiian Orchid Societies, Inc. A major achievement of that Conference was the establishment of an International Orchid Commission on Classification, Nomenclature and Registration, with Mr. Robert M. Scully of Miami, Florida, as Chairman.

An invitation from the Royal Horticultural Society

brought the Third World Orchid Conference to London, England, in May, 1960, under the joint sponsorship of the American Orchid Society, the British Orchid Growers' Association and the Royal Horticultural Society. Again, nearly a thousand orchid enthusiasts gathered to hear the forty-four speakers, as well as to attend the famed Chelsea Show which featured orchids in support of the Conference. Among the major accomplishments of the Third World Orchid Conference was the clarification of the international system of orchid hybrid registration, with the Royal Horticultural Society being approved as the International Registration Authority.

The colorful display of the Malayan Orchid Society did much to influence the selection of Singapore as the site for the Fourth World Orchid Conference in October, 1963. Once more hundreds of orchid enthusiasts from many parts of the world met in a Conference, this time under the joint sponsorship of the American Orchid Society, the Royal Horticultural Society and the Malayan Orchid Society, the last as host, staging a superb Orchid Festival Show at the Singapore Turf Club. The basic pattern of Conference sessions provided about forty speakers, the over-all planning being directed by the Chairman of the Working Committee, Mr. Max Lewis, and his Vice-Chairman, Dr. Yeoh Bok Choon. A major achievement of this Fourth World Orchid Conference was to approve in principle a "Handbook on Orchid Nomenclature and Registration," and to establish a Handbook Committee for the completion of that work under the guidance of Dr. Leslie A. Garay, Curator of the Ames Orchid Herbarium at Harvard University.

Now, once again the United States has been selected as the Conference site, and the Fifth World Orchid Conference is being held here in Long Beach, California. Jointly sponsored by the American Orchid Society, the Royal Horticultural Society and the Orchid Society of Southern California, with the cooperation of other orchid societies in the Southern California area, it is ably directed by Dr. Wendell B. Sell, Chairman of the Working Committee, and his legion of capable assistants. As this is written, it is still too early to say how many registrants have attended the sessions, how many countries are represented in the Show and the roster of speakers. We cannot yet point out any one major achievement. But look around at the vast array of orchids from all parts of the world, watch and listen to the stream of Show visitors, observe the expressions of sheer delight that animate the faces of this multinational throng. You will see here the "orchid world" exhilarated by the "world of orchids." And that, in brief, is a World Orchid Conference.



by
KURT
GREER



Orchids Outdoors

. . . IN SOUTHERN CALIFORNIA

Orchids can be grown outdoors in many parts of Southern California, along the coast from Malibu south, a few miles inland in areas with an elevation of a few hundred feet, and along the south slopes of the Santa Monica mountains. A few miles of this section from Beverly Hills east, the so-called "Thermo Belt" is considered the driest and healthiest section of Los Angeles. It is free of smog, fog and frost.

We are most fortunate to live in this area at an elevation of 600 feet approximately eight miles from the Pacific Ocean, and around 30 feet above street level. The sea breeze makes summer and winter temperatures more agreeable, strong winds never reaching us. A steep bank on the north and east sides protects us from cold air. When we built our house in 1952 this bank of partially decomposed granite 20-40 feet high and 100 feet long was a great liability. As a protection against erosion we built an 18 inch high wall in front and planted between the bank and this wall climbing fig (*figus repens*). After a very slow start

the whole bank was covered within a few years and we had the best protection possible, thousands of roots had grown deep into the granite. Instead of the bare bank we had a beautiful green background for our patio.

Where the granite was still solid we mounted approximately 25 half wire baskets and planted in each one 6-8 different colors of reed stem Epidendrums; the roots of the ficus have in time completely filled the baskets, yet the Epidendrums grow and bloom without any potting material — just in a mass of roots. A few were mounted on hapuu slabs — their roots covered with sphagnum moss — they grow and bloom like the ones in the ground or potted. Up to a height of 10 feet we tied driftwood, old oak, manzanita of all sizes and shapes with wire on the ficus or where possible with nails and mounted a large variety of Bromeliads and botanical orchids. More Bromeliads were just pushed in back or between the branches of the ficus, most have in time

grown right into the granite. Sphagnum moss has been wrapped around the roots to enable us to wire or nail them to the fig. Today it has become a "living wall" with hundreds of Bromeliads of many different sizes, shapes and colors growing right out of the bank with Oncidiums, Laelias and Cattleyas in between.

The plants are watered with a hose every few days and fed biweekly with the help of an Hydromix. Additional humidity is provided from the water in the cups of the Bromeliads and food from the decomposing leaves in the back of the ficus. This bank is facing south, but a Chinese elm on the east side provides varying degrees of shade and makes a wide selection of plants possible. Along the length of this bank and the little wall in the narrow space (only a few inches) many dozens of reed stem Epidendrums and Epicattleyas in mixed colors, white, several shades of rose, pink, yellow, orange, lavender, red and purple give us color every day of the year. Here too their roots are completely overgrown by the roots of the ficus, yet they grow and bloom just as well as those which are planted in good soil in beds or pots, tubs or hanging baskets. The latter are planted in old Cattleya or Cymbidium mix.

On this little wall are standing pots of many genera. In full sun from April till November Vandas and Dendrobiums, all year round Laelias (*superbiens*, *gouldiana*, *purpurata*, coronet, *autumnalis*, several varieties of *anceps*) flower freely and happily. Under the protection of some shade, hybrid Cattleyas, *Oncidium altissimum*, *splendidum*, *Epidendrum oncidoides*, *cochleatum* and many of the newer crosses between *Laelia anceps alba*, *flava*, *cinnabarina*, coronet, *Cattleya forbesii*, *aurantiaca*, *clausiana* grow and flower. All potted plants here and throughout the garden are in a mixture of $\frac{2}{3}$ fir bark and $\frac{1}{3}$ redwood chips which is soaked for 24 hours in water to which some nitrogen (Urea) has been added. After the water has been drained off and the mixture is just moist — not wet — we add some hoof and horn, Dolomite lime and superphosphate.

Our little greenhouse was soon overcrowded. With no space for an addition we decided to put some Cattleya backbulbs, plants that had never bloomed, and our least desirable crosses, right into the trees. Sphagnum moss was wrapped around the roots, held firm with some small rubber bands and tied to the branches with plasties or strips of old nylon hose. Most grew well so we decided on a program to put all but our better plants (and warm growing genera) into a more or less natural setting. We had some Chinese elms, Japanese rice paper trees and Dracaena palms. All have rough bark, so the roots can take a firm hold and fine debris collects and adds food to

the plants. During the past five or six years these trees were all covered to approximately 12 feet high with Cattleyas and Laelias with Tillandsias and Spanish moss between. Some of the *Laelia anceps* have grown to large clumps with more than 25 spikes and 100 flowers on each one last winter. More Laelias, Oncidiums, Odontoglossums, Brassovolas and Tillandsias are mounted on hapuu slabs or cork and are hanging down between baskets of Begonias and other tropical plants and large staghorn ferns. The roots of the Cattleyas are running up and down the stems as much as 2 feet or more and the bulbs of the new growth are short, fat, and sometimes egg-shaped. The blooming season is mostly many weeks later than for the same crosses grown in a greenhouse, there is little or no growth during the colder months, but the flowers last much longer at this time. Some Cattleyas which were shy bloomers in our little house bloom regularly now, which might be due to the constant circulation of fresh air or the fact that the roots are not confined to containers and dry out soon after watering. We have a sprinkler system throughout the garden; where Orchids are planted in the trees the sprinkler heads are 10-12 feet high, the pipe running along the trunk of the tree or hidden by tall hapuu logs. A good soaking is given every 3-4 days, liquid food biweekly in summer and monthly in winter. Under the Chinese elm and throughout the patio are many tropical Ferns, Palms, Anthuriums, Spathiphyllums, Hawaiian Ti plants, Bromeliads, Azaleas and Camellias. Some hapuu logs (4-6 feet high) are set in between and covered with Bromeliads, Cattleyas, Oncidiums, Odontoglossums, Stanhopeas and others. The roots of the plants are also covered with sphagnum moss and nailed to the logs.

On the west side of the house we had a lath roof built, 10 x 20 feet with some extra 2 x 4 posts between the structural 4 x 4 for more hanging space. There are no side walls and the posts can be used for hanging on all four sides and the plants can be given more sun or shade as desired. Baskets and pots are hanging from the roof, more pots and hapuu and cork slabs on the posts. By using "Oscar Kirsch pothangers" we can hang 4 smaller pots on each larger one. Lately we have been using more cork for mounting and have mixed some osmunda with the sphagnum moss to avoid fast drying out. Hapuu slabs retain water much longer between watering. For watering and misting on hot days we tied a so-called sprinkler hose under the roof and just connect it on a regular garden hose. Low on the post and the east side where there is most shade are several Cypripediums and *Lycaste Deppei*, *aromatica* and *virginialis* hanging. Several *Odontoglossum crispum* hang only inches above the Bromeliads in the ground

from which they receive additional humidity. So far they survived our high temperatures in fall but produced never more than 4-5 flowers per spike. In the ground are several Sobralias, which have grown to large clumps and Vanda 'Miss Joaquim' climbing up on a hapuu log.

Several years ago we planted one Vanda 'Ata Rainbow' in the ground (decomposed granite with perfect drainage) against a Dracaena Palm; so far it has survived several winters and the roots have taken a good hold on the Palm. One *Cattleya bowringiana* was also planted into the soil and is growing well. In both cases the holes were made quite large and filled with large size fir bark. *Stanhopea wardii* and *tigrina* were in large wire baskets. Spikes showed every year but some rotted before opening. The baskets were too deep. Now, several years later, new bulbs have grown outside the baskets and no more spikes are lost. *Coelogyne Massangeana* are also in wire baskets to let the flower spikes hang down all around. Under the lath roof and outside are some more hapuu logs from 4-6 feet high planted with Orchids and Bromeliads.

For readers in less favorable but still frost-free areas who wish to bring some Orchids outdoors we would recommend starting with Laelias, *Odontoglossum grande* and the cool growing, beautiful Brazilian Oncidiums like *Forbesii*, *crispum*, *Gardneri*, *Marshallianum* and *Sarcodes*. The Laelias will give flowers in late winter and early spring, the Oncidiums through the summer and *Odontoglossum grande* in fall. Along our garage wall in full sun in a 3 foot deep bed we have planted reed stem Epidendrums in mixed colors with several 6 foot high hapuu logs in between, covered with Tillandsias and Laelias, and in front along the curb, sun loving Bromeliads. Miniature Cymbidiums are grown in nearly full sun and bloomed extremely well the last seasons. Some in 8 foot tubs had 8-10 spikes with 30 flowers to a spike, while standard Cymbidiums are very poor bloomers for us. They are watered and fed according to rules, but our location seems to be too protected. Most of them have been given away.

Among the plants grown in this area are:

<i>Oncidium</i>	<i>Cavendishianum</i>
	<i>Cebolella</i>
	<i>altissimum</i>
	<i>flexuosum</i>
	<i>leucochillum</i>
	<i>microchillum</i>
	<i>maculatum</i>
	<i>sphacelatum</i>
	<i>Sarcodes</i>
	<i>crispum</i> var. <i>grandiflorum</i>

Forbesii
Gardneri
Marshallianum
ornithorynchum, which last winter had 60 spikes.
 Several of the Hawaiian Miniature Oncidiums.

<i>Laelia</i>	<i>anceps</i> , several varieties
	<i>flava</i>
	<i>millerii</i>
	<i>cinnabarina</i>
	<i>lundii</i>
	<i>grandiflora</i>
	<i>rubescens</i>

<i>Brassia</i>	<i>caudata</i>
	<i>Gireoudiana</i>
	<i>Lawrenceana</i>
	<i>maculata</i>
	<i>verrucosa</i>

<i>Brassovola</i>	<i>glauca</i>
	<i>cuculatta</i>
	<i>Digbyana</i>
	<i>nodosa</i>

Odontoglossum cordatum
Cervantessii
Bictoniense
Insleayi
Rossii
Uro - Skinneri
pulchellum
citrosimum
grande

The latter two are dried out after blooming till new growth starts in spring.

<i>Epidendrum</i>	<i>alatum</i>
	<i>aromaticum</i>
	<i>atropurpureum</i> roseum, and
	<i>Randii</i>
	<i>Brassovola</i>
	<i>ciliare</i>
	<i>fragrans</i>
	<i>nemorale</i>
	<i>oncioides</i>
	<i>prismotocarpum</i>
	<i>Vitellinum</i>
	<i>Lindleyanum</i>
	(roots exposed to full sun)

Also some Miltonias, Odontonias, Odontocidiums and some of the newer Hawaiian Hybrids, crosses between Miltonias, Brassias, Oncidiums and Epidendrums.



Cattleya Orchid

Culture **FOR THE BEGINNER**

by
**LEO
HOLQUIN**

Orchid growing is an interesting and rewarding hobby in this day and age, with all the hustle, tensions, and freeway driving. It is a relaxing hobby. A few hours spent in the greenhouse does a world of good in easing tensions.

Many people feel that orchids are difficult to grow, but this is not the case if you follow a few simple requirements. More orchids are killed with kindness than with rough treatment. Most orchids will adopt themselves to the conditions you provide for them, as long as you try to give them an environment that meets their needs. The principal requirements (other than a greenhouse in most areas) are temperature, light, relative humidity and ventilation, water and fertilizer. We will discuss these in order.

TEMPERATURE

Temperature conditions vary, of course, in different areas of the country. 60 to 65 degrees at night and 80 to 85 degrees days is recommended for adult

cattleyas. For seedlings 65 to 68 degrees nights and 80 to 85 degrees days. In cooler regions 55 to 60 degrees nights and 65 to 70 degrees days are easier to maintain and more desirable. In areas such as the desert or its fringes where light intensity is high and temperature hot, an evaporative cooler may be required, or a fan and pad exhaust type system can be used to keep the temperature down during the summer months.

In late spring through summer and early fall, it may be necessary to add more shade to keep temperature down. It is to be remembered that at night you can control the temperature with the temperature control on the heater. In the daytime, of course, it will vary, may even go up to the 100 degrees once in awhile, but this does no harm so long as you maintain humidity.

LIGHT

Light is a controversial subject. Light conditions vary throughout the country even in the same city or county. Generally 2000 to 3000 foot candles is sufficient for optimum growth, or 20 to 30 percent of outside light. I prefer to grow at around 2000 foot candles. Plants suffer less and production is still maintained. By observing your plants you can generally tell if they are receiving sufficient light. If most of the new growth develops erect and without need of tying to a stake, and when the buds come out of the sheath and develop without the benefit of too



much staking, or tying, then I feel that the light is sufficient. The leaves should be an olive green, or reddish tinge in color. If the growth is soft, succulent and deep green in color there is too much shade.

There are different methods of shading the greenhouse roof. Garland Shading Compound is a type of water paint that is made especially for greenhouse roofs. It comes off easily if too much is applied. Assuming that the greenhouse roofs face north and south, from November until March the glass on the north side can be clear, and a thin coat of shading on

the south roof. After March the dust is washed off and a thin coat of shading applied to the north and south roofs. Generally the last coat goes on in late spring. Be sure and wash the dust off between each coat of shading. By fall the shading has oxidized to such an extent that rain, or hosing it down will leave only a light shading for the winter months.

A more permanent and satisfactory shading can be had by the use of Saran fabric, 65 percent to 72 percent shade depending on your location. This material is suspended about 18" above the glass on a wood or metal frame. It can be left on all year, or can be installed in such a manner that it can be removed during the winter months, at least on one side. Using Saran cloth is less troublesome and more satisfactory than the use of paint, and makes a neater appearance.

RELATIVE HUMIDITY

Relative humidity, moisture, dampness, or the percentage of water vapor in the air, to the total amount possible at the same temperature. A relative humidity of 60 to 65 percent is average in most areas. Here again, light and temperature are important factors. The higher the light intensity and temperature, the quicker the greenhouse will dry out. If you have no automatic humidity control system it will be necessary to wet down the benches and floors, or sprinkle the plants overhead several times during the day in order to prevent too much loss of moisture from the plants. This is, of course, during bright, hot, dry days. In more humid regions this does not have to be done as often as in dry regions. Keep in mind that while the floors and benches require moisture, they should not be kept in a state of saturation.

In areas where summers are hot and dry I believe one could have success with the pad and fan system. In brief this consists of a pad, drip conductor, and a return gutter which must be arranged to circulate water and distribute it evenly over the entire pad area without splashing and flooding. This pad is installed at one end of the greenhouse, or sides, with a suitable exhaust fan at the other end, to draw air from the outside, through the pad. The fan and water system could be set on separate controls for easier control of humidity and temperature in the greenhouse. With this system the balance of the greenhouse should be as airtight as possible.

One of the most satisfactory systems for the control of relative humidity is the use of an automatic humidistat that is connected to the electric source in the greenhouse. A system of copper tubing is connected to the water source and small nozzles used that make a very fine spray. The humidistat is set for about 60 percent and when the relative humidity drops below that figure the system automatically goes

into operation and remains in operation until the relative humidity rises to about 70 percent, then shuts off automatically. Parts for this system can be had from any greenhouse supply company and it is easy to install. It does away with any guesswork on your part as to relative humidity in the house.

VENTILATION

Those of you who are not fortunate to have automatic controls must watch the temperature a little more closely. Open the vents early in the morning on bright days, before the greenhouse gets too hot. It is better to let it warm up gradually. As the day cools off lower the vents. Whenever possible it is advisable to leave vents open from one-half to one inch at night. It should be remembered that while Cattleyas require a maximum amount of air at all times, they should not be subjected to draughts as this causes the plants to dry out too quickly, and is likely to chill them.

WATERING AND FERTILIZING

After repotting the plants do not require too much water until root action develops. However, they should be given frequent overhead spraying during bright warm weather. Once root action starts they should be watered thoroughly. Depending on the weather large plants in 7 or 8 inch pots may go from one to two weeks between waterings. Smaller sized pots may be watered from once to twice a week. A word of caution is necessary when watering plants in fir bark. The first six months or so the new material does not hold water very long. However, after this period the bark starts to slowly break down and it will hold moisture for a longer time, although the surface appears dry. Be careful not to overwater at this time. The plants should be watered thoroughly and then allowed to dry out well before the next watering. When in doubt wait a few days. One



secret of success with Cattleyas is to maintain a good root system. Overwatering will rot the roots, causing the plant to shrivel and turn yellow.

When using by-products of wood such as fir bark,

redwood bark, or Hapuu, fertilizing is a must. Fertilize every other watering using a 3-1-1 fertilizer full strength, or half strength solution every watering. There are various fertilizers on the market. Check with your orchid dealer as to which is best suited to your location.

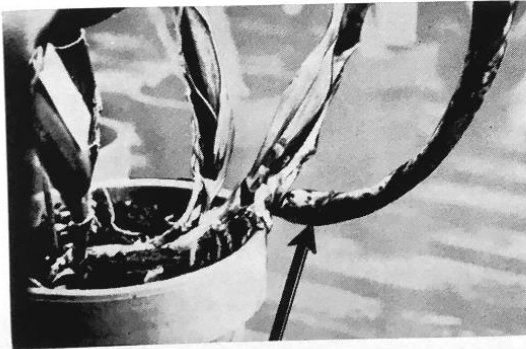
POTTING MEDIA

There are several good potting media on the market. Fir bark, Hapuu, redwood bark, and the old standby, Osmunda. Fir bark has become quite popular in the culture of orchid plants of all kinds. I use a mixture of three parts Silvabark to one part redwood bark. To this add ten pounds of Dolomite lime to each cubic yard. The Dolomite lime is to adjust the pH to around 5. This mixture is easy to pot with and lasts a little longer than two years. It should be fertilized every other watering, or at least twice a month.

For adult Cattleyas use size $\frac{3}{8}$ to $\frac{1}{4}$ " Silvabark, which is the standard grade. For seedlings use $\frac{1}{2}$ to $\frac{1}{8}$ ", the fine grade. Moisten material before using to make it easier to work with. Most growers have their own preference as to potting mixture. You will have to experiment to see which one you can do the best job of growing with.

POTTING

When to repot? It must be remembered that the majority of Cattleyas today are complex hybrids, with little or no resting period. Repotting is usually done when plants are through blooming, and are crowding



the inside of the pot, or growing over the edge. The best time is when there are signs of renewed root action, such as roots commencing to grow from the base of the new growth. Whenever possible it is best to wait for the new growth to make up, and pot just as the new roots start to show at the base of the rhizome. However, if the medium is broken down, or sour, it is best to move the plant into fresh material as long as it is not in bud. In some cases root action will begin before the growth is made up.

It is best to pot at this time to save the roots. In any event, potting should not be done just prior to blooming. This will prevent the flowers from developing properly. Allow sufficient space in the pot for two years growth. Be sure and tamp the material in good and firm. In this manner it will retain moisture for a longer period of time and less watering will be necessary. If material is too loose you will have to water more often and you may have to repot before two years.

CONTROL OF PESTS

The most likely insect pests found on Cattleya orchids are thrips, greenfly or aphids, scale, millepedes, slugs, snails, mealy bugs and ants.

For slugs and snails try Cooke's Slug and Snail, Slug-It, or Zectran, to keep them under control.

Chlordane dust will keep ants under control.

For millepedes, sowbugs and earwigs use Sevin 50 W, or Diazinon 25 E. Cygon has proven effective for scale as well as other pests.

Malathion should take care of scale and other pests. For new insecticides coming into use, keep in touch with your orchid dealer.

An easy insecticide to use is SMOKE FUME 103. This comes in a cardboard container and consists of Tetraethyl Dithiopyrophosphate 15%. Close up the greenhouse late in the evening, and, if you have automatic cooling, disconnect it. Otherwise the heat from the Smoke Fume will cause it to come on and blow the smoke all away. Shut off all ventilating fans. Punch a hole in the top of the container and insert the fuse. Light it as directed on the container, and it is all set to do the job. Next morning open the vents to air out the greenhouse and turn on your fans and cooling system. This will control spider mites (red spider), aphids, whitefly, and some species of mealy bugs, thrips and soft brown scale. In badly infested houses it is well to repeat the process in about a week.

A word of caution. Use all insecticides with care and be sure to follow instructions on the labels. They are there for your protection. Do not use more than is recommended.

IN GENERAL

These are the fundamentals of successful orchid culture. Each individual, will, of course, have to learn the easiest and best methods for his conditions. Once you have mastered this do not change. If you wish to experiment, do so on a small scale. Remember, what works well for John may not do as well for Tom, or vice versa. No two growers seem to use the same cultural methods, yet most have good success. In orchid growing it will be one or two years before you see the results of your labors. Do not be inconsistent. Stick to one method for a year or longer. Happy Orchid Growing!

MEET THE *Cymbidium* AND ENJOY IT



PAUL GRIPP

There is no doubt about it, *Cymbidium* orchids are among the most lovely and most gratifying of all flowering plants. Their beauty, color, long sprays, durability, usefulness and ease of growing all make the *Cymbidium* an ideal plant. Their tremendous popularity is a testimonial to all these facts. With a blooming peak about Easter, some early varieties flowering near Christmas and certain varieties coming distinctly later, it is possible to have flowers over half the year.

Color variety is the thing that lends excitement to *Cymbidiums*. They come in all the basic colors except blue. There are lovely whites, pinks, yellows, greens, bright reds as well as bronze tones and polychromes with several colors blended together. *Cymbidiums* give much added value with their long keeping quality both on and off the plant. Cut sprays will last a month, and on the plants, it is not uncommon for flowers to last 2 or 3 months.

The species from which most present day hybrids have come are found in nature in Southeastern Asia. *Cymbidiums* grow in the mountainous areas of Burma and North Central India and into Vietnam. Conditions are not particularly tropical in these areas and are characterized by high rainfall, cooler nights and more seasonal changes. Consequently, *Cymbidiums* are grown best today with warm sunny days and cool nights and abundant watering.

They grow well out-of-doors in the relatively frost-free areas of the United States and are classified as cool house growers where greenhouses are required. They will take a few degrees of frost but flower spike damage can be expected to occur at about 27° with foliage damage occurring a couple of degrees below that. It is customary when growing in a greenhouse to hold a 45-50° night minimum and to keep the daytime high below 90° F. whenever possible with 75-80° an ideal temperature. The cool night temperature is desirable for flower spike initiation and development and in some areas where excessive day or night heat is a factor, evaporative coolers are used to advantage. Even in many of the areas where *Cymbid-*

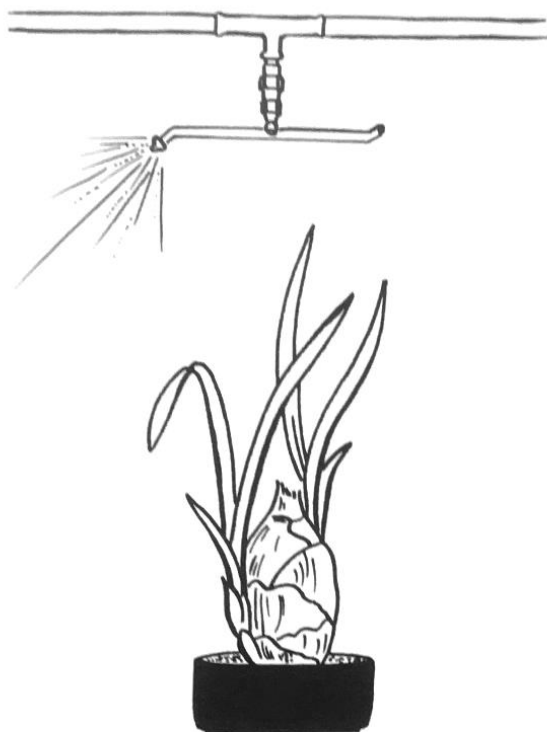
iums are grown in greenhouses in the winter the plants are often grown out-of-doors in the summer where it is often cooler and better growth is obtained.

Cymbidiums are very satisfactory garden plants in mild climates and will perform well under garden conditions with a slight bit of soil preparatory work. In the garden *Cymbidiums* should be planted where they get partial shade, but care must be taken not to give too much shade, as other shrubs grow up around them. Also, they should not be planted too close to the shady side of buildings where the sun rarely shines.

CYMBIDIUM CULTURAL PRACTICES

LIGHT. Light and sunshine are perhaps the most important factors in growing and blooming your *Cymbidiums*. Most authorities agree that lack of sufficient light is the most common reason for flowering size plants failing to spike. Remember to give your plants as much light as you can without burning the leaves. An occasional sunburn shows that you are giving good light. Growers look for a "golden green" color to the foliage, with strength and broadness to the leaves. Dark green leaves which have a tendency to bend and break suggest that light is lacking. It is common for growers in the Pacific Northwest to put their plants out in full sun during the frost free months and good results are achieved. In more southerly areas, where heat is a factor, shading is applied for the cooling factor.

It is important for small growers and hobbyists to keep a close watch on light because often with the backyard collection, houses and trees will cast harmful shadows which keep your plants from getting sufficient light. Locate your plants in a spot where they will get good light all day long. During the growing season, *Cymbidiums* should have at least 4,000 ft. candles of light and many growers will go to 5,000 to 7,000. During the flowering season, from December to June, shading is different for those plants which are in spike. Because we are intent on protecting the spikes and getting the best quality of flowers, extensive shading is used. Normally 1,500 to 2,500 ft. candles of light gives good protection.



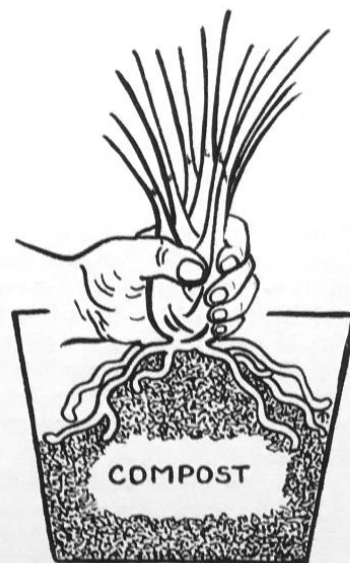
by the use of some type of sprinkler system where a thorough leaching can be obtained. After watering, knock a plant out of the pot to see just how wet it really is.

FEEDING YOUR PLANTS. In the past few years, growers have learned how well Cymbidiums respond to a regular balanced feeding program. There are countless brands of fertilizers available and I am sure that most balanced combinations are fine for your Cymbidiums. Following the label usually keeps you within safe bounds. Feeding might vary slightly with the type of soil mix you use and the time of the year. It is well to see what others in your area are doing. In general, those that are growing in rather inert materials such as various wood products, and sand combination, need a bit more fertilizer than those whose growing materials contain organic materials such as peat, manure or leafmold. Materials classified as water soluble liquid foods or dry fertilizers are both effective. Liquid foods should be applied about every 7-10 days with inert mixes and about every 2 weeks with more organic soil mixes. Dry foods, which are usually slower to act but more long lasting, need only be applied once a month.

WATERING. Watering is one of the most important of cultural practices also. Cymbidiums are watered extensively during the growing season when warmer temperatures prevail and even in the cool season, the plants are never allowed to become exceptionally dry. The rule of thumb is to apply water when the plant begins to get dry. As you see the top of the soil in the pot begin to get dry, it is time to water even though by digging into the soil with your finger, the soil beneath may be visibly damp. This procedure is varied slightly in the summer time when even more water is applied and in the winter time when the cool damp days make one hold back just a little on the normal watering.

Equally important with the frequency of watering, is the quality of the water and the way it is put on. The Cymbidium is somewhat sensitive to water of poor quality, meaning those high in soluble salts or those having toxic ions, such as Sodium. In most areas of the United States, water quality is fine, except for localized places in some of the more arid regions. However, in nearly all cases, good watering practices will off-set bad water conditions.

Good watering practices are taken care of by the simple rule, "when you water, water heavily." This means that you should water your plant until water comes out the bottom of the pot, which amounts to two or three times with the hose. A better watering is



PLANTING AND POTTING CYMBIDIUMS. Cymbidiums are handled similar to other rhizomous or bulbous crops when it comes to plants or repotting, except that somewhat specialized soil preparation is recommended. Cymbidiums are generally grown in

fluffy coarse mixes of standard horticultural materials. Materials combined include fir bark, redwood bark, peat moss, wood shavings, coarse sand and coarse leaves. A typical mix might contain 2 parts redwood bark ground together with one part peat. Some will substitute fir bark and/or wood shavings for the redwood bark. Some will use mixtures of all three. Oak leaves can be substituted in part for the peat moss but they break down rapidly. Some growers like to add about 10% sand to their mix but many do not use sand. Regardless of your mix, it is well to add single super phosphate (3#/yd.) and agricultural lime (10#/yd.). This mix will need a constant regular feeding program when plants are potted.

Plants are generally divided in the Spring after blooming. Cymbidium plants need repotting when they have outgrown the pot or when the soil mix is broken down. If the bulbs are beginning to come over the side of the pot or if there is not room for the next big bulb to form, it is time to repot. If the plant is in good condition and has a very few dry back bulbs in the center, it might be well to advance it to a larger pot. If the old mix is broken down shake off the old soil and by building a mound of mix right in the middle of the pot spread the roots and pack the new mix in firmly. If the mix is not broken down, the plant can simply be placed in a larger container and the new mix packed firmly around.

Sometimes before a plant has outgrown its pot, the soil mix becomes broken down and when this happens it is best to shake off the old soil and repot the plant in new mix. A good way to tell if the mix is spent, is to watch for plants that have settled deep into the pot or by taking one's finger and sticking it into the mix. If it goes right down then most likely the soil needs replacing. More rapid than usual breakdown is caused by not packing the mix tight enough at potting time or perhaps by using potting material that breaks down rapidly (i.e., coarse leaves, manure, etc.). A good potting mix should last about 3-4 years before becoming completely broken down.

When the plants are too large, or when the center is full of dry bulbs (when they separate easily), it might be well to divide the plant. For best results, plants are usually made no smaller than 3-4 green bulbs. Normally, we do not like to leave many of the dry bulbs attached unless one or two connect separate leads that make a nice looking plant of larger size. Ordinarily, all the dry bulbs are taken off. If the plant is of good quality, the back bulbs can be used for propagation material to make new divisions by planting them singly in compost, in separate small pots, in which they will sprout rapidly.

PESTS. Cymbidiums have a few pests that are not easily controlled by routine treatments. Red spiders are perhaps the most common of pests and these can often go unobserved unless you know what to look for. The tiny mites cause a silvering to the underside of the leaves and on very close examination one can see their tiny webs and the mites themselves. During the course of a season, red spiders are almost certain to attack at least once.



CYMBIDIUMS FOR THE GARDEN. In the frost free mild coastal areas of the United States, Cymbidiums are often grown as garden plants out-of-doors. Here are a few tips for garden Cymbidiums.

1. Plant in semi-sunny location, being careful that trees and houses do not cut out too much sun. A partially shaded southern exposure is good, for you will get good sun during the winter and also get some protection if below average temperatures prevail. Throwing a covering over the plant on frosty nights might save your spikes.

2. Work about 50% coarse horticultural materials into the natural soil and mound the planting spot slightly. A mulch of wood shaving is often beneficial.

3. Keep lots of slug bait around when the slugs are active and spikes showing.

4. Feed once a month with your regular garden fertilizer.

The excitement and expectation of these plants is stimulating the year round. The blooms from one spring season have hardly passed when the new flower spikes begin to show toward the end of summer. Their growth and development is fascinating to watch and the climaxing beauty of their blooms is surely a masterpiece of nature.

THE CULTURE OF THE MINIATURE-FLOWERED CYMBIDIUMS

EMMA D. MENNINGER

THE SPECIES AND HYBRIDS of miniature-flowered Cymbidiums require basically the same growing conditions as their larger-flowered relatives. The culture of the large-flowered Cymbidiums has been fully described in the past, so attention will be directed to those practices which apply particularly to various miniature species and their hybrids.

Many of the small-flowered Cymbidium species are terrestrials, while most of the larger-flowered ones, with the notable exception of *Cymbidium insigne*, are epiphytes. A few of the coriaceous group with small flowers are also epiphytes; however, experience has shown that no radical concessions need be made on this score. The polymins and second-generation miniatures are treated the same as first-generation miniatures.

Some *devonianum* hybrids, indeed the species *Cymbidium devonianum* itself, resent heat during the critical period of flower-bud development and flowering, and unless kept cool, the buds often turn yellow, fail to open and drop off. This happens to the second-generation *devonianum* hybrid Sola if grown indoors. Therefore, the species and hybrids of *devonianum* are best grown out-of-doors here in Southern California.

Nearly all other small-flowered species take kindly to cool-greenhouse culture in Southern California. These include the warm-growing species from tropical climates such as *dayanum* from the Philippines and *madidum*, *suave* and *canaliculatum* from North Queensland, Australia. These latter will flower here outdoors if temperatures do not go much below frost.

The oriental species, including *ensifolium*, *kanran*, *soshin* and the like, have no difficulty, for they flower in the hot months of August and September. Their hybrids also flower about this time and seem immune to heat. Since we have relatively cool nights, this may be a deciding factor. The *ensifolium* progeny generally inherit the tendency to summer and fall flowering — upright racemes and very fragrant blooms.

Miniature hybrids are especially desirable because of their tendency to flower over a long period. Often a plant will send up new flower spikes while others are in full bloom. Hybrids, especially those derived from *pumilum*, often begin to flower in August and September, and the same plant or different clones may continue to flower through June. Given good culture, most mature plants should flower each season unless checked by late potting or disturbance due to having been recently divided.

While the hybrids of *pumilum*, *devonianum* and *ensifolium* are generally free flowering, as are those of *madidum*, the hybrids of *canaliculatum* and many of the coriaceous-leaved Cymbidiums grow into large plants and then appear difficult to flower, while their species parents are relatively free-flowering. Often the shock of placing these recalcitrant plants in a different situation, such as moving them outdoors or dividing them, will cause them to flower. The hard-leaved species such as *finlaysonianum*, *pendulum* and *simulans* are by no means dwarf in habit, and they are best grown in hanging pots or baskets where their pendent or semipendent racemes can be displayed.

TEMPERATURE: — The natural habitat of the species will determine, to a certain extent, their preferences in regard to cold and heat. Their hybrids, however, prove to be much more obliging and thrive in a much wider range of temperatures. An example is the species *Cymbidium pumilum*, which, here in Southern California, resents even cool-greenhouse treatment. Though growing well under such conditions, it usually refuses to flower. Grown here out-of-doors, *Cym. pumilum* appears to revel in the cold winter nights, sometimes with a few degrees of frost, when it will initiate its flower buds. These buds remain semi-dormant until spring — the normal flowering season. Dr. Yoshio Nagano reports that this species, Chinese in origin, has become naturalized in some of the mountains of Japan.

FLOWERING: — The *pumilum* hybrids flower over a long period from fall into spring and under a wide temperature range, some flowering in the Cattleya house. It is reported that they flower in Hawaii and Florida where the large-flowered conventional Cymbidiums are difficult to flower because of the warm nights during the season of bud initiation and flowering.

STAKING: — Not all miniatures will need staking, but those needing support should be staked and trained to conform to the natural habit of the raceme, whether upright or pendulous. It might be mentioned that *devonianum* spikes, when an inch or two in length, have a tendency to grow down into the compost. A plastic label placed under the spike at this stage will direct it upward and outward.

LIGHT: — One of the commonest deterrents to good flowering is the lack of adequate light, not just on the tops of the leaves, but with penetration to the base of the leaves and pseudobulbs. Intense light is not needed; a general exposure to light appears to be the most critical requirement.

The colors of some flowers are at best in shaded situations, especially the greens, which take on a brownish suffusion in bright light. This presents a problem for plants that have been grown in good light. I believe a plant in spike should not be moved except early, when the spike is a few inches high, or later, when the buds are well separated and the spike is hardened. To move a *Cymbidium* when the buds are developing and orienting on the raceme is to risk harming the symmetry of the flower arrangement. When the plant is moved, it should be placed in the same direction or relation to the light as it was before.

POTTING: — Most well-drained, moisture-retentive organic materials used for standard *Cymbidiums* are suitable for miniatures. The mix may include bark, peat moss, redwood fiber, leaves — and, for the *ensifolium* group, perhaps a little humus soil. A little agricultural lime and superphosphate in the mix have been found beneficial. With this type of material, crocks are not needed provided there are ample drainage holes. We use plastic pots and find them excellent. Extra drainage holes can be made in plastic pots with a heated nail. I believe in packing the damp (not wet) mix rather hard so that the plant has good support and drainage. After potting, the plant should receive a thorough watering.

Since most miniatures make many new growths, encircling the outer edge of the plant, room should be left for generous space around the edge. The *ensifolium* types with very long, thick roots can be provided with deeper pots, but this does not seem necessary. Miniatures should be repotted every two or three years. If the old mix is in fair condition, the plant may be reset without disturbance to the roots in a larger pot with fresh mix.

FERTILIZING: — As with other *Cymbidiums*, fertilizing is desirable. Whether fertilizer is included in the mix, surface-applied dry or as liquid, will depend on the choice of the grower. *Cymbidiums* are heavy feeders, and miniatures are no exception. Naturally, more fertilizer will be required during sunny weather with less or none at all in dull, cold or rainy periods.

HUMIDITY AND WATERING: — Since nearly all *Cymbidium* species, except for very few, come from humid climates, their hybrids will appreciate a damp, but well-ventilated atmosphere. Some species, in their natural habitats, are subjected to periods of successive drought and rain, and knowing this may be of value in the watering program for both species and hybrids. Except for desert varieties, such as some varieties of *canaliculatum*, *Cymbidiums* should never be allowed to dry out. When the mix is just moist, it is time for a thorough watering. This will expel

the soluble salts and thus help to prevent tipburn of the leaves. On cold, damp days, special care should be taken to water in the morning so that water will not stand in the base of the growths at night.

VENTILATION: — Miniatures enjoy a buoyant atmosphere, as do their larger relatives. Open ventilators and fans in the greenhouse will be beneficial in insuring air movement during the day, with less at night.

PROPAGATION: — Miniatures may be divided at the time of repotting. The plants will naturally fall into divisions, and these may be broken apart without the aid of cutting tools. Although the dormant bulbs may be very small, they usually can be started into growth by potting up, or better still, being placed in tightly closed plastic bags with a little damp mix.

PESTS AND DISEASES: — Not much can be said in this short article about pests and diseases except that miniature *Cymbidiums* may be attacked by the same pests as other orchids, the most serious and difficult, perhaps, being the two-spotted mite or spider mite. These mites feed on the underside of the leaves, leaving a silvery sheen. Since the use of DDT and malathion, one seldom finds scale as a serious pest in Southern California today. Aphids occasionally attack flowers, often rather suddenly. These can be carefully washed off before damage is done to the flowers. Slugs and snails are difficult to control. Since pests often become resistant to remedies, it is recommended that local agricultural authorities or other experts be consulted for the best means of control. For plant diseases, the amateur had best consult an authority.

VIRUS: — The control of virus disease is in prevention, since at present it is considered to be practically incurable. Hazards such as insect infestation and contaminated cutting tools which transfer virus from diseased to healthy plants cannot be too carefully guarded against. If cutting tools are used, they should be thoroughly flamed after each using. Metal stakes that may have pierced a virus-infected root should be flamed before re-using; otherwise, only new stakes should be used.

Although much of the material for this article is the result of experience in growing miniature *Cymbidiums* in Southern California, it is believed that it can be adapted to conditions in other climates. Miniature *Cymbidiums*, given a few simple requirements, are not difficult to grow. Their charming flowers may be had over a long season. — 700 North Old Ranch Road, Arcadia, California.

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Cyp. Bell Ringer var. Chimes A.M./AOS-ODC

THE *Cypripedium* ...

In order for any orchid genus to maintain its popularity as a cultivated group of plants, ease of culture as well as esthetic value must be present. *Cypripedium*, as a major genus, certainly scores high in both of these prerequisites. The flowers are unique in form, have a color range from pure white through many shades of green, yellow and brown to deep purple-red and have much variety in color pattern.

From a cultural standpoint these plants present a minimum of problems. There are certain environmental requirements which should be provided in order to get the most favorable response and yet the adaptability of the plants is so wide that many growers are successful in spite of providing only

marginal conditions. An intermediate temperature greenhouse offers the best basic set of growth factors but cultivation is also possible, in mild climates, under outdoor shade garden or even in the home culture.

In order to understand the cultural recommendations for cypripediums a short explanation of their native habitat is in order. The plants orchid growers call *Cypripediums* are botanically named *Paphiopedilum* and are native to southeast Asia. This particular branch of the *Cypripedium* family extends from the slopes of the Himalayas south and east to the sea and to the island complex of Indonesia. Although this area is close to the equator most of the species do not grow under tropical conditions. Many grow at rela-

tively high altitudes where the climate is temperate. In general, the mottled leaf varieties grow at the lower elevations and enjoy warmer conditions than the plain green leaved varieties.

TEMPERATURE. *Cypripedium* hybrids may be successfully grown in a greenhouse as companion plants of *Cattleyas* and *Phalaenopsis* or the cooler growing *Cymbidiums*. The night temperature, as for most orchids, is of more importance than daytime temperatures. When grown outdoors they will accept night temperatures down to freezing but in a greenhouse the most desirable night temperature is between 50° and 60°. Most cyp hybrids grow and flower best at the 60° temperature. In the spring months, from March through June, it is particularly important that the plants be subjected to no higher than this 60° temperature. Warmer conditions at this time tend to inhibit blooming of some plants. Summer night temperatures are relatively unimportant, as are summer day readings. Summer daytime temperatures may go to 100° with little detriment but the most advantageous readings would be closer to 80°.

LIGHT. This is a growth and flowering factor which is only half understood by many growers. The usual instructions call for growing cyps "well shaded" which to one grower may mean a light intensity of 200-300 foot candles while another grower may translate this to as much as 1500 foot candles. Actually, light is more accurately stated if it is referred to in foot candle hours which is a figure that includes photo period (time of light exposure) as well as foot candles (intensity of light exposure). By multiplying the number of daylight hours by the foot candles of light we get the daily foot candle hours which should be a constant figure regardless of the geographical location of the grower. Observation in many well controlled greenhouses has established a figure of about 10,000 foot candle hours as satisfactory. In the temperate zone this means a reading of 700 - 800 foot candles in the summer and about 1000 foot candles in the winter.

WATER AND HUMIDITY. Most hobby growers believe that high relative humidity is a requisite for all orchid culture. Not so for cyps. The usual greenhouse humidity is certainly not a detriment but neither is it an essential requirement. Of more importance is the requirement that the plants should always be kept moist in the root area. If the plants are potted in a suitable media it is impossible to overwater them and often daily waterings are found to be beneficial. Some growers condemn the practice of watering overhead, which wets the leaves and

developing flower buds, as being responsible for bud loss, but this has never been proved. Some bud loss occurs whether the plant leaves are wet regularly or not and this is more likely explained by bud infection with *Erwinia* bacteria. Some control of this form of bacterial rot is obtained by providing constant air movement in the greenhouse. *Erwinia* rot also attacks healthy leaf tissue, usually at the base of a leaf, and is recognizable by its translucent, wet or greasy brown appearance. Infected leaves should be removed immediately to prevent the death of the plant. Severe cases may be treated with Natriphene or Zerlate.

POTTING MEDIA AND FERTILIZING. Cyps are not fussy about the makeup of their potting material and almost any organic mix will do, provided it has excellent drainage (for aeration of the roots), good moisture retention and slow breakdown to supply a steady small amount of food for the plant. Presently most locally used cyp mixes have a fir bark base which is of seedling grade or smaller. Some bark is so fine it resembles ground coffee. To this is added sand or redwood bark fiber. Often crumbled dried oak leaves are included for food value. One point is especially important regarding feeding. It is well known that plants requiring low light intensity also require less food than plants grown under bright light. For this reason, chemical additives to the mix is not advised and any periodic feeding should be with a weak liquid fertilizer which is alternated with plain water so as to avoid a soluble salt buildup in the pot. In watering, always flush a good quantity through the pot.

REPOTTING AND DIVIDING. The best time to repot cyps is immediately after flowering and before the roots become active in the late spring. Even though most cyp mixes will last for about two years the plants will suffer less root loss and will grow better if repotting is done every year. Division of the plants is easily done at repotting time and although a blooming size plant may be as small as two growths, much superior flowers will result if the plants are allowed to become large enough to produce several flowers. Always include at least one flowered growth to each new plant division. Since most trouble originates in the root area this is the place to investigate first if the plants are not growing satisfactorily. No harm results by this root examination at any time of the year and fresh potting material, regardless of the season, usually remedies the trouble.

E. C. Wilcox *Cypripediums*
1336 Michillinda Avenue
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BOTANICALS

and

SPECIES

by

**FLORENCE
ESCOBEDO**



Platyclinis glumacea

Botanicals are usually described as a group of plants having unusual flowers or forms of flowers, but having no commercial value in their blooms. The dictionary describes species as a group of animals or plants, smaller than a genus, belonging to that genus, but differing in some details: a kind, sort, or form. It notes that species is a noun, used as singular or plural. Genus is described as a sub-division of a family, having similar characteristics and denoting a common ancestry. Genera is the plural of genus.

We, as a number of others, started with that one fatal orchid plant, which for some reason seems to cry for more. The only difference with us is that the first orchid plant was a botanical, *Chysis bracteescens*. Curious as to why we had never seen many of this type, we started to investigate. When the whole panorama of unusual flowers, fantastic in a maze of colors, shapes, forms and sizes opened up for us, we were too far advanced to retreat, and so we became botanical and species growers.

Importations for a number of years really give a good cross-section of what one may expect from botanicals. Minute plants with tiny brilliant flowers whose beauty can only be seen with a magnifying glass, semi-miniatures with unusually large flowers, large plants with long scapes of varied shapes and colors, pendulous and upright habits of growth, all go to make up an interesting collection deserving space in anyone's greenhouse. Most all of these flowers have a fragrance. In some cases it can be quite pungent or slightly disagreeable, but most of

them are pleasant. They seem to project the most fragrance at certain periods of the day, reputedly when the particular insect, moth, etc., is active which pollinates a particular type of plant. Some have the fragrance of the honeysuckle, others that of the citrus, another smells just like coconut pie.

We have been importing heavily from many areas over a period of years. The thrill of receiving a shipment has never waned, as there is always that possibility of getting an extremely rare varietal form of a species, so desirable and enchanting, or even a relatively unknown species. Even though one has numerous plants of the same species, one finds that each is just a little different. All shipments are checked by the Department of Agriculture at the port of entry regardless of how shipped. They record the number and condition of plants received, and check very carefully for any scale or insects. Plants are then treated as necessary.

Quite frequently a newly imported plant blooms quickly on what is termed the "jungle growth." This flower does not always represent the quality of bloom received after the plant is established, as the change tends to force the flower to open prematurely. In most cases you will find that the bloom on the growth matured after import will be larger, and denser in color. After the plant is well established, botanicals will reward you with quite a dependable blooming season with long lasting quality.

Contrary to the common belief, orchids seldom grow in the dense jungle areas, dankly shaded, hot and

humid. They are most commonly found in the tops of trees and frequently out in the open seemingly growing on rocks, or on cliff overhangs above streams. Some grow in what is termed cloud forests where it is cool and damp. One of the primary requirements for all orchids is air circulation. No plant does well in stagnate air. We therefore keep fans operating around the clock in the greenhouses, maintaining a good circulation with a vent open for fresh air. They like a filtered light. Most botanicals can be grown in patio areas, in the home, and even mounted in trees not too densely leafed. They thrive on ordinary care as you would give any other plant during extreme hot or cold days, misting and watering to build up humidity on the hot days and more sheltered areas on the near freezing days.

We have experimented in various growing mediums. We have found that our botanicals are not fussy, are easily grown, and adapt quickly to our culture. We have settled on redwood chips, which is the cut up bark of the redwood tree, and on Mexican fern slabs. Others seem to have equal results with fir bark, osmunda and hapuu. We are firm believers that each individual grow in a medium best handled by himself. Each person waters differently and this in turn reflects on the growing medium. We like the redwood chips as it seems almost impossible to over-water, a common error with most beginners; can be packed just "thumb" tight; and induces good root growth. Good drainage in any case is a must.

There are so many genera to choose from, that it sometimes becomes difficult to draw the line on what one wants in a collection. There is beauty in all of them and possibly one genera will do better for you in your area than another. One of my favorites is the *Oncidium*, for here one finds much variety. It is very popular with beginners and quite easy to grow. For the hobbyist who must confine his efforts to small areas, there are the miniatures with tall or arching scapes with flowers up to one or two inches across. For the hobbyist with a larger house, there are some with scapes eight to ten feet in length. Predominant colors are in the yellow tones with brown overlays, with a few of the species in light pinks and deep roses. Some of the blossoms have huge lips with small sepals and petals giving the effect of dancing girls or ballerinas, while others have large sepals and petals with smaller lips, giving the effect of a pansy type flower.

Listed herewith are a few of the more recommended species for your collection:

Oncidium Carthagenense. Stiff bayonet shaped wide leaves. Three to five foot semi-erect scapes shortly branched. Small flowers usually under one inch, with

slightly waxed segments. Basic color is creamy white, heavily spotted with light pink to deep rose-magenta.

Oncidium cebolleta. Erect terete leaves. Tall branched scapes. Flowers about 1½ inches with sepals and petals yellow lightly spotted with red, lip bright yellow with red dots on reverse side.

Oncidium crispum. Pseudobulbs about 3 inches long, scapes 2 to 4 feet, branched, with 2 inch flowers. Segments crisped, sepals greenish brown, petals bright chestnut brown, lip chestnut brown with yellow spots.

Oncidium excavatum. Stout shiny light green pseudobulbs. Leaves usually over one foot long. Scapes 2 to 5 feet, branched with many flowers. Sepals yellow, petals yellow sometimes spotted with red, lip canary yellow. Flowers are about 1½ inches in size, mostly at the terminal end of scapes with many short branchings, forming a pompon effect.

Oncidium falcipetalum. Magnificent large plant. Scapes sometimes 20 feet long. Very large flowers. Sepals honey brown to dark brown, narrowly margined with light yellow. Petals narrow, edges wavy, yellow with brown spots. Narrow lip greenish or purplish brown, with shiny brown markings. One of the largest flowers in the *Oncidium* family.

Oncidium Forbesii. Pseudobulbs 2 to 3 inches high, with 6 to 8 inch leaves. Scapes 1½ to 3 feet, with large flowers. All the segments are broad, making a rounded flower about 2½ to 3 inches across. Main color is bright chestnut brown with narrow golden yellow laced margins.

Oncidium incurvum. Semi-erect scapes, 3 to 5 feet long. Dainty flowers about one inch across, with sepals and petals rose pink, tipped with white. Lip is white. This makes up its spike which seems to hold with no further developments for several months, and then quickly sends out short branches and flowers.

Oncidium Kramerianum. Known as the "Butterfly" orchid. Erect stem, no branches, with single flower at terminal end. As one flower fades, another blooms from the same place, and therefore neither the dead flower or the stem should be cut off. Petals and dorsal sepal are like antennae, lateral sepals are broad, golden yellow with brown spots. Lip is round and full, ruffled, yellow with brown spots on border. Dwarf growing plant with splotched leaves. Truly delightful in a collection.

Oncidium maculatum. Eight to 10 inch scapes with 2 inch flowers. Sepals and petals yellowish green, blotched with chestnut brown. Lip white and yellow. Long lasting.

Oncidium onustum. Dwarf growing plant. Showy short arching scapes of clear yellow gold colored flowers, unusually large for size of plant. Pseudobulbs are mottled with brown. Does best mounted on tree fern slabs.

Oncidium pulchellum. Miniature plant with short saber shaped leaves. Scapes slender slightly branched, 15 to 18 inches long. Flowers large, some are 1½ inches across, white flushed with rose. Lip is full. Some of these plants tend to be a very dark pink in color. Does best mounted on small slabs.

Oncidium sarcodes. Three to 7 foot scapes, shortly branched. Flowers are fairly large, rounded with chestnut brown sepals and petals bordered in yellow. Lip bright yellow with few chestnut spottings.

Oncidium tigrinum. Stout heavy bulbs with erect lightly branched scapes, 2 to 4 feet high. Flowers are large and very fragrant. Sepals and petals yellow, heavily blotched with brown. Lip full and spreading, bright clear yellow, and often 2 inches across.

Oncidium varicosum. Three to 5 feet arching and lightly branched scapes. Often referred to as the "Dancing Girl" orchid because of its full large yellow



Phaius grandifolius

lip with small sepals and petals lightly barred in brown. *Var. Rogersii* of this species has much larger flowers.

Another very interesting and variable genus is the *Epidendrum*. These do very well inside or outside the glasshouse, and while some of the flowers are quite small they are nonetheless bright and colorful. Some have pseudobulbs and are referred to sometimes as Encyclia, while others have thin tall stems and are commonly called Reed Stems. There are so many species, so diversified, both in color and in florescence, that it becomes very difficult to limit oneself to just a few of the plants. We have selected a few of the more popular species easily grown under practically any condition.

Epidendrum alatum. Rounded conical bulbs with 2 stiff strap like leaves 12 to 18 inches long. Spikes slightly arching, branched. Flowers about 2 inches across. Sepals and petals shaded with brown purple, lip yellow with rose purple striations or shadings.

Epidendrum atro-purpureum. Bulbs 2 to 4 inches high, ovate, with 2 leaves 12 to 15 inches long. Flowers 2 to 3 inches across on 5 to 12 flower racemes. Sepals and petals green and chocolate brown. Lip is white with crimson radiated blotch in center. Very fragrant. *Var. Roseum* has deep rose lip.

Epidendrum ciliare. Bulbs 4 to 7 inches high, resembling a *Cattleya*. Scapes erect, 2 to 8 flowered, 3 to 4 inches across. Sepals and petals narrow, yellowish white, with three lobed lip of pure white, fringed on the outer edges.

Epidendrum cochleatum. Spikes erect 5 to 10 flowered, 2 to 3 inches across. Sepals and petals narrow, twisted, yellowish green. Lip deep purplish black with lighter veins. Sometimes called the cockle shell orchid or the black orchid. Seems to be continuously in bloom.

Epidendrum nemorale. Ovate bulbs. Tall spikes



Sarcocylus Hartmanni

lightly branched with many 3 to 4 inch flowers. Sepals and petals narrow, rose mauve, lip large with almost white center bordered with deep rose. Flowers are star-shaped and long lasting.

Epidendrum radiatum. Stout 3 to 6 inch elongated bulbs with long narrow leaves. Spikes 3 to 8 flowered, about 2 inches across. Sepals and petals cream color, lip white, shell like, with radiating purple lines. Very fragrant. Each plant seems to have a different fragrance.

Epidendrum vitellinum. Dwarf growing plant about 6 to 9 inches high. Semi-erect scapes, branching, 8 to 10 inches high. Flowers about 1½ inches across, sepals and petals bright cinnabar red, lip and column yellow. Quite colorful.

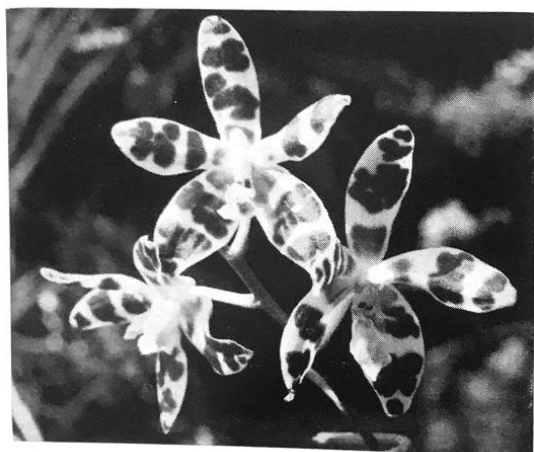
The *Maxillaria* tribe or family comprises several hundred species, varied in appearance in both plant foliage and flowers. Most *Maxillarias* are easy to grow and do very well under *Cattleya* conditions. A few plants of these should be in every collection.

Maxillaria grandiflora. Short pseudobulbs with leaves lanceolate type up to 15 inches in length. Three to 4 inch flowers, creamy white with lip reddish purple and yellow. As the name would imply, quite attractive.

Maxillaria luteo-alba. Tall growing leaves 15 to 18 inches in length. Flowers are medium size, sepals and petals white at base and bleeding out to reddish-purple tips, stained with yellow.

Maxillaria nigrescens. Another of the so-called "black orchids." Flowers about 2 inches wide, dark wine in color with very dark blackish purple lip.

Maxillaria Sanderiane. Reputed to be the finest of them all, on the rare side, and not in too many collections. Flat oblong bulbs with tall erect lanceolate type leaves. Beautiful plant even when not in bloom. Flowers up to 6 inches across. Creamy white sepals and petals, lip white stained with reddish maroon. Does best planted in baskets as inflorescences quite



Phal. mariae

frequently are deflexed sending blooms out the sides and bottoms of the basket. Can also be planted on raft, but when established, makes quite a large handsome plant and basket culture is recommended.

Maxillaria tenuifolia. A must for every orchidist. Small rhizomes with erect ribbon type leaves like wide blades of grass. Ascending or semi-climbing with rhizomes spaced a few inches apart, with base of bulb encased in brown imbricating parchment like covering, as is the stem bearing the numerous pseudobulbs. Flower bracts come from the base of the bulbs. These do well planted against fern slabs, totem pole effect, as ascending plant needs light support. Flowers 1 to 1½ inches in size, yellow petals and sepals spotted heavily with red. Lip same coloring with some purple spotting. Referred to most commonly as the "coconut pie" orchid, and when in bloom the entire greenhouse is as fragrant as a bakery just taking fresh baked coconut pies out of the oven.

Some of the more fragrant orchids belong to the

Brassavola genus. There seems to be much controversy as to the proper category some of the species should be listed with, as some were earlier classified as Epidendrums, Laelias and Cattleyas.

Brassavola Digbyana. Habit resembles that of Cattleya or Laelia, with 3 to 8 inch bulbs with single cattleya type leaf covered with grey powdery substance. Flowers usually one only, 4 or more inches across, slender sepals and petals with large rounded lip with heavy fringed margin. Color is white shaded with green or light green. Very fragrant in the evening hours.

Brassavola cucullata. Narrow rush like foliage. Flowers about 2 inches across, sepals and petals very narrow about 3 inches in length, with inch size lip more or less triangular shaped. Color is greenish white. This too is quite fragrant during the evening hours.

The Cattleya genus of course is the most popular,



Epidendrum mariae

showy, and useful. They are used greatly as one parent of new hybrids, and assist in controlled flowering by the cut-flower growers.

Cattleya Aclandiae. Small type plant with thin pseudobulbs about 6 inches high. Flowers about 3 inches across, olive green with purple blotchings, lip brilliant magenta. Quite showy. Does best on slabs or shallow baskets.

Cattleya amethystoglossa. Very tall growing plant with long slender bulbs. Flowers are in clusters, about 4 inches across, sepals and petals rose with purple spots. Lip is magenta. Flowers deepen in color as they age.

Cattleya bicolor. Slender tall bulbs. Flowers 4 inches across. Sepals and petals bronzy-green, lip rose purple.

Cattleya Bowringiana. Tall pseudobulbs, swollen at the base. Spikes heavily flowered. Flowers 2 to 3 inches, rose purple with darker lip.

Cattleya citrina. The upside down flowering cattleya. Bright yellow waxy flowers, semiclosed form,

single flower to scape. Leaves coated with white substance giving grey appearance to plant. Must be planted hanging down, and does best on slabs.

Cattleya Forbesii. Cylindrical pseudobulbs 12 to 15 inches high. Spikes have 2 to 5 flowers, sepals and petals yellowish, lip yellow with reddish streaks, whitish ground. Variable blooming season.

Cattleya guttata. This cattleya and its many varieties are always interesting in a collection. Tall thin pseudobulbs. Spikes have up to 15 flowers, sepals and petals tawny yellow densely spotted with deep crimson. Lip rose or magenta.

Cattleya Warneri. Labiata section. Definitely the hybrid cattleya type of growth. Large deep rose flowers with deep crimson lip. Very fragrant.

The *Laelia* genus, usually similar to the *Cattleya* in growth, adapts itself very easily to outside culture.



Epidendrum Schumannianum

The Mexican species like more light, air and moisture. All do well on slabs or in baskets. We have many of them growing in oak trees, and while the temperature sometimes is down to freezing, we have good air current and our plants are not hurt.

Laelia albida. Dwarf growing plant with 1 to 2 inch bulbs with narrow strap leaves. Spikes arching 10 to 15 inches long, with 5 to 7 flowers about 2 inches across. Sepals and petals white, lip rose flushed.

Laelia anceps. Three to 5 inch bulbs, sort of four sided. Tall scapes with 2 to 6 flowers, 3 to 4 inches across. Sepals and petals deep rose, lip crimson purple, side lobes yellow with red markings. There are many varieties with color variations in both the lip and entire flower. A well established plant will have 10 to 20 spikes in bloom at once and therefore is quite showy.

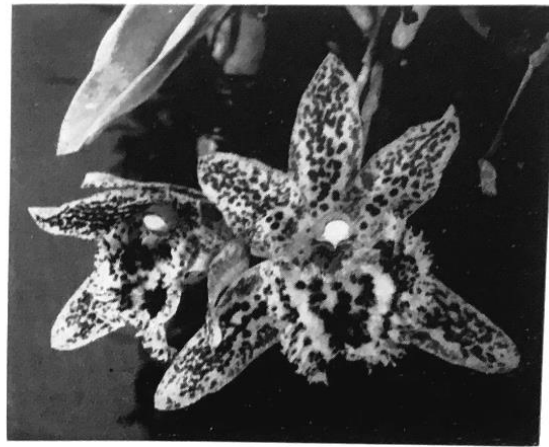
Laelia cinnabarina. Bulbs 5 to 9 inches high, with

reddish leaves. Spikes erect 12 to 24 inches long, with 6 to 15 flowers. Flowers 2 to 3 inches across, with pointed segments, bright cinnabar red.

Laelia flava. Resembles *Laelia cinnabarina* in habit but smaller plant. Spikes 8 to 10 flowered, 1 to 2 inches in size, clear canary yellow in color.

Laelia grandiflora. Small rounded bulbs. Spikes 1 to 2 flowered, flowers large, about 6 inches in width. Sepals and petals rosy, lip whitish in center, margined and spotted with mauve purple. This flower has tremendous sheen or iridescence.

Laelia purpurata. Many varietal forms of this species. Tall growing, with long dark leaf 20 to 30 inches high. Scapes 3 to 9 flowered. Flowers large up to 9 inches across. Sepals and petals rose white, deepening with age, lip has yellow throat striped with crimson, and front lobe deep crimson.



Kefersteinia Tolimensis

Laelia tenebrosa. Plant form similar to *Laelia purpurata*. Scapes 2 to 5 flowered. Large flowers, sepals and petals reddish brown, lip dusky deep purple, with lighter shadings at edge. Very striking flower.

This is only a very minute listing of botanicals or species. Space precludes including some very unusual genera that would add to any collection. Most plants are in the price range that anyone can afford, and can grow under practically any condition. Join the many avid orchidists who are finding this hobby on a small or large scale to be absorbing, relaxing, and exciting. Day-dream with them of tropical areas and give some thought to the early collectors, whose stories are as interesting as present day adventure novels. A few plants will start you on your way.

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Orchids

TO BE OR NOT TO BE?

VARINA WEBB VAUGHN

A recent book dealing with the threatened vanishing of the golden eagle from America's skies makes the point that, for this country's public to become actively interested in preserving a plant or animal species, or even a wilderness area, a practical value must be proven — that beauty is not, in itself, enough. An example noted is the preservation of certain wild fowl, and their increase through management, because of their popularity with hunters, while species that provide neither sport nor financial return may perish unnoticed. Similarly, little enthusiasm can be engendered for preserving wilderness, as such, but speak of turning it into campsites and playgrounds and the proposition becomes understandable and desirable.

For years, we have watched the advancement of ugliness across the land, the darkening of clear water, the stilling of bird songs, the inexorable advance of the bulldozer. In the warmer areas, as the forests went down, their crowns of epiphytes perished and everywhere delicate terrestrial orchids were trampled underfoot or died from disturbance of water tables.

This is not to present a hopeless picture where conservation of orchids is concerned. It is, however, intended to indicate that education is needed and that orchid societies and real orchid enthusiasts are the only organizations and people who can do the job. The "public" of whom we speak has never seen the vanished forests of Colombia, with their loads of magnificent orchid blossoms, nor the masses of yellow lady's-slippers that may still be found around the Great Lakes, and they will never see the thousands

of fluttering white ghost orchids (*Polyrrhiza lindenii*) which once graced the centuries-old cypresses of Florida's swamps, to reflect in the dark water at their feet.

Fairly recently, however, the continuing efforts of conservation-minded organizations and individuals are beginning to bear fruit in an increasing administrative and public awareness. It seems a good time, then, for orchid people to take a look at their own segment of the problem of conservation.

First, is it worth while to try to preserve native orchid species? Of what value are orchids in the wild? From the financial standpoint, they are valuable only to the persons who remove and sell them — a small part of the orchid community. From the viewpoint of plant scientists, they are living sources of knowledge in a wide range of fields, much of the information unobtainable from captive species grown in an artificial environment. And from the standpoint of every plant lover their transcendent worth is that of natural beauty, the value of which was recently well expressed by the President: "Natural beauty is more than a rich source of pleasure and recreation. It shapes our values, molds our attitudes. It feeds our spirit, and it helps to make us the kind of men and women we finally become."

Granted that there are reasons for preserving the wildlings in habitat and other natural settings, how may this be done? It was in search of answers to these and similar questions that the American Orchid Society recently explored the need for appointing a permanent Committee on Conservation of Orchid

Species. Replies received from divergent parts of the world evidenced remarkable similarity of thought.

From a part of the United States where terrestrial orchids are still to be found come these comments: "I believe that we have a great deal of orchid habitat in the state parks (of some states). Unfortunately, those who administer these parks are concerned mainly with recreational use in the sense of camping, fishing and hunting. There is little or no attempt to preserve the native plants beyond lip service to it." The writer then cites an instance where a gravel walk was constructed directly upon a large station of ground orchids, not from intent to destroy, but through lack of knowledge.

He continues: "It would seem to me, therefore, that one immediate approach which might be made to conserve orchids is to start a program to educate those who administer our public lands that there is more than one sort of recreation; that many enjoy our native plants as much as some enjoy boating, fishing, or hunting. Where beds of native orchids are known within public lands' boundaries, special attempts could be made to protect them from destruction. If we could make the proper persons aware of it, we have a great deal of orchid habitat already in public ownership without our spending money to acquire it; there we need only to educate."

In summation, there is this comment, "I honestly believe that the best method of orchid conservation is to obtain large natural areas of varied conditions and to preserve or maintain conditions there through management. Areas must be large enough to protect water levels. Probably a compromise between absolute preserves and public land use would be the only method financially feasible."

The widespread problem of destruction of orchids through devastation of habitat is also present in some countries in our southern hemisphere, though in a different form. Crude agricultural practices include continual deforestation by fire and axe. As land fertility is exhausted, cleared spaces are extended outward in all directions. Headwaters are deforested, vegetable waste is burned, dry season drought becomes harder at lower levels and a vicious circle of destruction is in operation.

As an approach to conservation under these conditions, a correspondent writes: "Interested persons in these areas envisage the setting up of a big forest, or forest-and-savanna 'reserve' on a suitable mountain slope, covering a complete range from sea level to perhaps 10,000 feet. In this reserve not only orchids could be conserved but many other plants and animal life in general, and species not naturally present could be introduced from other parts of the country."

Problems would be effective fire prevention and policing against human depredations.

Interest in this field is by no means confined to the Americas. New Guinea is the site of a large scale "experiment in conservation" — just what part orchids will have in this program is yet to be seen. Orchid-rich Malaysia is beginning to recognize danger signals, though the writer is not aware of the extent of the interest. The International Union for Conservation of Nature and Natural Resources, with headquarters in London, has selected the Orchid Family to be a pilot project for conservation study.

A number of orchid groups in Australia, which still has an extensive orchid flora, are doing an excellent job of naturalizing plants in parks. At the same time, there is constant emphasis in orchid journals and other printed media upon the need for the measures being taken. There is also continuous effort to develop an appreciation for native orchids which is designed to result in preservation in the wild and improved cultivation in collections.

Reports on a variety of projects undertaken by orchid societies and by individuals are at hand. Some state that native orchids were established in what would be considered protected areas, only to fall prey to those whose automatic response to the magic word "orchid" is with a knife or shovel. The flower may be of a kind that does not appeal to the "collector" at all, or the plant may be a terrestrial of a type that requires such a delicate balance of original habitat conditions that these are nearly impossible to duplicate and maintain — nevertheless, the acquisitive person must take the hapless plant away with him.

Are we saying that all orchid collecting must cease? Not at all. The reputable collector, like the reputable dealer, has no desire to destroy indiscriminately the source of his income. Frequently, he is an ardent orchidist himself. And through the efforts of the plant hunter new species are introduced into cultivation. Selling of the best of these, and of the fine older introductions is another way to conserve species.

Laws designed to protect wild orchids are enforced to varying degrees but, in the final analysis, attitudes on the part of those who grow orchids are the only effective controls. Of all plant societies, ours are the most notable for reiteration of dedication to the "perpetuation and preservation of native species." Shall we assume the responsibility we proclaim? It will not be easy, but every orchid grower accomplishes the impossible as a matter of course. And here is a challenge worthy of our mettle.

West Palm Beach
Florida
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BASIC BOTANY OF ORCHIDS* . . . by T. J. SHEEHAN

Basic botany of orchids should be a topic of great interest to anyone, amateur or professional, growing orchids. Many people, and this is unfortunate, often become very involved in orchid growing and yet know very little about the botany of plants they are working with.

A discussion of basic botany would not be complete without first establishing the relationship of the orchid family to the rest of the plant kingdom.

The plant kingdom is divided into four major sections:

- Division I Thallophtes—this group encompasses bacteria, algae and fungi, or lower forms of plant life.
- Division II Bryophytes—next step up in evolution of the plant kingdom, containing mosses and liverworts.
- Division III Pteridophytes—ferns.
- Division IV Spermatophytes—more evolved group. All seed bearing plants fall into this category.

The Spermatophyte group contains plants we are most familiar with. Trees and shrubs around our homes and the majority of plants in woods and fields fall into this category. Division IV is an extremely large group of plants, and therefore, Spermatophytes are further subdivided into many smaller groups, one group, of course, being the family Orchidaceae.

Division IV is broken into two major subdivisions:

- Subdivision I Gymnosperms—this section includes all cone bearing plants and plants that do not have ovules enclosed in ovaries.
- Subdivision II Angiosperms—contains those plants that have seed and ovules enclosed in an ovary.

Subdivisions, like divisions, also contain large numbers of plants and must be further subdivided into classes, families, orders, tribes, genera and species. However, since we are only concerned with the orchid family and not any specific variety, we will only break the groups down to family level.

Orchids having their ovules enclosed in an ovary naturally fall into Subdivision II, the Angiosperms. This group contains two classes:

- Class I Monocotyledons—all plants having one cotyledon, parallel veins and having no annual rings.

- Class II Dicotyledons—plants having two cotyledons, netted veins and annual rings or cambium layers.

The orchid family has parallel veins, and no annual rings, therefore, is part of Class I — Monocotyledons and is just one of the many families in that group. Orchids are close kin to members of the lily, amaryllis and iris families.

The orchid family (Orchidaceae) is a very large and composite group encompassing upwards of 30,000 species according to some authors. Consequently, the orchid family is further divided into orders, tribes, sub-tribes, genera, species and varieties.

This vast family of herbaceous plants is circumboreal, that is, growing in all parts of the world, except within the Arctic Circles and major deserts. No matter what part of the world you visit or live in, you will find orchids native to that region. Florida alone has over 80 species of orchids in its native flora, whereas Hawaii, often considered the "Orchid Capital of the World" has only two and possibly three native species.

The questions that often arise at this point are "Why is a plant an orchid?" and "How are they distinct from members of other plant families?" These questions can be answered simultaneously, as there are a combination of five characteristics found in orchids that are not found in any other plant family. These characteristics are used to separate plants we know as orchids from other plants.

If a plant has four or more of the following characteristics, it is included in the orchid family:

1. Gynandrium (Column) — an organ formed by union of the style, stigma and stamens. This structure is found in the center of the flower. The gynandrium may bear one fertile stamen, represented by a terminal anther on the column (as in *Cattleya*) or two lateral stamens situated midway along the column (as in *Cypripedium*).

2. Pollen — the pollen is mostly in masses (Pollinia) that are removed by insects in the act of pollinating. Number of pollinia varies in most cases from two to eight. They may be borne on simple or forked stalks or may even be sessile.

3. Rostellum — the style often ends in a beak or projection lying between the anther-cells, or standing at the base of the anther. This dam of tissue is called the rostellum and is instrumental in preventing self-fertilization.

4. Flower is zygomorphic — a special type of irregular flower.

5. Seed — a very minute naked (no endosperm) seed.

If a plant has all aforementioned characteristics, then you can be sure that it is an orchid. Actually there are a few plants having only four characteristics, yet these are still orchids.

A few more terms pertinent to any discussion of basic botany of orchids follow:

1. Monopodial — *mono* meaning one — literally having one foot — refers to plants with an ascending stem such as *Vanda* and *Phalaenopsis* (Figure 1).

2. Sympodial — *sym* meaning with — literally with feet — actually a prostrate rhizome with lateral branches such as *Cattleya* (Figure 1).

3. Rhizome — a modified stem.

4. Pseudobulb — a false bulb — the thickened fleshy stem (or branch) of orchids — as in *Cattleya*, *Cymbidium* and many other genera.

5. Lead — new growth on sympodial plants.

6. Backbulbs — old pseudobulbs.

7. Roots — thickened fleshy structures — covered with "velamen," a layer of white spongy tissue — function to "soak up water." Actually the velamen layer only holds water for a very short period of time.

8. Leaf-buds conduplicate — leaves folded together lengthwise within the bud.

These terms are illustrated in Figure 1. Once you are familiar with them they will no longer seem strange. Labelled illustrations in Figure 1 will help you familiarize yourself with these names.

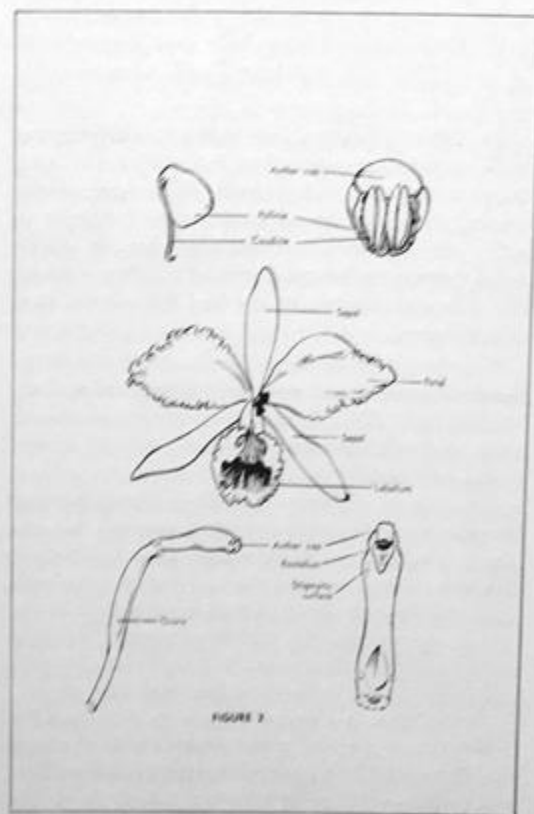
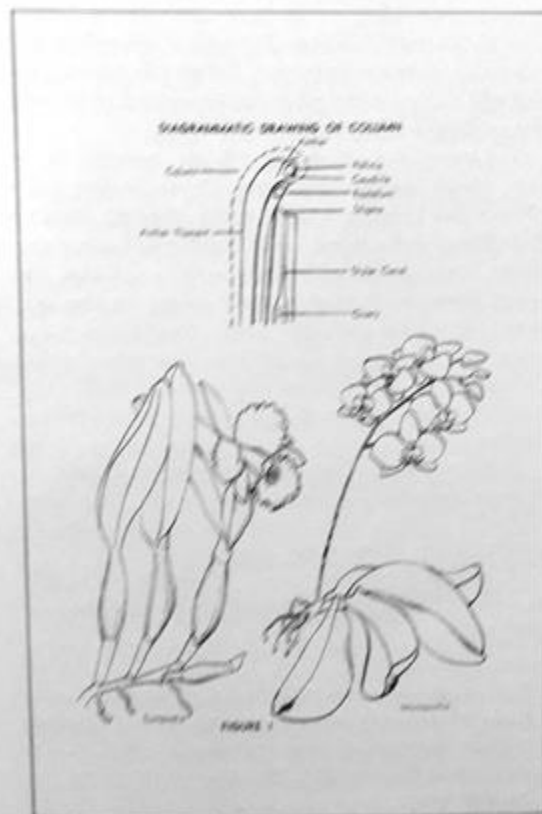
The flower is the most noteworthy portion of the orchid and is the structure we are all interested in. Earlier we mentioned the flower very briefly, when discussing various characteristics that make a plant an orchid. The reason we did not discuss it in detail at that time was because the flower is very unique in many ways, and, consequently, deserves special attention.

The hobbyist wants to show off flowers to his friends; florists are interested in the flowers' potential in a corsage or arrangement; and the breeder eyes it with respect to its potential as a parent for producing top quality offspring.

Consequently, since this segment of the plant is of great importance, let us look at the flower in great detail and see why it is so interesting.

Since the *Cattleya* flower is the most familiar orchid flower, we will use *Cattleya* as a model for studying structure of an orchid flower.

The flower is zygomorphic. A special type of ir-



regular flower (Figure 2) that can be divided in one plane and will produce two identical halves. This can be accomplished by splitting the flower in a perpendicular plane. Any other form of irregular flower cannot be divided into two equal halves. Consequently, an orchid is a specialized flower.

Orchids, like many monocots, have floral segments arranged in groups of 3's. There are exceptions as in *Cypripedium*, but in general most orchids have three merous segments. The outer whorl consists of three sepals, usually similar, narrow and not always very showy. Sepals protect the unopened bud while emerging from the sheath. The next inner whorl consists of three petals, with two — the lateral ones — similar, usually larger than the sepals and very colorful. The third segment forms the lip — labellum — which may be saccate (*Cypripedium* or *Paphiopedilum*) or spurred (*Dendrobium* or *Angraecum* — the spur in species of *Angraecum* often 12 inches long); in some genera the middle lobe of the lip is divided into distinct parts. The lip, which is often the largest and most colorful portion of the flower, is believed to have arisen from fusion of one petal and possibly two or more anthers. Variations found in lips are almost as great as the variations in flower shapes and colors.

Catasetum, for example, has a lip with a trigger mechanism which ejects the pollen when insects alight. *Phalaenopsis* flowers have hard structures on the lips called calli, and have fragile antennae near the tip.

The ovary (Figure 2) is inferior, meaning that floral segments are attached to the apex of the ovary, mostly elongated and twisted. Why are ovaries twisted? Orchid flowers are said to be resupinate in bud, that is, the bud as it emerges is actually upside down. Consequently it must turn 180° before it opens, and it is this turning of the bud that results in a twisted ovary.

The ovary will develop into a capsule about the size of a lemon if pollinated and will produce between 500,000 and 1,000,000 seed. Records indicate that as many as 3,770,000 seed have been produced in one orchid seed pod.

The column (Figures 1 and 2) is the white waxy structure atop the ovary and often partially or completely enclosed within the lip. Botanists believe that the column evolved through fusion of stigma, style and stamens. This portion of the plant is the center of reproductive activity. In order to fully understand the column let us start from the apex and study the arrangement of the component parts.

The column in *Cattleya* is said to be monandre, or having one terminal anther covered with an anther cap. Removal of the anther cap exposes four pollinia in *Cattleya* — each pollinium has a caudicle or handle.

Removal of pollinia requires man or a strong insect. As an insect withdraws from the flower, the hook at the base of the caudicle catches onto the insect's body and the pollinia is carried to the next flower. Thus, cross pollination is assured.

Proceeding down the column, the next structure encountered is the rostellum. This structure forms a fence or dam between pollinia and stigmatic surface. A gland is also present which the insect ruptures on entering, coating its body with a sticky fluid to which the caudicle adheres as the insect backs out. This dam of tissue is also instrumental in preventing self-pollination. In the few cases where self-pollination occurs, research workers have found that a self-diversion of the rostellum takes place, letting the pollinia fall onto the stigmatic surface affecting pollinization.

Just below the rostellum there is a concaved area covered with a sticky substance. This is the stigmatic surface. As an insect enters seeking nectar, with pollinia attached to his back or forehead, he forces his way past the stigmatic surface — the labellum acting as a spring holding him against the column — and the pollinia adheres to the stigmatic surface and pollination is complete. The pressure of the labellum is so great in some flowers that insects have become wedged in between the lip and column and been unable to get out.

A stylar canal (Figure 1) leads from below the stigmatic surface to the ovary. Pollen tubes must pass through this canal to reach the ovary and eventually the ovules to bring about fertilization.

The ovary lies below the column, contains many very minute rudimentary ovules. Ovules develop only after pollen has been applied to the stigmatic surface. If pollen is not applied while the flower is open the ovules never develop. However, once pollination has taken place, development of the ovules begins, and once the ovules are developed, fertilization takes place and seed formation follows. The period from pollination to fertilization varies considerably. The number of days may be as high as 90 in some *Cattleya* crosses.

Anyone having a thorough knowledge of *Cattleya* flowers and their component parts will have little difficulty locating and identifying various parts of flowers from other orchid genera.

A knowledge of basic botany of orchids will enable any grower to more thoroughly enjoy his hobby or profession.

*Talk presented at the Sixth Annual Orchid Growers Short Course, University of Florida, Gainesville, Florida, November, 1964. Reprinted, with permission, from *The Orchid Advertiser*, Vol. 2, No. 7, August, 1965.

ORCHID POTTING MEDIA



Orchid plants are tough; they have to be! I've seen orchids growing in some of the most unlikely potting materials one could imagine: From marbles, baling wire, stumps of trees, gravel, to pumice, and even plastic foam.

Without a doubt orchid growing media are the most often misunderstood factors in orchid culture. Basically, two general rules are wise to follow when searching for potting materials — they must be exceptionally well drained and aerated.

It seems logical that we return to the orchid's natural habitat to learn the individual requirements and basic environmental needs. When we do this we find two general classifications of orchids — epiphytes (plants that grow on other plants but do not penetrate their substance nor absorb their juices) and terrestrials (plants that grow in or on the ground). Both categories include plants that grow from 1½ inches at maturity to those that grow to 20 feet in height.

We also find that these two general classifications are themselves divided into two further types according to the growth habit of a plant. The sympodial type indicates the growth of several stems or pseudobulbs, and rhizome, such as in cattleyas. Monopodial types bear one stem instead of several with no pseudobulb or rhizome, such as vandas and phalaenopsis. Monopodial types may branch.

Since it is literally impossible to duplicate the orchids' exact local environment, we strive to create a reasonable facsimile. For example, the cattleya is known to be an epiphytic type and is usually found growing high on the limbs of trees in the Southern Americas. We have found that the roots do not derive their sustenance from the tree itself, but the roots are designed to cling to the surface of the bark and wind themselves through the mosses and decomposed leaves found on the surface of the bark. Roots of this type of plant are protected from the sun by thin layers of sponge-like cells capable of absorbing many times their own weight in water. Although frequently soaked by rain in their native habitat, the plants are quickly dried out by the sun and wind. With these observations made in nature we know that roots must have free air circulation, plants must be well drained, and the material must be slightly acid.

For over a century the principal potting material was *osmunda* fibre, the fibrous roots of the cinnamon fern. Correct potting in this material was difficult and

often took from ½ to 1 hour per plant. Because of its relative scarcity, *osmunda* became quite expensive and growers, recognizing its limitations, began searching for a more simple potting media.

Another of the methods used to propagate orchids was the hydroponic method of growing plants in an inert media, such as gravel or pumice. Required fertilizers were flushed through the root system at the time of watering. The correct nutritional balance was difficult to maintain and this method was discarded.

Others have tried using shredded redwood and oak leaves and found this combination decomposed far too rapidly. Redwood shavings were popular for a time, but the supply of true redwood became scarce and this too was discarded.

Tree fern is another popular material used in potting epiphytic orchids, for it too is slightly acid, has excellent aeration, and breaks down slowly. An advantage tree fern has that other mediums lack is its extreme long lasting quality. Frequently, the entire root ball may be shifted into a larger pot intact without removing the old material. Fresh material is added around the old root ball and firmed tightly resulting in a savings in time and cost of material and practically no shock to the plant whatsoever.

As orchid growing progressed, commercial growers became more aware of the costs of potting materials, the length of time it could be utilized before decomposing, and the time involved in the act of potting. The popularity of growing orchids as a hobby began to grow by leaps and bounds after World War II. Where it was once a hobby pursued only by wealthy estates who maintained a staff of gardeners, the hobby has increased tremendously and today thousands grow nature's most advanced plant as a backyard pastime.

Since 12 to 14 years ago, serious growers were urged to try several types of tree barks as potting materials. As these were by-products of the lumber industry they were relatively inexpensive, available in quantity, and gained wide usage in a short time. The ease of handling while potting combined with the relative ease of watering gained immediate favor with hobbyists. Several kinds of bark are currently on the market under various trade names; redwood, cedar, and pine are offered, but fir bark (botanically, *abies concolor*) is used widely by growers and hobbyists alike.

When bark was first introduced it was not graded into its present refined grades. Much wood pulp was

present and caused mycelium fungi to grow within the pot preventing water from reaching the root system. The fine dust particles were not entirely screened out and this too caused trouble as the bark tended to pack solidly, excluding both air and water.

Today, these problems have been corrected and fir bark is available in many graded sizes free from dust or fractions. Four basic particle sizes are available. The smallest size is *FINE* and contains small chunks $\frac{1}{8}$ to $\frac{1}{4}$ inch in size. This grade is used for potting small seedlings. Next is *MEDIUM* size bark with chunks from $\frac{1}{4}$ to $\frac{1}{2}$ inch. Many use this in potting cattleyas up to the $3\frac{1}{2}$ inch pot size and also for thin rooted orchids such as miltonias and dendrobiums.

The *STANDARD* size bark is a general all purpose grade that is used for mature sized plants. Chunks range from $\frac{1}{4}$ to 1 inch in size. The *COARSE* grade contains chunks from $\frac{1}{2}$ to 1 inch in diameter and is used chiefly for the fleshy-rooted orchids such as vandas and phalaenopsis, or large specimen plants. Do not add redwood chips to this bark. Pot into plastic containers, water profusely, and fertilize once per week.

Fir bark has a natural Ph of 3.7 to 4.1, being slightly acid. Some growers add dolomite lime to their potting mix to correct the acidity, but most areas do not require this addition as the water used appears to act as a buffer to the slight acidity of fresh bark. Watch your watering schedules carefully, for as bark becomes older it retains a higher content of water and begins to decompose slightly. New bark needs more water — old bark less. When you do water, *always* water thoroughly to leach out any accumulated salts. Naturally, different size plants retain moisture for varying lengths of time and pots should be grouped together for ease of watering.

Many growers find that adult cattleyas do well in a mixture of $\frac{2}{3}$ fir bark (medium or standard grade) and $\frac{1}{3}$ redwood chips (medium grade). This mixture holds the moisture somewhat longer than straight bark.

Another product growing in popularity as a potting media is redwood wool. The wool is derived from the inner layer of bark of the redwood tree. Some growers are potting plants directly into this material from the flask, and continue up to 5 inch pots. The key to success seems to be keeping the redwood *constantly* saturated with water. Small pots are watered daily. As redwood is highly acid, it must never be allowed to become dry or it will burn the roots.

Before potting pre-moisten any material used as a growing media. This makes it easier to work, settles any fine dust, and prevents the potting media from absorbing valuable moisture away from the roots of the plant.

All bark growing materials are deficient in growing chemicals and a fertilizer program should be followed. We suggest one of the high nitrogen soluble fertilizers available from most orchid growers. Set up a schedule and fertilize at least once every two weeks.

In turning to the terrestrial types of orchids, the potting media becomes somewhat more complicated. Scores of combinations of mixes are used by commercial growers with general success, but all of these follow a certain basic formula.

While researching the cymbidium orchid we find that it grows in moist areas in Asia, where the growing media is porous and slightly acid. When found in their natural state, cymbidiums frequently do not send their roots down into the actual soil itself, but the roots stay in the loose, open, not quite decayed top litter of the forest floor. Roots reach only 6 to 8 inches below the surface of the litter but seldom enter the true soil itself.

With this in mind potting materials have been devised that simulate the cymbidium's natural growing media. We find that the mix should be slightly acid, porous, should not contain clay, and should not break down rapidly. Actually, cymbidiums enjoy the same general type of mix as camellias, fuchsias, ferns and other shade plants. They require large amounts of water but will not tolerate water standing around their roots.

A typical mix might contain these ingredients: Fir bark, clay free sand, redwood shavings or bark, dry organic fertilizers, and possibly lime to correct the acidity. Oak leaves too may be used with success, but tend to decompose rapidly, thereby changing the structure of the mix and its chemical balance. The ideal potting media should remain stable for as long as possible without change. Prepared mixes are sold by many orchid nurseries.

A potting mix currently gaining in popularity because of its relative simplicity and growing results is:

0 - $\frac{1}{8}$ or 0 - $\frac{1}{4}$ inch fir bark
10% sand by volume, using a medium grade sand such as plaster sand

(Avoid coarse material containing gravel)

The fertilizer additives for this mix should consist of the following:

Amount per cubic yard of mix

3 lbs. single superphosphate

$\frac{1}{2}$ lb. potassium nitrate

10 lbs. calcium carbonate lime

10 lbs. dolomite lime

7 lbs. organic nitrogen such as blood meal, or hoof and horn meal

It is a proven fact that many types of orchids withstand tremendous amounts of abuse. Cattleyas

have been grown in glass marbles for years with nothing but an occasional watering of tap water, but this is not proof that orchids do not require food. This merely points out their tenaciousness and ability to adapt themselves to poor situations.

As we progress in our knowledge of orchids, we are constantly searching for potting media that are the best for each of the thousands of types we grow.

Since our orchids come from scores of different environments, one simple potting mix is not always the answer, but at present we find the general usage of fir bark to be as satisfactory as any media available.

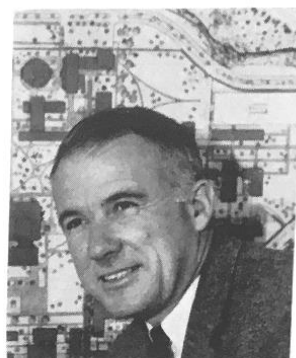
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The Orchid Show and Its Designer

The theme "The Wonderful World of Orchids" of the Orchid Show at the Fifth World Orchid Conference would lend itself to a variety of approaches. The show designer, Victor H. Pinckney, Jr., A.S.L.A., has chosen to interpret the theme in an informal garden setting. An elevated entry bridging the Orchid Society of Southern California's theme exhibit provides the visitor an overview of the main exhibit area, and an exciting introduction to the Show. Paths wandering informally among garden exhibits under tall trees lead through the arena and off into the wings which contain table and booth exhibits.

Mr. Pinckney has a distinguished connection with orchid exhibitions in Southern California, having designed several shows for the San Diego Orchid Society and the Tenth Western Orchid Congress. As a well known landscape architect in Pasadena, California and Phoenix, Arizona for the last twenty-five years, he has designed numerous flower shows, and many award winning exhibits. Among his public works of note are the grounds for the University of California at Santa Barbara, and the canal parks in Phoenix.



Victor H. Pinckney, Jr.
A.S.L.A.

SOME BOOKS

Perhaps it's true of any plant hobby, but that of growing orchids seems to be attractive to many people who could be described as "hobby-prone." One finds orchid growers who also collect stamps with orchid pictures, photograph orchids, collect china with orchid pictures, etc. Collecting books on orchids, of course, has the very practical purpose of assisting the grower in his culture techniques and adding to his knowledge of the family, as well as being another interesting approach to the hobby.

Fortunately it is not necessary to buy extensively to have access to many orchid books. Many societies have libraries and probably the best one in the area belongs to the San Gabriel Valley Orchid Hobbyists. Any member can borrow the books. The Botanical Library at the Los Angeles State and County Arboretum has a good collection of orchid books, and these may be used there for reference purposes. Also, of course, commercial growers and advanced hobbyists often have extensive collections which may be avail-

able as a reference source — and generally *not* borrowed.

The accompanying bibliography has been compiled with several points in view: (1) availability, (2) value to the amateur, and (3) the compiler's acquaintance with them. In general, scientific works have been excluded, particularly floras and specialized studies of the genera. Their inclusion would lengthen the list enormously, and in addition, many are no longer in print. Those interested should consult the chapter bibliographies of Carl Withner's *The Orchids* (particularly ch. 2).

Two general gardening dictionaries are included. Every gardener should have at least one of these on his reading table. Bailey's *Standard Cyclopedia of Horticulture* is aging, but was of such fine quality originally as to be more useful than any later published American work. The *RHS Dictionary of Gardening* is one of the great works of the gardening world. It probably gives an introduction to more orchid genera

and species than any other single work available today.

Sander's complete list of orchid hybrids is required for those interested in breeding, and very useful to all others. If you don't get it yourself, make sure your orchid society keeps a copy available. As a list of crosses it may have limitations, but it's the only study book we have. Without it hybridists would be lost.

Carl Withner's *The Orchids* is a botanical rather than a horticultural book. However any orchid enthusiast with a minimum knowledge of botany will find most of the book readily intelligible. He will also find much to ponder over and a real enrichment of his enjoyment of his hobby. The World Orchid Conference *Proceedings* are very much a mixture — one finds basic orchid botany next to culture and flower appreciation. The articles are interesting and stimulating and give viewpoints on orchids and orchid growing from most areas of the world.

The books by Dunsterville, Kupper, Monlen, and Wright are primarily pictorial in nature. Color photography of flowers always leaves something to be desired, but these are well done. Certainly they open new avenues to many hobbyists who think of orchids as "cattleyas" because they present primarily the fascinating, often minute, botanicals.

Sander's *Orchid Guide*, Veitch's *Manual* and Williams' *Manual* are primarily useful to the species grower, the specialist, and the hybridist. The reprints of Williams and Veitch have made available again great classics of the last century. With the passage of time some of their terminology has become outdated, but not overly so.

Most of the remainder of the titles on the list are primarily cultural in nature. They generally consist of two parts: 1) a general description of orchid culture in greenhouses in temperate regions, and 2) lists of various species and hybrids found to be relatively easy to grow. Unfortunately these lists are often repetitive from book to book. Choosing only one from the list might be difficult, but probably Northen's *Home orchid growing* as the most recent, and most extensive, would be the choice.

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Bellflower, Calif.

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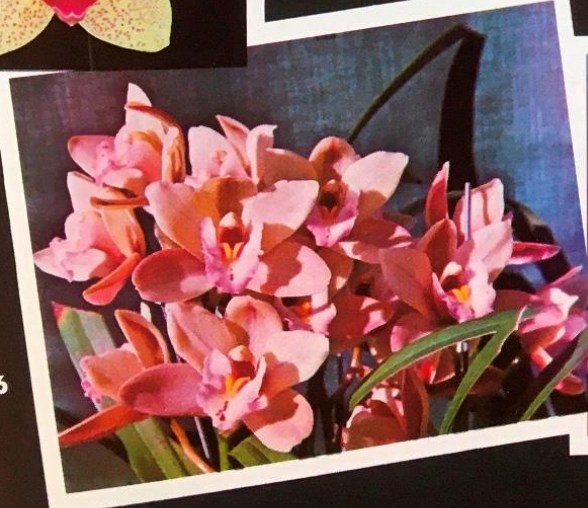
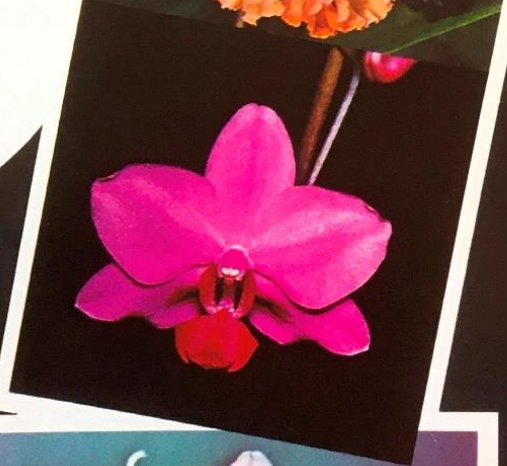
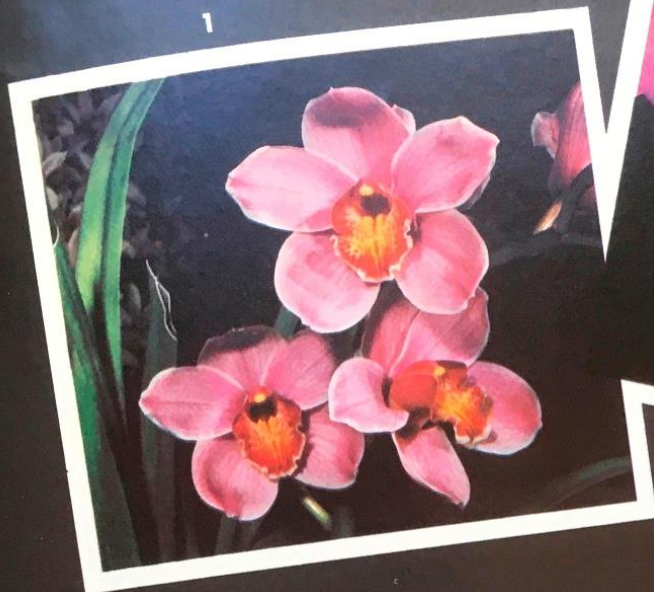
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1. Cym. LILLIAN STEWART 'Coronation' FCC/RHS
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L. Rabago
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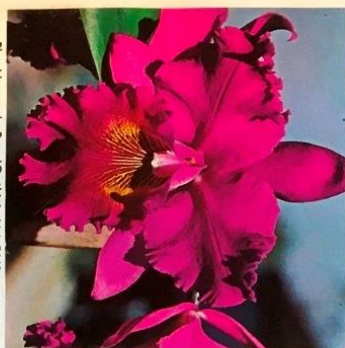
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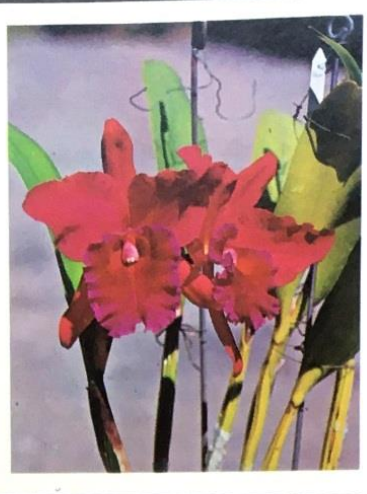


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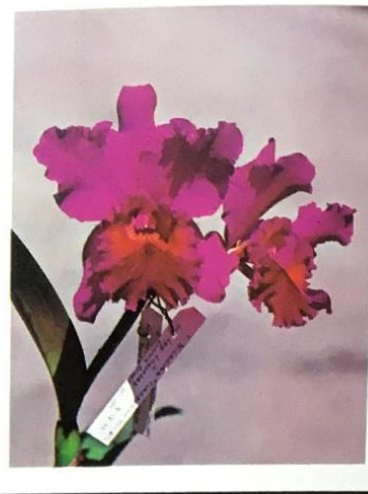
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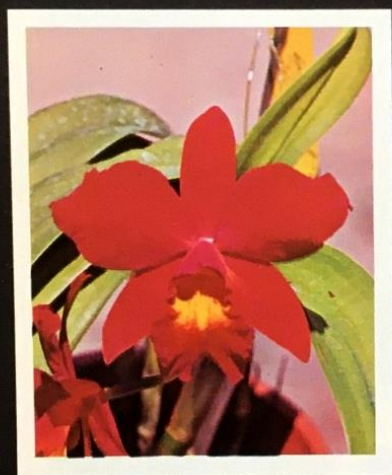
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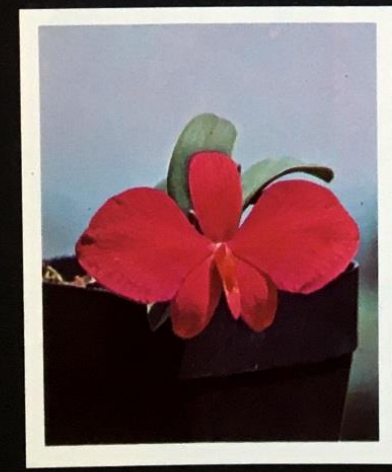


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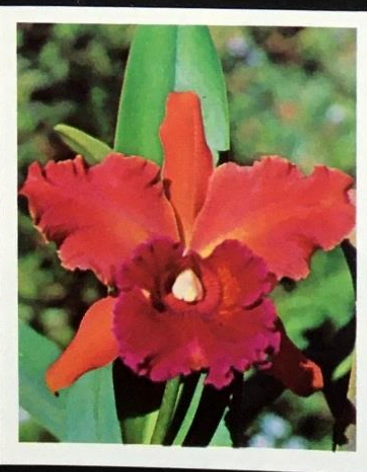


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POT. GORDON SIU 'RED RADIANCE' AM/AOS

Charles Chamberlain Hurst, famous English geneticist, predicted half a century ago that large, red Cattleyas would soon be produced by crossing *Sophronitis grandiflora* with the best large whites. This did not eventuate presumably because most albino Cattleyas carry either the C. or R. factor for purple color and are apparently of no more use for breeding reds than lavender Cattleyas. *Sophro* breeding did produce some beautiful, small, red orchids mostly rather difficult to grow and with a high sterility factor when used for breeding.

During the last few years, two developments have taken place which have given great impetus to the breeding of reds. The first of these was the production of some excellent reds of good size by combining yellow, orange and bronze *Laeliocattleya* varieties with dark red lavender Cattleyas. The classic illustration of this type of breeding is the hybrid Lc. Marie Ozzella made by the late Joe Ozzella of Hawthorne, California, by pollinating Lc. Lee Langford 'Copper Queen' with a dark red lavender *Nigrella*. This cross produced a whole range of reds from orange-red through fire engine red and brick red to dark red-purple shades. In fact, at least 70% of this cross would be classified as red. A few are extremely dark and there has been an occasional yellow. The cross is also notable for the fact that almost every plant that has bloomed has been an orchid that anyone would be proud to own. The forms of many are very fine, two of our favorites are illustrated herewith — the Red Queen, which is a brilliant orange red, and Dark Destiny, which is a plum red with orange overtones. Many of these reds are good size and excellent form, and, although most do not make prolific parents, several of the Marie Ozzellas have been used successfully in breeding and will in all probability lead to even better red orchids. Most of the Marie Ozzellas are of good size, averaging from 6" to 6-1/2" in diameter, and will, we believe, produce red offspring consistently when mated with *Sophronitis* hybrids showing any considerable degree of red coloration.

Because they have turned out so well, it is worthwhile to examine the breeding back of this cross in a little more detail. The Lee Langford parent, variety Copper Queen, is a 6" to 6-1/2" orchid of magnificent color, a brilliant copper-orange with a glowing copper red lip and some *dowiana* venation. Lee Langford is Lc. Calizona by S. J. Bracey, its copper and orange tones derived from L. *tenebrosa*, C. *dowiana* and C. bicolor. The Calizona is what might be termed a "soft" yellow and this overcomes the tendency to "cripple", inherent in its partner. In the Marie Ozzellas this tendency is further controlled by the *Nigrella* parent, a rather soft orchid which has C. *Fabia* twice

in its immediate ancestry. *Nigrella*, by the way, is an excellent example of the brilliant dark color bestowed by C. *dowiana*.

The question may be asked, why would a dark red lavender crossed with a copper orange produce red orchids? Our information on what action takes place is far from complete, but it seems obvious that in this instance the anthocyanin pigments responsible for the red and lavender colors in Cattleyas are here combined with the yellow anthoxanthin colors, derived not only from *Cattleya dowiana* but from the *Laelia* species in the Lee Langford ancestry. Both these pigments are sap soluble, and under certain conditions can and do mix to form new colors.

It seems quite evident that other red orchids may be produced by a similar type of breeding; certainly *Laeliocattleyas* having strong orange yellow and bronze coloration, such as Lc. Canberra, Gatton Glory, Mysedo, Edgard van Belle, Grande, etc., can be used successfully with brilliant dark red lavenders such as C. *Thethys*, *Ardentissima*, *Firebird*, *Fabia*, *Nigrella* and *Nigritian*, with the expectation of producing many fine reds. Surely, the best of the reds so produced when crossed with red *Sophros* will put us well on the road to producing in abundance the large, handsome, red Cattleyas all orchid lovers have desired for so many years.

Before we finish with the *Laeliocattleya* reds and with Lc. Lee Langford, we should mention that a few beautiful reds and yellows have been made by crossing Lee Langfords with whites with colored lips. With Lc. *Memoria Peter Sander*, a W/C/L, it makes Lc. *Lena Baldwin* 'Rouge' and 'Coral Sea,' fine reds here illustrated, and many good yellows. In fact, Lc. Lee Langford is a versatile and talented parent.

The second development of importance in breeding red Cattleyas has been the successful crossing of our finest large reds, red lavenders, orange and bronze Cattleyas with Slc. Falcon (Lc. *Aureole* x *S. grandiflora*), a brilliant red whose potential as a parent had not been realized in the 40 years since it received its FCC award from the Royal Horticultural Society.

Two varieties of Falcon are well known. Slc. Falcon FCC/RHS (1921) was awarded a second FCC by the American Orchid Society in 1960 and given the varietal name *Alexanderi*. Slc. Falcon 'Westonbirt' FCC/RHS (1922) was recently awarded an FCC by the American Orchid Society. During the more than 40 years since these fine varieties received their high recognition, hybridizers have tried to use them for breeding, in most instances without avail. Some years ago Rivermont Orchids obtained viable seed by crossing Falcon 'Alexanderi' FCC with Lc. *Charlesworthii*. These seedlings were poor growers and most of them died. A few, however, were carried to maturity and

have produced some gorgeous reds. Armacost and Royston some years ago were successful in crossing Falcon 'Westonbirt' with *C. intermedia alba*. The results from this cross were quite disappointing. Recently Mr. B. O. Bracey has secured seedlings crossing Falcon 'Alexanderi' with *L. cinnabarina*.

With the advent of embryo culture or green seed germination, we have found it possible to germinate a substantial number of these seedlings. To date, successful crosses have been made using Slc. Falcon 'Alexanderi' as the female parent and Slc. Anzac 'Orchidhurst,' Lc. Lee Langford 'Copper Queen,' Pot. Gordon Siu 'Red Radiance,' and Blc. Norman's Bay 'Low's' as the male or pollen parents. The probabilities seem excellent that some fine red orchids of good size and magnificent red color will be produced.

Some interesting work has recently been initiated using fine reds, both Sophro and non-Sophro, with what are loosely referred to as "double recessive" albinos as partners. There are apparently a few albinos in existence which carry neither the C., or chromogen factor, nor the R., or enzyme factor, for color and consequently do not overwhelm their breeding partner with lavender color. Crosses of this type to date have in all instances to our knowledge reflected only the color of the colored parent. Still another line of hybridizing activity that may be of

considerable value is the creation of new red parents of intense color, by crossing small red species, and in some instances yellow species, with each other and with the small Sophro hybrids.

An occasional fine red is produced by using some of the better Slcs. such as Meuzac or Estella Jewell with large modern lavenders containing considerable *C. dowiana aurea* in their ancestry. A recent example is Slc. Pearl Spencer, which is Slc. Meuzac crossed with C. Heyday. Some rather nice forms of Heyday have been around for many years. The parents are C. Profusion and C. Prospector, both carrying some *dowiana* in their ancestry. Pearl Spencer is an unusually fine red of good size and we will be greatly interested to know whether the cross produces other good reds. So far this type of breeding has not been too consistent. We know that on rare occasions large red orchids have cropped up in complex hybrids with comparatively small contributions by *Sophrontitis*, providing there have been generous admissions of yellow *Laelia* and *Cattleya* blood, as for example in Pot. Gordon Siu 'Red Radiance.' We know that large, red orchids may be made solely from *Laelia* and *Cattleya* ancestry consisting of both red-lavender and yellow varieties, AND we are convinced that our best hope for the future lies in combining Sophro reds with non-Sophro reds.

SOUTHERN CALIFORNIA ORCHID SOCIETIES

CYMBIDIUM SOCIETY OF AMERICA, INC.

(Meet fourth Tuesday, November through June, at 8:00 p.m., at Signal Oil and Gas Bldg., 1010 Wilshire Blvd., Los Angeles)

CYMBIDIUM SOCIETY OF AMERICA — Santa

Barbara Branch (Meet second Wednesday, November through June, at 8:00 p.m., at Santa Barbara Museum of Natural History, 2557 Puesta del Sol, Santa Barbara)

LONG BEACH AMATEUR ORCHID SOCIETY

(Meet first Monday of each month at 8:00 p.m., at Silverado Park Club House, 31st Street and Santa Fe, Long Beach)

ORANGE COUNTY ORCHID SOCIETY, INC.

(Meet third Monday of each month at 7:00 p.m., at Farm Bureau Bldg., 1916 W. Chapman Ave., Orange)

ORCHID SOCIETY OF SOUTHERN CALIFORNIA

(Meet second Monday of each month at 8:00 p.m., at Los Angeles County Museum, 900 Exposition Blvd., Los Angeles)

PALOMAR ORCHID SOCIETY

(Meet third Wednesday of each month at 8:00 p.m., at the Avocado House, Vista, California)

RIVERSIDE-SAN BERNARDINO COUNTIES ORCHID SOCIETY

(Meet second Thursday of each month at 8:00 p.m., at San Bernardino County Museum, Bloomington)

SAN DIEGO COUNTY ORCHID SOCIETY, INC.

(Meet first Tuesday of each month at 8:00 p.m., at Floral Bldg., Balboa Park)

SAN FERNANDO VALLEY ORCHID SOCIETY

(Meet second Thursday of each month at 8:00 p.m., at Golden Valley Auditorium, 13506 Sherman Way, Van Nuys)

SAN GABRIEL VALLEY ORCHID HOBBYISTS

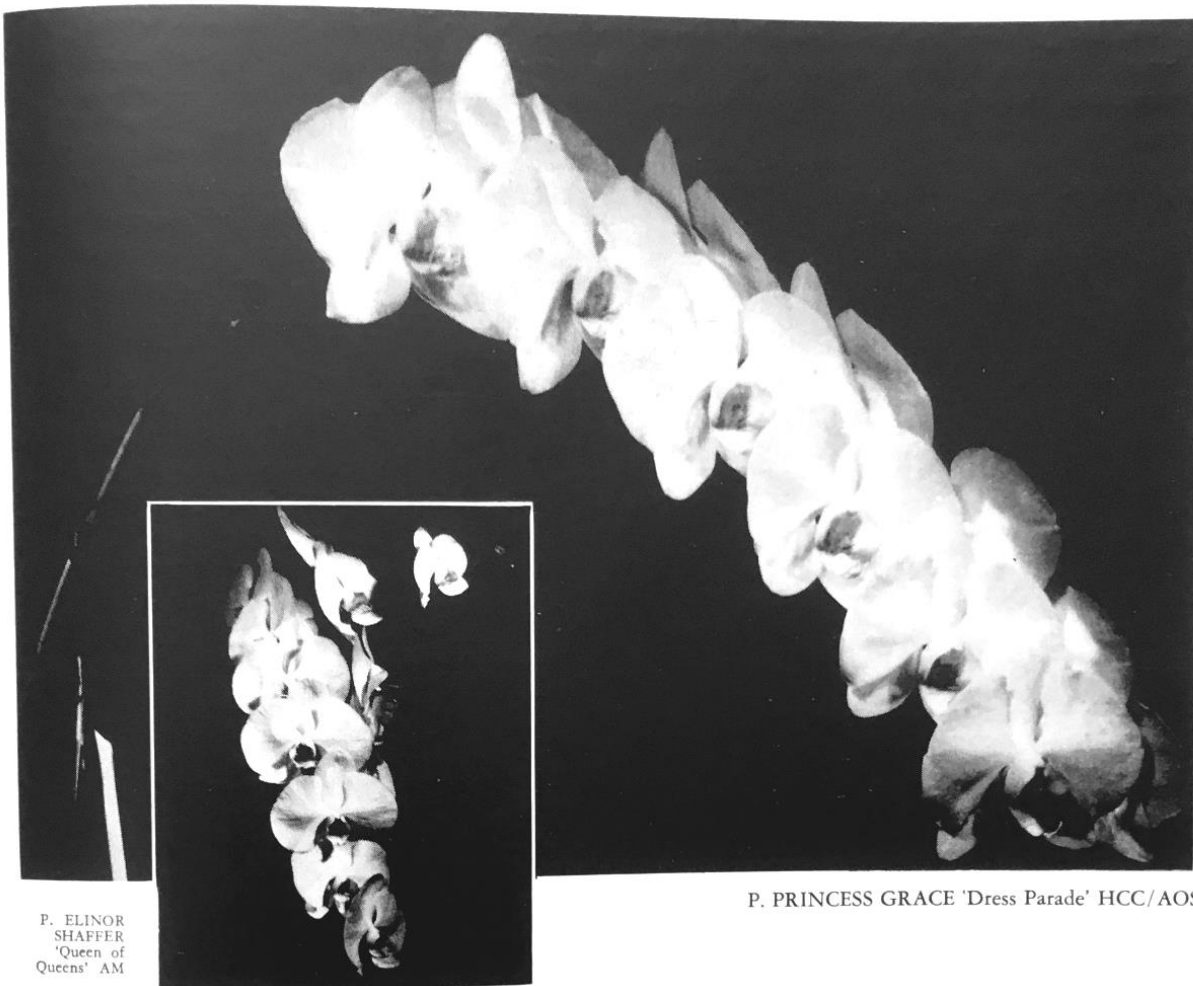
(Meet third Thursday of each month at 8:00 p.m., at Los Angeles State & County Arboretum, 301 North Baldwin, Arcadia)

SOUTH BAY ORCHID SOCIETY, INC.

(Meet second Friday of each month at 8:00 p.m., at El Retiro Park, Torrance)

SOUTH COAST ORCHID SOCIETY

(Meet fourth Monday of each month at 8:00 p.m., at Silverado Park Club House, 31st Street & Santa Fe, Long Beach)



P. PRINCESS GRACE 'Dress Parade' HCC/AOS

P. ELINOR
SHAFFER
'Queen of
Queens' AM

Modern Phalaenopsis . . . ROBERT ERNST

Many factors are leading to the growing popularity of the graceful Phalaenopsis. Paramount is the vast improvement of substance and consequently lasting properties now added to the lyric beauty of these flowers. This is of great significance, not only to the cut flower industry, but the private grower as well. Greater perfection of form and size of blooms also resulted from selective breeding. The use of species previously not employed continues to add new charm to collections as the spectrum of available color broadens.

Approximately fifteen species, most widely distributed in cultivation provide the foundation of our modern hybrids. These fall into four natural sections as follows: Euphalaenopsis, Stauroglottis, Zebrinae, and Polychilos. (Pfitzer)¹ (Garay)^{1a}

The species and natural hybrids of section Euphalaenopsis (amabilis, stuartiana, schilleriana, sanderiana, x leucorrhoda and x wiganiae) play by far the most

important role in the development of white and pink flowered types. Many crosses, even some natural hybrids, however, are intersectional. P. intermedia, for example, is a natural hybrid between amabilis, var. aphrodite (Euphalaenopsis) x equestris (Stauroglottis). A review of present hybrids based upon color type will prove more practical.

THE WHITE PHALAENOPSIS

The Dutch botanist Blume established the genus Phalaenopsis with the all important white species amabilis in 1825. The species had been known as angraecum album majus as early as 1750. Varieties of P. amabilis, such as rimestadiana, grandiflora, and aphrodite were ranked as separate species. P. aphrodite (Reich. f.) was reduced to a variety of P. amabilis from species rank by Ames.² Distinct differences of these two forms were however pointed out by Quisumbing.³ The white-flowered Phalaenopsis hybrids, having virtually reached form perfection could

therefore be regarded as selectively bred specimens of *P. amabilis*. This has been pointed out by Kirsch.⁴ A comparison of the photograph of *P. amabilis* var.



P. amabilis, var. *grandiflora aurea*

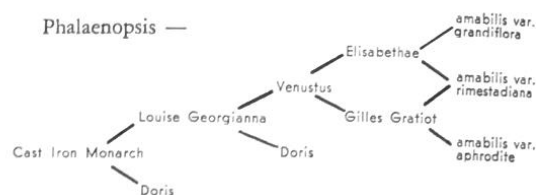
grandiflora with those of the recent hybrids, *P. Elinor Shaffer* 'Queen of Queens' AM (Juanita x Doris) and *P. Princess Grace* 'Dress Parade' HCC (Cast Iron Monarch x Grace Palm) amply demonstrates the level of achievement in this line of breeding. The round, overlapped flower form and desirable arrangement of inflorescence are typical qualities found with plants of award or exhibition quality.

These and other desirable horticultural characteristics such as heavy substance, glistening texture, and improved size are attributable to polyploidy found within these hybrids.

The following is a summary of chromosome numbers for species and hybrids of white *Phalaenopsis*, as reported by various investigators:

NAME OF PLANT	LINEAGE	CHROMOSOME NUMBERS (2N)	REFERENCE
<i>amabilis</i> var. <i>grandiflora</i>	Species	38 (2N)	5
<i>amabilis</i> var. —	"	38, 38	5
<i>amabilis</i> var. <i>aphrodite</i>	"	38	6
Thomas Tucker	Doris x Karen	38	5
Elisabethae	<i>amabilis</i> var. <i>rimestadiana</i> x var. <i>grandiflora</i>	59 (3n=57)	5
Gilles Gratiot	<i>amabilis</i> var. <i>aphrodite</i> x var. <i>rimestadiana</i>	76 (4N)	7
Katherine Siegwart	<i>amabilis</i> x Gilles Gratiot	76	5
Doris	Elisabethae x Kath. Siegwart	76	5
"	"	76, 76, 74	8
Grace Palm	Doris x Winged Victory	76	7
Juanita	Chief Tucker x Grace Palm	72*, 76*	7
Ramona	Th. Tucker x Mem. N. Tomoguchi	73*, 76, 78	7
Fairway Park	Th. Tucker x Winged Victory	76	5
Louise Dillingham	R. H. Montgomery x Doris	76	5
Margaret J. Degenhardt	Winged Victory x Margaret Bean	76	5
Chieftain	Doris x La Canada	76	5
Winged Victory	Elisabethae x La Canada	76	5
Palm Beach	Doris x Cast Iron Monarch	92	5
Joanna Magale	Chieftain x Cast Iron Monarch	95 (5N)	5
Boulder	Elisabethae x Venustus	92	5
Elisabethae	See above	95, 95, 95	5
Cast Iron Monarch	Louise Georgianna x Doris	100	5
*Denotes ±1		114 (6N)	5
		114	5

In contradistinction to collected species which proved to be diploids, most of the hybrids counted were of the tetraploid level. The pentaploids resulted no doubt, from mating of these tetraploids with selected hexaploid plants. Hybrids of *P. Cast Iron Monarch* are most typical for this line of breeding. *P. Elisabethae*, the first of hexaploid hybrids counted is in the background of white and other *Phalaenopsis* hybrids showing polyploidy. This is also the case with *Cast Iron Monarch*, registered as given below:



We know *P. Cast Iron Monarch* crosses can be given as follows:

Phalaenopsis — *Cast Iron Monarch* x

Doris Palm Beach
 Louise Georgianna May Lou Stoddard
 Chieftain Joanna Magale (A. Q. 1960)
 Grace Palm Princess Grace (A. Q. 1965)
 Palm Beach Monarch Gem

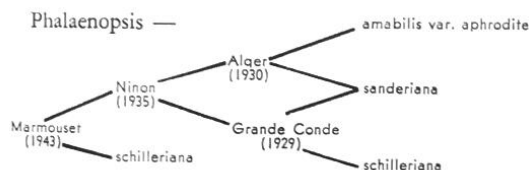
P. stuartiana, a more petite white species of the Philippines, is embellished with red to fuchsia spotting, covering the lip and inner basal portion of the lateral sepals. Additionally, the free blooming habit and the attractively mottled foliage has inspired its use in hybrid work. The first of such crosses, *P. Ariadne* (*amabilis* var. *aphrodite* x *stuartiana*) was made by J. Veitch & Sons in 1896. Several modern conforming hybrids are: *P. Lowana Goldlip* (Grace Palm x *stuartiana*); *P. Bourgogne* (Fanchette x *Valkyrie*); *P. Lachesis* (Fanchette x

Cendrillon); *P. Sinbad* (Thomas Tucker x *stuartiana*); *P. Blanca de Neve* (Valkyrie x *Lachésis*) and *P. Hacienda* (*Lachésis* x *Pacific Princess*).

THE PINK PHALAEOPSIS

While varieties of *P. amabilis* are distributed over wide areas of tropical Asia, the rose to lilac flowered *P. schilleriana* and white to purple colored *P. sanderiana* are indigenous species of the Philippine Islands. Both possess attractive foliage mottled or barred with silver gray-green. With *P. schilleriana* these are generally colored purple on the underside. *P. sanderiana* is close to *amabilis* in flower form. *P. schilleriana* resembles *P. stuartiana* in this respect, and in having flat, rough appearing roots.

The early development of pink flowered hybrids leading to the important cross *P. Marmouset* can be seen from the parentage chart below. Dates of registration are given parenthetically.



P. Yoshino (*amabilis* x *sanderiana*) registered in 1924 is of the type of *P. Alger*.

Well known among *P. Marmouset* hybrids are: *P. Aalsmeer Rose* (Ruby x —), *P. Hellé* (Adonis x —), *P. Clara I. Knight* (— x Doris), *P. San Songer* (Rêve Rose x —), *P. Fandango* (— x *sanderiana*), *P. Pink Wave* (Rosalani x —), *P. Parisienne* (Eglantine x —), and *P. Debutante* (Hannah Nair x —).

Numerous crosses between *P. Marmouset* hybrids and polyploid white *Phalaenopsis* were carried out. As would be expected, loss of color intensity was noted with a large percentage of the progeny. The gain in substance and size proved substantial, bringing these hybrids close to the quality of their white counterparts. Typical examples, for instance, derived from *P. Zada* (San Songer x Doris) and *Aalsmeer Rose* dominate the list of pink *Phalaenopsis* awarded by the A.O.S. during the year of 1964.

Still another species of the Philippines, *P. lueddemanniana*, of sub-genus *Zebrinae*, plays a significant role in this color group of hybrids. Two varieties, *pulchra* and *purpurea* have lent their purple to vermillion hues to novel shades, textures, and patterns. *P. Regnier* (*lueddemanniana* x *schilleriana*) recorded in 1922, is an "early bird" in this respect. This hybrid is found in the background of *P. Dark Hawaii* (Hawaii x *Regnier*) and the well known *P. Alice Bowen* (Dark Hawaii x *Pink Cloud*).

P. Lolita 'Iris' AM (Pink Vision x *lueddemanniana*) and *P. Rosy Charm 'Mercedes M. Rabago' AM*



P. Lolita 'Iris' AM

(*Hermione* x *Pink Wave*) shown in the photographs are recent types.

P. Rosy Charm through *P. Hermione* incorporates the charm of *P. stuartiana*. *P. Fontainebleau* (*schilleriana* x *wiganiae*) and *P. Rothomago* (*Fontainebleau* x *Rêve Rose*) are older hybrids involving the species *stuartiana*. Newer hybrids employing *P. stuartiana* include *P. Mistinguett* (*Rothomago* x *Hellé*), *P. Pink Star* (*Rothomago* x *lueddemanniana*), *P. Ghisoni* (*Mistinguett* x *Guignol Rose*), *P. Best Girl* (*Pink Vision* x *Sunrise*), *P. Ann Lovelace* (*Radiant Glow* x *Sunrise*), and *P. Violet Glow* (*Hermione* x *Susie Darlin*).



P. Elisa 'Nina' AM

Cytological studies indicate species of this color group to be diploids. However, a tetraploid *P. schilleriana* was also encountered. A further specimen proved to be an aneuploid between the $4n$ and $3n$ level. Unlike the white hybrids, numerous plants were shown to be triploids. Several plants were aneuploids near the $4n$ value. A surprise find were the two hexaploids, *P. Harold Fisher* and *P. Lee Wilder 'Ruffles'*.

'Warridge' AM (*Joanna Magale x mannii*), shown in the photograph, and the second generation cross *P. Golden Dawn* (*Golden Louis x Palm Beach*). *P. Gold Coast* (*Hymen x Doris*) involves members of three sections, (*Zebrinae x Polychilos*) x *Euphalaenopsis*.

The first hybrid involving a yellow form of *P. lueddemanniana* with a member of *P. amabilis* was

CHROMOSOME NUMBERS OF SOME PINK PHALAENOPSIS SPECIES AND HYBRIDS			
NAME OF PLANT: P.—	LINEAGE	CHROMOSOME NUMBERS (2n)	REFERENCE
sanderiana	species	38 (2n)	5
schilleriana	species	38, 65	5
"	"	38	7
"	"	38	6
lueddemanniana var. pulchra	species	38	5
Hermione	lueddemanniana x stuartiana	38	9
Pink Pamela	Pamela x Pink Glory	38, 38	5
Rothomago	Fontainebleau x Reve Rose	38	5
Regnier	lueddemanniana x schilleriana	38	7
Clara I. Knight	Marmouset x Doris	56, 57, 57, 57	5
Pink Chiffon	Pink Hawaii x Doris	57, 58	7
Pink Vision	Pink Sunset x Shocking Pink	73	7
schilleriana	species	76 (4n)	5
Zada	San Songer x Doris	77	7
Lee Wilder	Fontainebleau x Grandela	114 (6n)	7
Harold Fisher	Pamela x Yoshino	114	7

THE YELLOW PHALAENOPSIS

The species which play the role of color donor with yellow phalaenopsis hybrids are *P. mannii*, *P. lueddemanniana*, var. *ochracea*, *P. sumatrana*, *P. mariae*, and *P. cornu-cervi*. More recently, hybrids have become available employing *P. fuscata*. The use of *P. micholitzii* has also been proposed.

An exhaustive chronology covering yellow Phalaenopsis hybrids to 1962 is given by Vaughn.¹¹ The use of *P. mannii*, which together with *P. cornu-cervi* belongs to the sub-genus *Polychilos*, dates back to the cross *P. Hymen* (*lueddemanniana x mannii*), first made in 1900 by Veitch & Sons. This hybrid possesses much of the poor form of *P. mannii* and the pronounced reddish brown markings, contributed by *P. lueddemanniana*.

The hybrids *P. Golden Louis* (*Doris x mannii*) and *P. Golden Chief* (*Chieftain x mannii*) highlighted the potential of *P. mannii* in crosses with white polyploid hybrids to produce blossoms of relatively clear yellow to cream coloration. These crosses proved to be free blooming, star shaped, but of surprisingly good form, considering the narrow segments and bow-legged appearance of *P. mannii*. The flowers are of heavy substance as occurs with most inter-sectional hybrids.

In close succession, numerous of related hybrids were recorded. Early examples are *P. Golden Palm* (*Grace Palm x mannii*), *P. Topaz* (*Juanita x mannii*), *P. Yellow Jacket* (*Atala x mannii*), *Western Glow* (*Pasadena x mannii*), and *Golden Tenor* (*Caruso x mannii*). Further improvement in form of yellow hybrids was achieved by use of a pentaploid parent, as exemplified by *P. Golden Martha*



P. GOLDEN MARTHA 'Warridge' AM

P. Inspiration (*Juanita x lueddemanniana* var. *ochracea*), registered in 1961. More recent crosses of this type are *P. Golden Sands* (*Fanton Davis Avant x lueddemanniana* var. *ochracea*), and *P. Hawaiian Sunshine* (*Snowbird x lueddemanniana*). Owing to the great variability of *P. lueddemanniana*, hues range from greenish-yellow to yellow-ochre. Lips are rose-red to rust in color and the perianth is more or less spotted and suffused with these same color tones.

Attractive yellow hybrids are also obtained with *P. sumatrana*. The first of such hybrids, *P. Sumabilis* (*amabilis x sumatrana*) dates to 1938. Modern versions are *P. Moonglow* (*Springtime x sumatrana*), *P. Golden Isle* (*Fanton Davis Avant x sumatrana*),

and *P. Moonclurie* (Moonglow x Palm Beach). The variety 'Orchidglade' AM of the latter is shown in the photograph. The yellow-green flowers show pink



P. MOONCLURIE 'Orchid Glade' AM/AOS

suffusion around the column and are of heavy substance.

An interesting palette of yellow-salmon to bronze hues results from the mating of yellow with pink *Phalaenopsis*. The first hybrid of this type reported was *P. Mannipam* (*mannii* x *Pamela*). The variety 'Larkin' received an AM/AOS in 1953. *P. Luzon* (*sanderiana* x *mannii*), *P. Little Brown Gal* (*Sunrise* x *mannii*), *P. Amber Sky* (*mannii* x *Radiant Glow*), *P. Old Miss* (*Pink Vision* x *mannii*) and *P. Sandalwood* (*Gold Coast* x *sanderiana*) are new arrivals of this color form.

The use of *P. mariae* is exemplified by the hybrids *P. Macassar* (*amboinensis* x —), *P. Gracia* (*Grace Palm* x —), and *P. Fair Lady* (— x *Thomas Tucker*).

P. cornu-cervi has made a recent debut in the hybrids *P. Little Star* (— x *amabilis*) and *P. Cornsilk* (*Lowana Goldlip* x —).

The first appearance of a hybrid of *P. fuscata* (syn. *P. kunstleri*) constitutes *P. Janet Kuhn* (*Dos Pueblos* x —), registered in 1965. Related crosses of *P. fuscata* with *P. Elinor Shaffer* and *P. Zada* have also been reported.

Cytological studies on species of this group give

them as diploids. The few hybrids analyzed gave values of $2n$ and $3n$. Crosses such as *P. Golden Martha* and *P. Golden Dawn* no doubt give higher chromosome values.

THE PHALAENOPSIS WITH COLORED LIP

Phalaenopsis sporting a brightly colored labellum, and hybrids with vivid colored markings extending over the entire perianth, are a delight to the orchid fancier.

P. equestris (syn. *rosea*), *P. x intermedia*, *P. lindenii*, *P. violacea*, and *P. lueddemanniana* serve as the principal color donors. *P. sumatrana* and *P. mariae* have been employed less frequently. The latter give rise to effects in hybrids resembling those obtained with certain forms of *P. lueddemanniana*. The diminutive species *P. parishii* with its potential for amethyst lip color has only recently been featured in the hybrid *P. Partris* (*equestris* x *parishii*). The cross should provide an interesting platform for prospective breeding.

P. equestris and *P. lindenii* (both of section *Stauroglottis*) are charming small flowered species of the Philippine Islands. The column and base of the white sepals and petals of *P. equestris* are stained rose-pink. The drop shaped middle lobe of the lip is rust to rose purple in color. *P. lindenii* resembles in flower form *P. equestris*. The tepals are white to pink and show frequently attractive pink veining. The middle lobe of the lip is marked with vertical purple veins and is heart shaped. The leaves of this species are mottled with gray-green.

P. x intermedia is a natural hybrid of *P. equestris* with *P. amabilis*, var. *aphrodite*. This was substantiated by crosses of this type undertaken by Veitch & Sons in 1886 and 1892, involving two distinct forms of *P. amabilis*. A related pink hybrid, *P. Hebe* (*equestris* x *sanderiana*), was recorded by this grower in 1897. Not until four decades later was this line of breeding rejuvenated by appearance of the hybrids *P. Colin Potter* (*Elisabethae* x *intermedia* 'Portei'), *P. Roselle* (*Elisabethae* x *equestris*) and *P. O. M. Kirsch* (*equestris* x *Versailles*).

The hybrid *P. Sally Lowrey* (*Pua Kea* x *equestris*) registered in 1954, figures as an important parent of modern hybrids with colored lips, as pointed out by Hager.¹² *P. Judy Karleen*, *P. Sharon Karleen*, *P.*

CHROMOSOME NUMBERS OF SOME YELLOW PHALAENOPSIS SPECIES AND HYBRIDS

NAME OF PLANT: <i>P.</i> —	LINEAGE	CHROMOSOME NUMBERS ($2n$)	REFERENCE
<i>mannii</i>	species	38, 38 ($2n$)	6, 5
<i>cornu-cervi</i>	"	38, 38	6, 5
<i>lueddemanniana</i> var. <i>ochracea</i>	"	38	5
<i>mariae</i>	"	38	5
<i>Mannipam</i>	<i>mannii</i> x <i>Pamela</i>	38	10
<i>Luzon</i>	<i>sanderiana</i> x <i>mannii</i>	38	5
<i>Hymen</i>	<i>lueddemanniana</i> x <i>mannii</i>	38	5
<i>Moonglow</i>	<i>Springtime</i> x <i>sumatrana</i>	57, 57, 57	9

Cover Girl, P. New Era, P. Overture, P. Suffuse, P. Esquisita, P. Sunray, P. Peggy Houser, P. Thor Beauty, P. Suzanne Hager and P. Ann Hatter are recent hybrids derived from P. Sally Lowrey.

Another widely employed parent is P. Ruby Lips (Roselle x Doris). P. Queen Emma (Doris x —), and P. Candy Wakasugi (Texas Star x —) are prominent derivatives. Recent arrivals are P. Taffy (Sparkle x —), P. Ruby Zada (Zada x —), and P. Shari (Doris x Queen Emma).

Crosses in which the progenitors are *amabilis* and *equestris* yield only a modest percentage of hybrids with vivid lip color. This is as expected, since the *Euphalaenopsis* parent is generally polyploid. The tepals of these hybrids are substantially white, often suffused with rose-pink basally. In rare cases, the tepals show attractive rose to purple veining. This



P. RUBY LIPS 'Gertie' AM

effect is demonstrated by the photograph of P. Ruby Lips 'Gertie' AM.

Hybrids of *P. lindenii* also frequently display this 'Candy Stripe' appearance. Examples of such *P. lindenii* crosses are: P. Kahana (Gilles Gratiot x —), P. Spring Song (Fontainebleau x —), P. Robert W. Miller (— x *sanderiana*) and P. Peppermint (— x *Pink Profusion*).

The rhomboidal form of the petals found with *P. equestris* and *P. lindenii* is often transmitted to the hybrids. Selfing and crossing of selected types have however produced generations of plants equivalent in form and substance to the fine white hybrids of *P. amabilis*. The characteristics sought in this respect have been outlined by Hughes.¹³

P. violacea, a species native to Indonesia, has more recently gained great prominence as a source for

pink lipped hybrids. This species, of sub-genus *Stauroglottis*, is variable in form and color. Variety *alba* has off-white sepals and petals and a white to rose colored lip. In variety *bowringiana*, the tepals are light yellow in color, with the inner halves of the lateral sepals stained purple, banded and freckled with the same color at the base of the dorsal sepal and petals. In variety *schroederiana* the marking on the tepals is reported to be in the form of mauve-purple broken bands. Varieties of nearly solid purple color have been exhibited. Two principal types of this species as to conformation, based on geographic factors, have been observed by Kuhn¹⁴ in a review of *P. violacea* and hybrids thereof.

The history of the earliest *P. violacea* hybrid, *P. Harriettae* (*violacea* x *amabilis*), registered by Veitch & Sons in 1887, was traced by Vaughn¹⁵. More than half a century later the hybrids *P. Maude Lyon* (*Vergilles* x *violacea*) and *P. Ruby Nichols* (*Harmony* x *violacea*) reaffirmed the worthy nature of this line of breeding. The following hybrids of *P. violacea* have been recorded since 1960: *P. Violita* (*Juanita* x —), *P. Therese Frackowiak* (*Doris* x —), *P. Purple Heart* (*R. H. Montgomery* x —), *P. Royal Robe* (— x *rothschildiana*), *P. Terry* (*Thomas Tucker* x —), *P. Violet Star* (— x *intermedia* 'Portei'), *P. Sweet Violet* (*Sally Lowrey* x —), *P. Hans Burgeff* (*sanderiana* x —), *P. Kuipo* (— x *Chieftain*) and *P. Princess Kaiulani* (— x *amboinensis*).

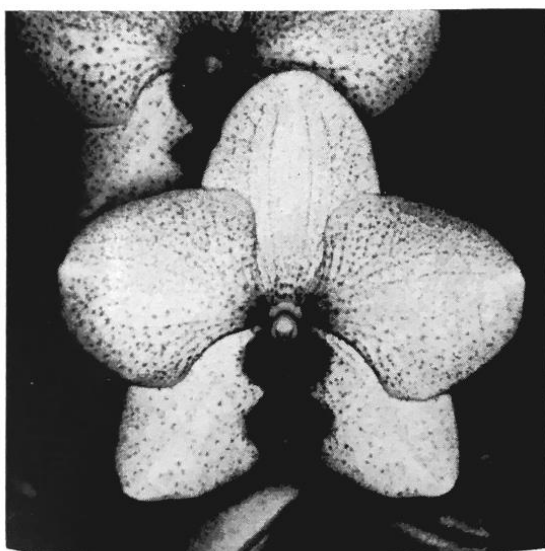
P. violacea imparts to its hybrids excellent substance and texture. Rose to purple lip coloring and like colored overlay on the inner basal portion of the lateral sepals generally results, but flower production is reduced. The corrugation of the leaves characteristic of *P. violacea* is often transmitted but the pleasing lemon scent is lost. Much beauty will result from selected breeding in this hybrid section.

Adornment through color in the floral segments of *Phalaenopsis* has been effectively achieved through use of the highly variable species *P. lueddemanniana*. The use of varieties of this species involved in yellow and pink hybrids has been described. Varieties *pulchra* and *purpurea* have found extensive use with hybrids described in this chapter.

Although selected hybrids having *P. lueddemanniana* in their pedigree produce round and even overlapped flowers, the majority of plants of this lineage have star shaped flowers. This star like form holds a charm of its own. When mated with white flowered members of section *Euphalaenopsis*, *P. lueddemanniana* will produce a most attractively spotted and color suffused perianth. The lively colored labellum generally conforms in shape to the *Euphalaenopsis* parent. These hybrids show a most remarkable gain

in size over the Zebrinae parent resulting from the higher value of genomes crossed in with the, usually, polyploid white hybrids.

The primary hybrid P. John Seden (amabilis x lueddemanniana) was created by Veitch & Sons in 1888. This firm also introduced P. Hermione (lueddemanniana x stuartiana) at the turn of this century. Numerous hybrids of this type appeared following World War II. Given in chronological order, these hybrids having P. lueddemanniana as the pollen parent are as follows: P. Malama (Irridescens x —), P. Lora Keller (Eustathia x —), P. Dr. George N. MacDonell (Fontainebleau x —), P. Nuel N. Songer (Doris x —), P. Star of Rio (Bataan x —), P. Texas Star (Evening Star x —), P. Star of Santa Cruz (Mem. Nasu Tomoguchi x —), P. Southern Star (Louise Georgianna x —), P. Star of Diamond Head (Grace Palm x —), P. Pierrot (amabilis, var. aphrodite x —), P. Star of Maui (Patricia Lea x —), P. Cabrillo Star (Ramona x —), P. John Glenn (Vallemar x —), P. Glenn



P. CABRILLO STAR 'Capitola' HCC

Sparks (Joanna Magale x —), P. Jane Shaffer (Mary Lou Stoddard x —), P. Enchantment (Summit Snow x —), P. Little John (Chieftain x —), and P. Patricia Ann (Ruth Bell x —).

These intersectional hybrids have the reputation of poor seeders. Nevertheless, many fine progressive generations have been developed over the years as follows: P. Waldo Swearingen (John Seden x Elisabethae), P. Lipstick (Palm Beach x Star of Rio), P. Rio Blanco (Star of Rio x Doris), La Gorce Blanc (Rio Blanco x Cast Iron Monarch), P. Samba (Star of Rio x amboinensis), and P. Ralph Kiesewetter (Cast Iron Monarch x Star of Rio).

As expected, the species and primary hybrids of this group are diploids. The few remaining hybrids examined and reported to date range from triploids to pentaploids, with aneuploids of the triploid and tetraploid level encountered. The latter types, characterized by incomplete genomes, may well be the reluctant seed producers with these and related Phalaenopsis.

It is the current effort of hybridists to bring the various colored types of Phalaenopsis to the extremely high standard of the white polyploid forms with regard to conformation, substance and floriferousness, consistent with the maintenance of color clarity and intensity. The quest for flowers of new character and color through the use of untried species and by virtue of intergeneric crosses continues.

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CHROMOSOME NUMBERS OF SOME PHALAEOPSIS WITH COLORED LABELLUM

NAME OF PLANT: P.—	LINEAGE	CHROMOSOME NUMBERS (2n)	REFERENCE
lindenii	species	38 (2n)	5
equestris	species (5 plants)	38 (each)	6, 7, 5
amboinensis	species	38	5
lueddemanniana	species (12 plants)	38 (each)	6, 5
John Seden	amabilis x lueddemanniana	38	7
Dr. George N. MacDonell	Fontainebleau x lueddemanniana	38	5
Mahinhin	lueddemanniana x equestris	57 (3n)	16
Star of Rio	Bataan x lueddemanniana	54	5
Sally Lowrey	Pua Kea x equestris	73	5
Ruby Lips (F ₂)	Roselle x Doris	95 (5n)	5
Ralph Kiesewetter	Cast Iron Monarch x Star of Rio		

A. O. S. AWARDS OF PHALAENOPSIS GRANTED IN 1964

PLANT NAME P.—	VARIETY	PARENTAGE P.—	POINT SCORE	NAT. SPR. OF FLOWERS
WHITE				
Alice Gloria	'Little Dume'	Ramona x Grace Palm	75	4-1/2
Arcadia	'Janice'	Grace Palm x Chieftain	78	
Antonio Guerrero	'Premier'	Seagull x Palomita Blanca	77	4-1/4
Cindy Brandt	'Idlewild'	Palm Beach x Goleta	80	4-5/8
Elinor Shaffer	'Dallas'	Juanita x Doris	80	4-1/2
	'Dior'		76	4-1/2
	'Elegance'		76	5
	'Estelle'		77	5
	'Queen of Queens'		84	5-1/4
	'Robin Lauraine'		77	4-3/4
	'Shesmine'		77	4-3/4
	'Waioiao'		82	4-3/4
Gladys Read	'Ginny'	Juanita x Grace Palm	75	4-1/2
	'Snow Queen'		78	4-3/8
	'St. Louis'		80	4-3/4
Goleta	'Gertie'	Doris x Margaret Bean	82 CCM	
	'San Juan'		75	4-7/8
Grace Palm	'Capitola'	Doris x Winged Victory	78	4
	'Don's Gigantea'		77	5
	'Snowball'		80	5-1/2
	'The Bride'		77	4-3/8
Louise Merkel	'Julie'	Mary L. Stoddard x Doris	78	4-1/2
Monarch Gem	'Challenger'	Palm Beach x Cast Iron Monarch	84	4-5/8
Princess Grace	'Bonsall'	Cast Iron Monarch x Grace Palm	76	4-3/4
	'Dress Parade'		77	4-3/4
	'Monaco'		78	4-3/4
White Medallion	'Edward Peltier'	Doris x White Rhythm	77	
	'Stevens'		77	
PINK				
Barbara Beard	'Gertie'	Virginia x Zada	81	3-3/8
Best Girl	'Ele'	Pink Vision x Sunrise	77	
Clara I. Knight	'Norman'	Doris x Marmouset	83	3-3/4
Elisa	'Chang Lon'	Grace Palm x Aalsmeer Rose	77	5
"	'Gigantia'		77	
My Fair Lady	'Barbara Jean'	Aalsmeer Rose x Radiant Glow	77	
Parisienne	'Winona'	Eglantine x Marmouset	77	
Rosada	'AVY'	Reve Rose x Zada		
Roswell	'Fireball'	Ruby Wells x Aalsmeer Rose	76	
Rosy Charm	'Judy'	Hermione x Pink Wave	78	
"	'Freckles'		76	3
Violet Glow	'Dark Beauty'	Hermione x Susie Darlin	77	
YELLOW				
Golden Louis	'Liberty Hill'	Doris x mannii	76	2-7/8
Golden Chief	'Grodske's Golden Dream'	Chieftain x mannii	86 CCM	
Inspiration	'Lemon Drop'	Juanita x lueddemanniana var. ochracea	76	3
	'Charm'	"	78	3-1/2
Sandalwood	'Varina'	Gold Coast x sanderiana	JC 82	2-3/4
COLORED LIP				
Cabrillo Star	'Capitola'	Ramona x lueddemanniana		
"	'Delight'		75	
"	'Fantasy'		79	4
Candy Wakasugi	'Camay'	Texas Star x Ruby Lips	82	3-5/8
Lipstick	'Malibu'	Palm Beach x Star of Rio	77	3-3/8
Mildred Karleen	'Velvet'	Judy Karleen x Sharon Karleen	81	2-3/4
Nuel N. Songer	'J. & L.'	Doris x lueddemanniana	79	
Princess Kaiulani	'Bee Ridge'	amboinensis x Star of Rio	81	2-1/2
Purple Heart	'Ruby'	R. H. Montgomery x violacea	77	
Ruby Lips (F2)	'Gertie'	Roselle x Doris	83	2-7/8
Samba	'Vivian'	Star of Rio x amboinensis	82	2-3/4
Therese Frackowiak		Doris x violacea	78	3-1/2
Texas Star	'Paul McKinley'	Evening Star x lueddemanniana	81	4
Violita	'Maurine'	Juanita x violacea	JC	

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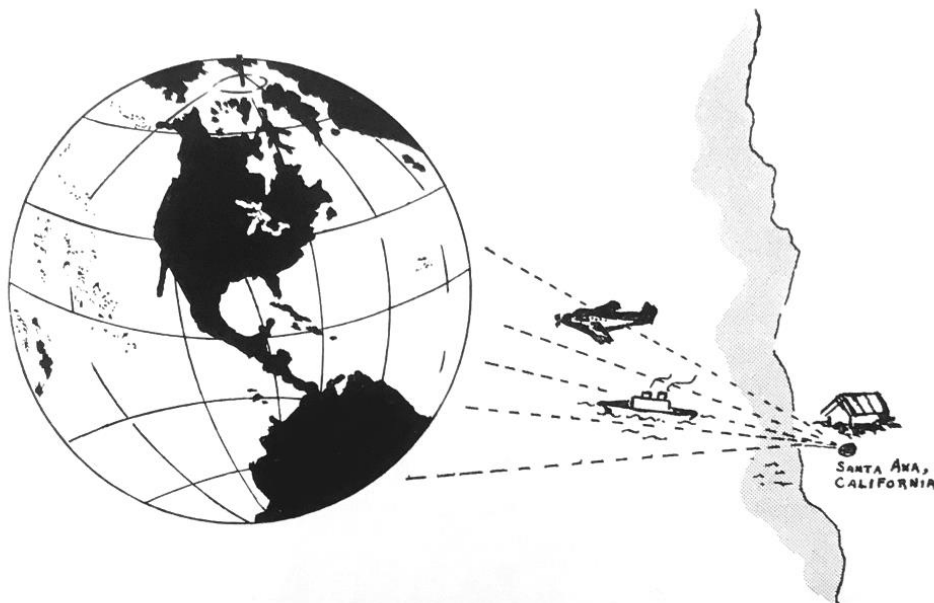
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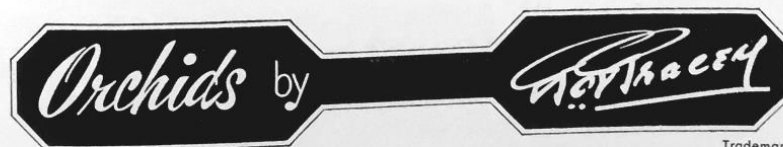
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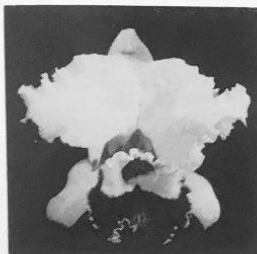
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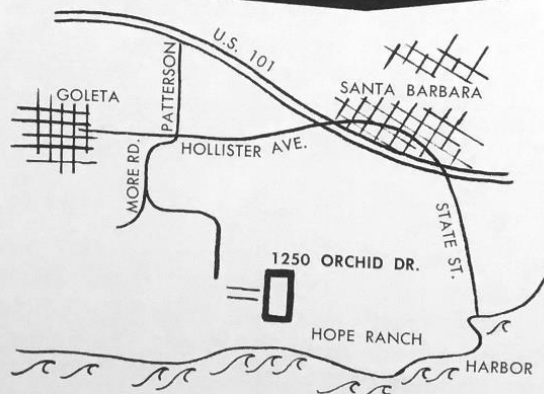
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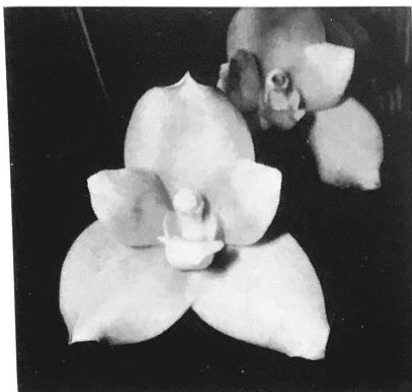
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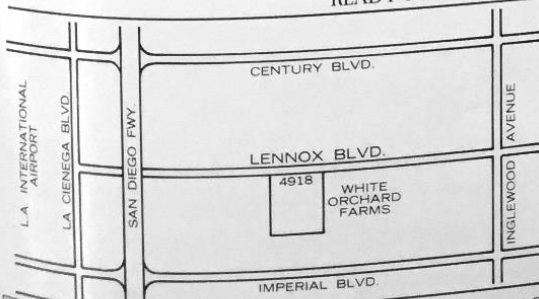
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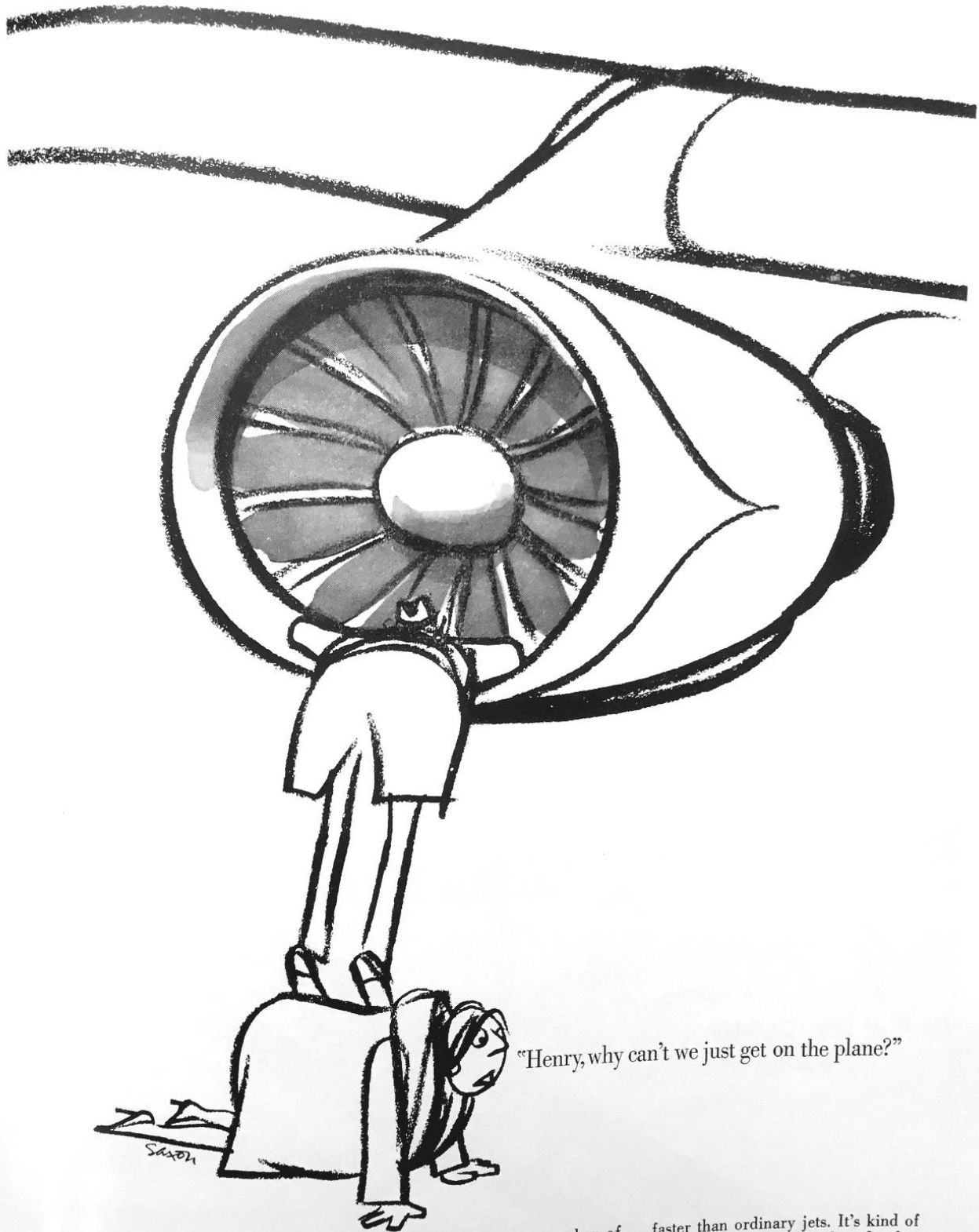
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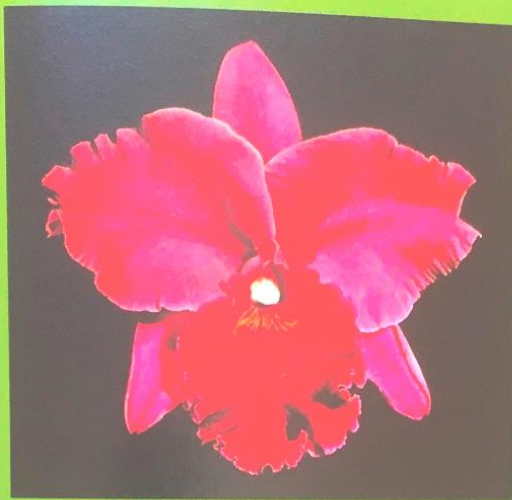
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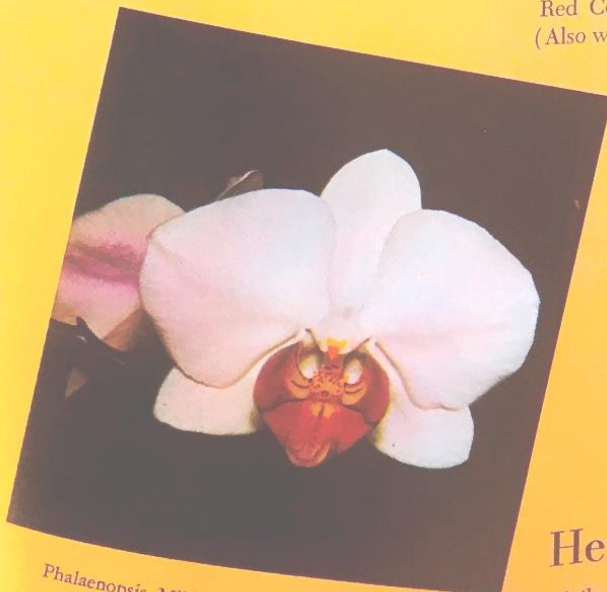
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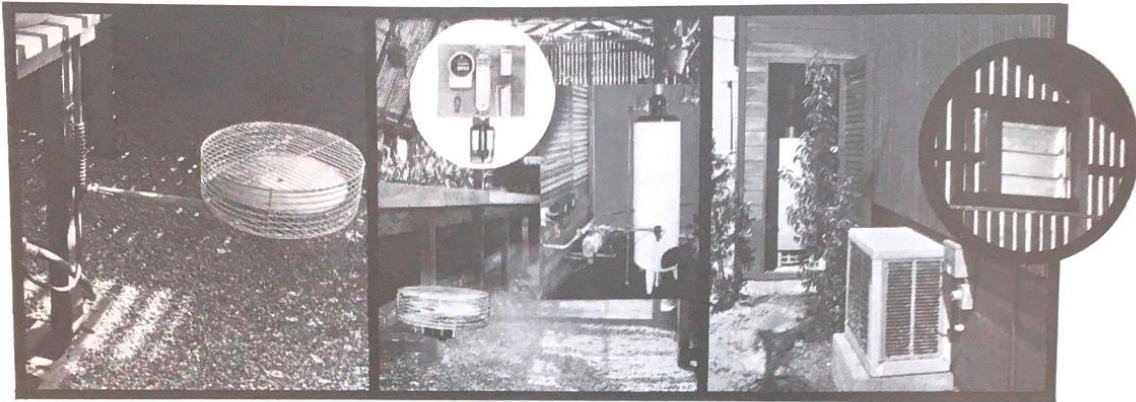
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