ORCHID CULTURE NOTES

For Beginners

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Prologue

The culture of orchids cannot be simply communicated on one page due to the large size of the orchid family. Different orchids require different conditions. Different people and their accompanying lifestyles, produce unique cultural conditions. Therefore, the following notes attempt to outline successful strategies that you can use and then modify them to suit your individual situation.

Whenever possible, correct terminology is used, so a glossary is provided. Orchid literature is contradictory in relation to cultural information due to individual biases of the authors and their experience. As much as possible, my personal bias has been minimized or at least identified.

This booklet has been prepared as the focal point of a series of meetings scheduled for the Southern Ontario Orchid Society (SOOS) newcomers or members that feel they require more information. The meetings are discussion based with example plants and practical demonstrations of repotting, division of plants and pests. Each member is encouraged to read the relevant sheets prior to each meeting to allow more time for dealing with the main areas of confusion and concern.

If you miss a meeting, come early to the next meeting to clarify any main points in the notes that cause you confusion.

Knowing the identity of your plants is very important to learning what conditions are needed for the culture. Questions about short forms or naming systems for orchids may be clarified by the notes. If a plant has no name, it is desirable to at least place it within a group (genus) of orchids. In many cases, experienced members can provide a genus name if the plant is provided for viewing. Precise names (hybrids and some species) may be impossible to discern in some cases without the presence of a flower; even then it may be impossible.

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ORCHID GLOSSARY

agar	gelatinized solution for germinating seeds or propagating seedlings
anther	the sac containing the pollinia (pollen)
anther-cap	the covering over the pollinia
apical	pertaining to the top or apex
ascending	curved upward or directed upward
asymbiotic	referring to the growth of seeds without fungi
backbulb	the pseudobulbs behind the lead (front); these possess dormant buds that may give rise to new leads upon division
bifoliate	referring to having two leaves on each growth
bisexual	having both anther and pistil in the same flower
blade	the expanded (usually flattened) portion of a leaf
capsule	correct name for an orchid seed pod
clone	an individual plant and all its vegetative divisions
column	the specialized reproductive structure in orchids that results from the fusion of the stamen and pistil
community pot	transitional growth container for seedlings between flask and individual pots
deciduous	referring to the habit of the leaves being lost at a specific seasonal time
endemic	in reference to species, restricted to a specific area
epiphyte	a plant that grows upon another but does not obtain nourishment from the host plant (orchids, bromeliads, some ferns)
evergreen	the habit of maintaining leaves over several years prior to loss
fertilization	union of pollen and an ovule to produce seed
flask	glass container in which seed is germinated and seedlings are raised on agar before deflasking into community pots
genus	(plural: genera) a classification group consisting of several related species
grex	the group of plants that result from a cross; grex name is the registered name of the cross
hybrid	offspring resulting from parents of two different species or any of their offspring
inflorescence	arrangement of flowers along an axis
intergeneric hybrid	a plant resulting from parents of two different genera; e.g. Miltassia

keiki	Hawaiian name used to denote a vegetative offshoot produced by some orchid genera
labellum	lip of the flower
lead	usually referring to sympodial growth, the new, active growth that arises from the rhizome
lithophyte	a plant that inhabits rock outcroppings
mericlone	A generally exact copy of an original orchid plant made via the laboratory technique of meristem propagation.
meristem	The undifferentiated plant tissue from which new cells are formed, as that at the tip of a stem or root.
monopodial	growth habit where the plant progressively grows upward along a single axis; as in Phalaenopsis and other Vandaceous plants
multigeneric hybrid	a plant resulting from parents of more than two different genera; SLC, BLC, Beallara…
natural hybrid	plants that result from cross-pollination by insects between two related species in the wild
node	a joint or knot that occurs along a stem or inflorescence from which leaves, branches or flowers emerge
ovary	the part of the pistil that harbours the ovules; which when fertilized become seeds; an expanded ovary is referred to as a capsule
pollination	the transfer of pollen from the anther to the stigma
pollinium	(plural: pollinia) a mass or package of pollen
primary hybrid	offspring resulting from two parents of different species
protocorm	the first stage following germination, a cell mass without roots, stems or leaves
pseudobulb	thickened bulb-like stem or petiole that arises from the rhizome and acts to store food and water
resupination	the process of the flowers twisting a half-turn prior to opening; some orchids are non-resupinate and bear their lip uppermost
rhizome	a horizontally growing stem that gives rise to the pseudobulb and leaf
selfing	pollen is placed on the stigma of the same plant; a form of inbreeding to perpetuate rare species or to accentuate desirable genetic traits
sheath	long tube-like covering; in conjunction with Cattleya flower buds
siblings	plants that result from the same capsule

species	(singular/plural: species) the major subdivision of a genus or subgenus, regarded as the basic category of biological classification, composed of related individuals that resemble one another, are able to breed among themselves, but are usually not able to breed with members of another species.
stigma	the portion of the pistil that receives the pollen
symbiosis	the condition of two unrelated organisms growing together for mutual benefits orchid germination, in the wild depends on a fungus' presence
sympodial	growth habit of producing successive lateral shoots (rhizomes) as found in Cattleya, Paphiopedilum,…
terete	leaf shape that is pencil-like
terrestrial	referring to the habit of growing in soil
velamen	the thick, usually white, spongy layer of cells on the surface of epiphytic orchid roots; may appear green when wet

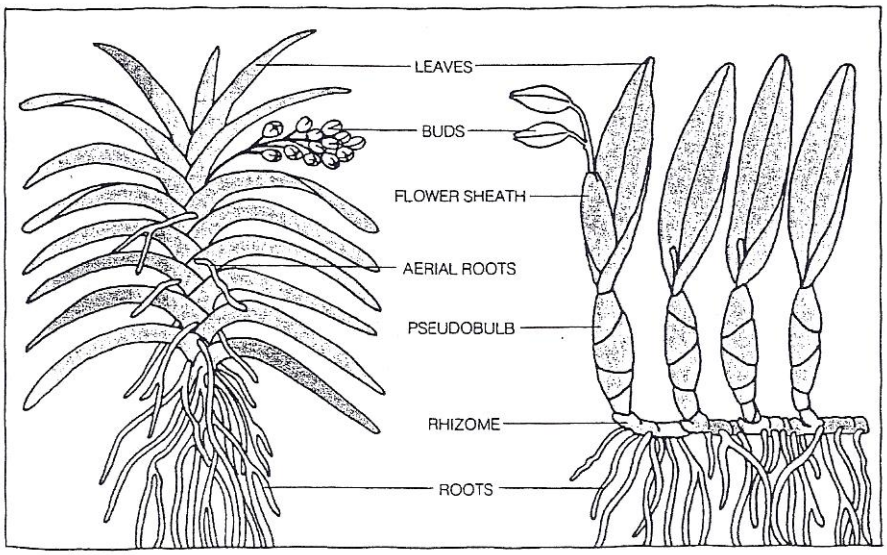
PARTS of ORCHID PLANTS

Flowers: Their primary purpose is to ensure the production of seeds, essential for the development of new seedlings. In the wild, specific pollinators ensure that pollen is moved from a flower to another flower of the same species. Once fertilization occurs, the flower wilts and a seed capsule (pod) forms. Orchid seed is extremely small (barely visible) and its germination depends on favourable conditions of moisture and warmth plus an interaction with a fungus. Although thousands of seeds may be produced, only a few are successful in reaching maturity in the wild.

Leaves: Leaves function to absorb sunlight and convert the light energy into sugars. For this process (photosynthesis) to happen the leaf cells require water and carbon dioxide. Water is transported into the leaves through veins. Leaf surfaces possess small openings (stoma) that are opened or closed to allow air (containing carbon dioxide) to enter and water to leave. The leaf must maintain a balance between carbon dioxide absorption and water loss, by closing the openings when water loss is too high. Excess sugars are transported to other plant parts for storage (as starches usually) or growth.

Stems: Stems support the leaves and connect leaves to roots. Enlarged stem in orchids are referred to as pseudobulbs (false bulbs) and serve the purpose of water and sugar storage. Plants possessing **one** upward stem are referred to as monopodial (e.g. Phalaenopsis). Sympodial orchids possess upright stems that are joined by a horizontal (or nearly so) rhizome, with a new set of stems being produced annually (e.g. Cattleya).

Roots: Orchid roots function to absorb water and dissolved minerals. They also anchor the plant to branches and stems of other plants, rocks or soil. Orchid roots have a spongy outer coating called the velamen. This coating reduces water loss from roots into the air while acting as an enhancement to obtaining water. Many epiphytic orchids have roots that perform photosynthesis and appear green when wet.



ORCHID MEDIA

Several materials are used for orchid growing media. The prime criteria in selecting material for media must be a combination of your personal watering habits and the plant's needs. Some media are composed of one type of material while others contain several materials in a mix. Some mixes are available but the mix can be varied.

Cork: (dry) Very slow to decompose but does not hold water. Can be used in the chunk form with other materials to form a mix. Equally useful for mounted plants. Solid wine corks are usable and provide air spaces.

Charcoal: Additive to mixes that slows decomposition by opening the mix and may remove toxic substances. Remains dry and provides "no nutrients" so a complete fertilizer is required.

Perlite: A form of volcanic, white, spongy rock. Provides good aeration to roots. Drier component of mixes or used alone. Becomes green due to the growth of algae if kept wet.

Tree Fern: Rarely used alone, but a common component in mixes. Provides a drier, open mix and is long-lasting. Usually needs 20-20-20 fertilizer.

Clay Pellets: Spheres of baked clay that is somewhat porous. Often used instead of medium bark or in semi-hydroponic culture. Behaves much like medium bark but doesn't degrade. Flush well to avoid salt build-up.

Fir Bark: Commonly used for orchids that prefer to dry between watering, like Cattleya. Comes in a series of grades: seedling, fine, medium, coarse. Usually this material lasts about two years and provides small amounts of nutrients as it decomposes.

Osmunda: Long-lasting, supplies most of the required nutrients, expensive and difficult to obtain now. Somewhat moister than medium bark.

Sphagnum: Used alone or in mixes. Holds large amounts of water and keeps the roots moist but aerated. Quality is important since poor quality moss compacts and results in the loss of roots. Good quality sphagnum lasts several years. If sphagnum becomes very dry, it is difficult to remoisten. Anti-rot agents and root promotion make it useful for reviving weakened plants. Balanced fertilizer should be used. *Caution should be exercised in handling this material as it can cause a severe fungal infection in skin lesions and lungs.*

Coconut: Considered a replacement for sphagnum, used in chunks the size of medium bark. Remains very moist but needs excess salts leached before initial use.

Peat Mixes: Shredded peat and perlite have gained popularity as a mix. This mix remains moist or wet and is nutrient deficient. The lack of air can result in rotting of roots if they remain very wet.

Rockwool: (wet) Man-made product of long fibres from melted basaltic rock. Retains water extremely well but provides good aeration. Does not break down, but seems to change over time. Requires careful attention to be paid to fertilizers and pH.

WATERING

A very critical aspect in the successful cultural of orchids is the watering process. It is very important to the plant's health that good water is applied in the preferred quantities and at the required times.

Type of Water: Orchids are accustomed to water that is very low in dissolved salts. The preferred water is clean, tepid rain water or distilled water. However, **some** spring water is low in solutes and can be successfully used. If chlorinated water is the only water available, then allow it to stand at room temperature for 25 to 48 hours prior to its use.

Do NOT use water that has been chemically softened.

How Much Water: When orchids are watered, a large quantity is advised. Although much of the water passes through the pot, it dissolves salts and other harmful materials and removes them from the media. Some orchids are very sensitive to salts around their roots; salts accumulate from the applications of fertilizers. Large volumes of water flush these salts out. The large quantity of water used encourages the undesirable practice of re-using water. The re-used water places salts back into the media and may be a possible mechanism for the transfer of pests and diseases from one plant to another.

When to Water: The individual needs of the plant dictate when to water. The factors influencing the time of watering are: type of plant, growth phase of the plant, type of media, type of pot, temperature, and humidity. Some plants prefer to have a moist medium such as Paphs and Phals, while others require a drier rooting material like equitant Oncidiums and plants that grow best on slabs.

Habitat information provides a clue to their demands. Plants in active growth require more water than dormant plants; withholding water is sometimes essential to producing flowers. Some media hold water for a longer period of time.

Higher temperatures and lower humidity levels require more frequent applications of water.

Generally, watering should take place early enough in the day to allow the plant surfaces to dry before evening; warm, sunny days are the ideal. Light stands produce warmth that dries plants quickly making it possible to water any day that it is required. Greenhouses remain cooler and the plants don't dry quickly on cloudy days.

FERTILIZERS

Another important aspect in culturing orchids is the application of fertilizers. It is very important to the plant's health that fertilizers are applied in the preferred quantities at the required times.

Why: Orchid media tend to **not** supply the nutrients required for proper growth. Fertilizers must supply the six elements of nitrogen, phosphorus, potassium, magnesium, calcium and sulphur. Minor (trace) elements are also needed in very small amounts. Some fertilizers lack these elements.

Amount: Orchids are accustomed to receiving very dilute quantities of essential nutrients on a nearly continuous basis. When using fertilizers, it is desired that you apply only the amount that the plant requires in order to avoid a toxic build-up around the roots. However, the amount needed is difficult to assess so a good rule is to apply at a strength of one-quarter to one-eighth the recommended strength for that brand of fertilizer.

When: Orchids do not need equal amounts of all nutrients throughout their various growth phases. Therefore, apply fertilizers according to the phase of the plant's growth. Rapid vegetative growth required larger amounts of water, fertilizers and sunlight. Conversely, a plant in a resting state after the completion of growth needs very little or no supplied nutrients. It is a good practice to develop a routine, tempered by the seasonal aspects, of applying fertilizers in one watering followed by a watering without any fertilizers. These non-fertilizer waterings flush remaining fertilizer salts from the media.

Type: Inorganic fertilizers are inexpensive, balanced and do not produce an odour, as do some of the organic or natural fertilizers. Most fertilizers do contain some of the trace elements that are required in extremely small amounts. Newly developed liquid fertilizers contain the trace elements calcium and magnesium in a special chelated form.

Formula: Vegetative growth requires large amounts of nitrogen, so a fertilizer with a high FIRST number should be used (i.e. 30-10-10 which is 30% nitrogen, 10% phosphorus and 10% potassium). To promote hardening of the tissues, a fertilizer higher in the THIRD number should be used. Flowering can be encouraged by fertilizer composition so a low nitrogen, high phosphorus and potassium fertilizer is advised (10-30-20). Other factors (lower temperatures, drier dormant periods, plant vigor and day length) influence the formation of flowers.

Seasonal Fertilizer Cycle:

30-10-10	Spring	- promotes strong stem and leaf growth
20-20-20	Spring and Summer	- supports all aspects of growth/development
10-30-20	Fall	- encourages flowering and tissue hardening
……...	Winter	- much reduced need for fertilizers, use balanced fertilizer occasionally

REPOTTING

Why: Plants need to be repotted for three main reasons:

1. The plant has outgrown the pot. A sign of good culture is the rapid growth of the plant. Once the plant fills the entire pot, or is outside it, it is time to provide more space for continued growth.
2. The medium in the pot has decomposed. Some media are prone to break down and stay soggy. These conditions occur most commonly in the centre of a pot any may result in the loss of roots because of an insufficient supply of oxygen. Wet culture encourages the destruction of the medium
3. The current medium does not suit your plant. Newly purchased plants may be in a medium more suitable to someone else's cultural conditions. The plant, medium and pot style must be consistent with **your** growing conditions.

When: The ideal time to repot varies depending on certain plant characteristics. Many plants are best done following a short rest after flowering. However, repotted plants experience stress and must be able to root into the new situation as soon as possible. Cattleya alliance plants are best repotted soon after the initiation of new roots (roots not exceeding 5mm are ideal) since this only occurs on an annual, cyclical basis. Cool growing orchids are often repotted in the fall to provide good opportunity to re-root before the warm weather of summer. If forced to choose, preference has to go to the period of active root development.

How:

1. Select the proper time for the plant.
2. Select a pot that is large enough to allow two new growths (approximately two years). Dendrobium and Phalaenopsis prefer to be root-bound. Decide upon clay or plastic pots, appropriately modified for drainage and aeration.
3. Select the desired medium for your plant, pot and conditions.
4. Pre-soak the medium in boiling water and allow it to cool. Drain the mixture.
5. Fill the pot **partially** with an inert (stone or Styrofoam) drainage material.
6. Remove the plant from its current pot. Remove all old decayed medium and dead or broken roots (using sterile tools). Place the plant into its new pot with the oldest growth (sympodial) against the pot or centred (monopodial).
7. Add medium until the plant is at an appropriate height. Secure the plant by use of clips or stakes. Some media are firm and this may not be required.
8. Add the date of repotting to the label and insert the label into the pot. Replace the label if it has become brittle. Rewrite the name if it is fading.
9. Return the plant to its usual growing area and resume normal culture.

LIGHT

Intensity: Although many orchids grow in direct sunlight in the wild, caution must be exercised when growing them indoors since the enclosed area seems to accentuate the intensity factors. Some varieties that need high light levels to bloom can be sunburned if exposed to intense light either under high temperature conditions or without accustoming them to bright light gradually. Whereas light is a very important cultural factor, its effectiveness is greatly influenced by the temperature and the humidity. Plants can be grown at their highest light intensities when temperatures are maintained at moderate levels and humidity remains high (greater than 50%). Air movement is important in moderating temperatures and creating uniform humidity levels in the growing area.

Light intensities are often referred to in units called foot-candles. Seasons, time of day, amount and type of cloud cover and construction of windows all affect the light received by the plants.

Assuming that other growing conditions (water, medium, fertilizer, humidity and air movement) are appropriate, the following table indicates the light levels suggested for some of the major genera:

Toronto, Ontario receives approximately 9,000 foot candles of light on a perfectly clear, late June day around noon. Winter (January) days are shorter and the sun is lower passing through the atmosphere. This requires an increase in the length of exposure and a reduction in the amount of shading for the plants in winter. Be careful of the early spring days where light intensities are much higher than the plants have become accustomed during the winter.

Genus	Desired Foot-candles	% Full Light Summer	% Full Light Winter
Paphiopedilum	**800 to 1200**	**25**	**40**
Phalaenopsis	**1000 to 1800**	**25**	**40**
Odontoglossums	**1000 to 2000**	**30**	**50**
Miltonia	**1000 to 2000**	**40**	**60**
Dendrobiums	**1500 to 3000**	**50**	**70**
Cattleya	**2000 to 3000**	**50**	**70**
Oncidiums	**2000 to 4000**	**50**	**80**
Cymbidiums	**4000 to 5000**	**70**	**100**
Vanda	**5000 to 6000**	**70**	**100**

HUMIDITY

Amount: Humidity is a measure of the amount of water vapour in the air. A relative humidity of 100% is defined as the maximum amount of water that air can carry at a given temperature. As the temperature increases, the amount of water required to saturate the air to 100% increases. As the humidity level decreases, the plant loses water to the air at an increased rate. If the roots cannot match the water loss by the leaves, the plant dehydrates or its growth rate is reduced.

Orchids usually require considerable humidity to grow to their maximum potential. Below 50% is usually considered to be too low for successful culturing of most orchids. Short periods below 50% can be tolerated by most plants if other factors are not extreme. A true relative humidity of 70% seems to be desired for many varieties. Temperature greatly influences the level of humidity. A relative humidity of 100% at 10°C (50°F) falls to 25% humidity at 32°C (90°F) if the amount of water in the air remains the same.

Measurement: Humidity is most reliably measured with a wet/dry thermometer. However, the conversion of temperatures and the difficulty of refilling have yielded to humidity meters that are easier but less accurate. It is best to check the accuracy of any humidity meter periodically, particularly when it is new.

Increasing: Humidity can be increased by watering more frequently or placing the plants onto "pebble" trays. Trays are partially filled with gravel; the plant pots are placed onto the gravel. Water is added to partially cover the gravel. As water evaporates, humidity increases. Water must be replaced into the tray periodically.

AIR MOVEMENT

Why: Air movement ensures that the growing area is more uniform. It reduces leaf temperature, evens heat distribution, dries off leaves and helps prevent fungal infections. At low humidity it can also be very dehydrating. Air movement appropriate to the growing environment will achieve good results.

How: The use of fans, large (75 x 75 cm) or small muffin (12 x 12 cm), depends on the amount of space, the plants grown and the growing conditions of light and temperature.

When: Most fans are best run at all times at the lowest speed that gives positive results.

YOUR FIRST PLANT(S)

Among orchids there exists an extremely large variety of flower size, colour and style complexed with various vegetative sizes, forms and growth strategies. The choice of a first plant(s) is important since your success or failure with this plant may greatly influence your future involvement with orchids. Your choice will be heavily influenced by your personal criteria but should be tempered by your cultural experience and the environmental factors of your growing area in the home. Before taking the plunge, a few facts should be appreciated.

First and foremost in the selection of a plant, are the characteristics of the flowers. Size, colour and form of the flowers seem to be most important but the number, frequency and duration of the flowers should be considered. What constitutes an attractive flower is very much individual preference.

Your choice should be restricted by the coldest night temperature in the growing area, probably experienced during the winter. This temperature will limit your selection to WARM (above 17°C or 63°F) plants, INTERMEDIATE (between 13°C or 55°F and 17°C or 63°F) plants or COOL (below 13°C) plants. For cool plants, the maximum temperature experienced is summer is critical as this may be very problematic.

Light then narrows the choice of appropriate plants. The maximum light available will be the critical factor since the light may be reduced but is difficult to increase. Growing in a window usually requires a south, east, or west window. Using supplemental lighting may modify the plant choices but "high light" plants would be an inappropriate choice. When growing under fluorescent lights, you must take into account the height of the plant and its flower spike.

Watering practices should be considered in your decision. Some plants will require very frequent, daily watering (i.e. small plants on slab) while others only require a weekly watering. Humidity requirements of some plants may make them a poor plant for your growing environment. How much are you willing to accommodate the plant by changing your lifestyle?

<u>Now for the recommendations</u>. Choose an orchid that has the flower qualities that you prefer. Confirm that the temperature and light requirements can be met. Select a mature hybrid plant in a pot. I believe pot culture is usually easier under most growing conditions for beginners. Inspect the plant carefully before purchase; if flowers are present, are they what you want? Does the plant show signs of good health and vigour (roots and size of the recent growths are the best clues)? AVOID plants that are infected, weak, newly imported or freshly re-potted.

CREATING AN ORCHID CULTURE AREA

General: When you attempt to grow orchids, certain conditions are needed to be successful. The types of orchids grown will determine most of the design aspects of your micro-ecosystem. Generally speaking, you are best to start without a greenhouse and concentrate your efforts on relatively few types of orchids; perhaps even one type. The use of light stands and windows should be attempted first. Greenhouses experience large variations in conditions regarding light, temperature and humidity. These extremes in a growing area provide challenges that are unnecessary at the beginning. Greenhouses serve their purpose once your collection gains size and variety and you have gained valuable experience.

Light: The limiting factor on many growing areas is the amount of available light. The problem is easily solved when you grow under fluorescent lights as more lights provide higher intensities. Light stands give the most constant of all growing conditions. Orchids, such as Phalaenopsis and Paphiopedilums, probably grow as well under lights as anywhere. Fluorescent lights produce their greatest output near the middle and their intensity diminishes with age. Growing in a window provides more variation in light levels but can allow for growing plants that need higher light levels or cool seasonal periods. South windows provide bright locations for Cattleya, Oncidiums, Dendrobiums and perhaps enough for some Vandas. East and west windows provide comparable light levels to each other but west windows are more likely to sunburn tender plants as the air temperature is usually higher in the afternoon. North windows, unless very large or supplemented with lights, are usually unsuitable due to their very low light.

Warmth: This factor is usually under direct control, except in a greenhouse, where size and distribution can become important factors. The plants should be chosen with temperature in mind, or you should be prepared to adjust your life style to achieve success. Many orchids prefer a decided difference between day and night temperatures. Usually a difference of 5C° to 9C° is reasonable for most orchids. Temperature plays an important role in initiating flowering. Can your growing area cool to a low enough temperature for the plants that you have chosen?

Humidity: Humidity of 50% or higher in the vicinity of the plants is needed; some demand more than 60%. Water supplied in the form of watering raises the humidity but frequent watering is not a substitute for proper humidity levels. Misting helps but an evaporative tray under the plants is better; the pots must remain above the water.

SPECIES AND HYBRIDS

Approximately 30,000 species of orchids are believed to exist. A SPECIES is composed of naturally occurring forms that are similar in appearance and freely interbreed to produce fertile offspring. A species is identified by two names – the genus name and the species name. In text the genus name is capitalized and both parts are underlined, italicized or bolded.

e.g. Laelia pumila or *Laelia pumila* or **Laelia pumila**

Laelia anceps or *Laelia anceps* or **Laelia anceps**

Within a species, all individuals are very similar but not identical. Individual plants are given clonal names to distinguish them from others of their species.

e.g. *Laelia pumila* 'Black Diamond'

Any offspring that results from two individuals of the same species also receives the species name.

A HYBRID is any individual that results from two parents that are not of the same species. A PRIMARY hybrid is one produced from two species whereas a complex hybrid involves at least one of the parents being a hybrid. The name of a hybrid reflects the genera (plural of genus) to which the parents belong. Once a hybrid is created, it may be registered under a new name in order to simplify its naming and the subsequent hybrids it may produce. The following illustrate various hybrid names:

e.g. Laelia Ceres = (*L. pumila* x *L. milleri*)

Laelia pumila x Cattleya walkerana = Laeliocattleya Mini Purple

LC. Mini Purple = (*L. pumila* x *C. walkerana*)

Complex hybrids composes of more than three genera are usually given simplified names. For example, Potinara is the name given to a plant with parentage involving Brassavola, Sophronitis, Laelia and Cattleya.

PESTS and DISEASES

General: Good cultural practices, hygiene and healthy plants greatly diminish pests and disease conditions in your collection. It is important to recognize and remedy disease problems and pests as soon as possible so that the problem remains small or is eliminated.

Pests can come from a wide range of animals and insects to barely visible mites. Diseases are the results of infections by bacteria, fungi and viruses.

A good strategy to use is to inspect your plants often for symptoms of pests or diseases. Isolate new or affected plants. Use mechanical methods of removal followed by low toxicity chemicals. Biologically active controls exist but may not eradicate the problem completely.

The use of chemicals to control these conditions involves some risks; avoid personal exposure to the treatments.

PESTS:

Scale insects – Scale insects are small (1 to 4 mm) oval domes that attach themselves to leaves, pseudobulbs and flower stalks. Wipe small infestations with alcohol (70% isopropyl) or treat large problems with an insecticide such as diazinon or malathion (check to see what is available and recommended in your area). Repeated treatments at weekly intervals are needed to kill the developing young.

Mealy Bugs – Mealy bugs appear as white, fluffy ovals up to 7 mm long. They are often seen in the axils and crowns of plants. A similar treatment as for scales works but they can reside in the mix and often survive unless the pot is dipped.

Mites – Mites are extremely small, 0.5 mm. Most mites thrive in dry conditions on thin or fleshy leaves. The mites puncture the leaf surface leading to a pitted appearance. The presence of a web on the underside of the leaf confirms mites; false spider mites do not make a web. Shake the leaf above white paper to see the mites. Washing the leaves with warm water is helpful.

Slugs – Slugs and snails feed at night and create jagged edges on flowers, leaves and fresh roots. Slugs often leave mucous trails on the plant. Metaldehyde pellets are the desired treatment, although beer may also work.

DISEASES:

Fungal Rot – Appears black and wet, often growing in size and causing yellowing of the leaf and then death. Anti-fungal chemical, used as directed, can control the spread. Often results from wet growing conditions.

Bacterial Rot – Appears dark brown or black, distinguished from fungal rots by looking dry.

Virus – Virused plants cannot be cured and should be destroyed by burning. The symptoms vary but can include black areas that tend to follow the vein pattern, weakness in the plant's growth, and deformity in the flowers. Use of a sterile tool in dividing plants is important in preventing the virus from spreading.

PHALAENOPSIS

Temperature: Phalaenopsis usually require warm temperatures for successful culture.

Days	22°C (72°F)	to	30°C (86°F)
Nights	17°C (63°F)	**minimum**	

A small difference is required between day and night temperatures.

Light: Phalaenopsis need bright diffuse light conditions for strong growth and good flower production. A measurement of 1500 to 2000 foot candles is recommended for most varieties. Phalaenopsis are especially well-suited to growing under fluorescent lights. East, west or shaded south windows can be used but avoid direct sun.

Water; Media Phalaenopsis prefer to have their medium remain constantly moist at most times. The medium most often employed is a medium size fir bark mix, with seedlings in fine bark, and/or sphagnum moss (depending upon your watering habit and humidity). Repotting can be done whenever convenient. Plastic pots are common since they keep the medium moist longer.

Flowering: Phalaenopsis are encouraged to flower by about two weeks of lower night temperatures - between 10°C and 13°C. This condition often happens naturally in August or September, resulting in flowering between December and April. Drier conditions with brighter daylight during this time may help. Do not cut the spikes of plants that have "yellow" parents since they rebloom on the same spike. After flowering, the spike can be cut back to the node nearest to the flowers. This flower spike may either:

A: produce a second flower spike later
B: develop into a keiki or plantlet
C: wither and die

Fertilizers: During the rapid growth phase of spring and summer, they need frequent applications of weak fertilizer solutions. Growth is slower at other times of the year, so fertilizing can be less frequent. 20-20-20 seems to yield good results. As growth slows in the fall, the amount of fertilizer should be reduced or completely omitted; during this cool period 10-30-20 may be used to promote flowering.

Problems: Phalaenopsis are relatively free of problems and make good plants to begin your orchid experience with. If problems exist, it is that some homes are kept too cool in winter resulting in fewer flowers or that the plants are not kept humid enough. Avoid water in the crown of the plant or rot will develop, usually resulting in the death of the plant.

PAPHIOPEDILUM

Temperature: Paphiopedilums are best divided into three groups according to their temperature needs.

A: Warm *haynaldianum, philippinense* and *rothchildianum.*
B: Intermediate most of the Paphiopedilums
C: Cool Most originating in India and southern China

A small difference is required between day and night temperatures.

Light: Most Paphiopedilums need bright diffuse light conditions for strong growth and good flower production. A measurement of 1200 to 1800 foot candles is recommended for most varieties; some need higher. Paphiopedilums are especially well-suited to growing under fluorescent lights. East, west or shaded south windows can be used but *avoid* direct sun on most Paphiopedilums. Those that are multi-floral, tend to require brighter conditions.

Water; Media Paphiopedilums prefer to have their medium remain constantly moist at all times; *Paph philippinese* and *Paph parishii* prefer drier. The medium most often employed is a fine bark mix with fine charcoal, tree fern and perlite added, with seedlings in finer fir bark mixes. The addition of crushed limestone or egg shells is beneficial to many and essential to some. Repotting is best done whenever new roots are forming (often when new growths are 1/3 mature). Plastic pots are common since they keep the medium moist longer.

Flowering: Paphiopedilums are encouraged to flower by about two weeks of lower night temperatures, between 10°C and 13°C. This condition often happens naturally in August or September, resulting in flowering between December and April. Some types such as *philippinense, parishii* and *rothchildianum* need bright light and slightly cooler winter temperatures to flower well.

Fertilizers: During the rapid growth phase of early spring, the plants need frequent applications of weak fertilizer solutions. Growth is slower at other times of the year so fertilizing can be less frequent. 20-20-20 seems to yield good results, but ensure that trace nutrients are supplied. As growth slows in the fall, the amount of fertilizer should be reduced and 10-30-20 may be used to promote flowering.

Problems: Paphiopedilums are relatively free of problems and make good plants for beginners. If problems exist, it is that they are allowed to become too dry or the medium decomposes badly and destroys the roots.

CATTLEYA

Temperature: Cattleya usually requires intermediate temperatures for successful culture.

Days	18°C (65°F)	to	30°C (86°F)
Nights	13°C (56°F)	to	16°C (61°F)

A decided difference is required between day and night temperatures.

Light: Cattleya need bright light conditions for strong growth and good flower production. A measurement of 2000 to 3000 foot-candles is recommended for most varieties. If full sun in a southern exposure is available, use 50% shade cloth. Bifoliates and their hybrids require more light than unifoliates and their hybrids.

Water; Media Cattleya prefer to have their medium become dry (or nearly dry) between waterings. The medium most often employed is medium fir bark, with seedlings in fine fir bark. Charcoal, tree fern and perlite can be added. Clay pots are common since they prevent the medium staying too wet. Other media can be used but should not remain wet. Following flowering, watering should be decreased for several weeks. These plants are very seasonal in their water demands, requiring considerably more when actively growing.

Flowering: A unifoliates Cattleya produces about three large flowers while bifoliates tend to have many somewhat smaller flowers. Some are known as fall-blooming since they mature and bloom immediately, whereas others bloom later in winter or spring after a rest period. The later blooming varieties have their flowering influenced by photoperiods and temperature (long cool nights).

Fertilizers: During the rapid growth phase of early spring, the plants need frequent applications of weak fertilizer solutions. One or two applications of 30-10-10 is useful in early spring. However, 20-20-20 seems to yield good results when used the remainder of the growing period. As growth slows, the amount of fertilizer should be reduced and some 10-30-20 may be used to promote flowering.

Problems: Loss of Roots – Cattleya grow roots once in a growth cycle, therefore, the plant will greatly weaken before new roots form. Cattleya demand good light – low light results in weak growth and no flowers. Some newer hybrids have been developed to grow under lower light conditions: mini-cats, Cattletonia and many SLC hybrids.

DENDROBIUMS

Temperature: Most Dendrobiums prefer **intermediate** temperatures similar to Cattleya.

Days	18°C (65°F)	to	25°C (77°F)
Nights	12°C (54°F)	to	15°C (59°F)

Exceptions are some from high altitudes and extreme latitudes such as *Den. kingianum, dearei* and their relatives.

Light: Most prefer intermediate light conditions similar to Cattleya.

Water: Most prefer ample amounts of water when actively growing but reduced watering once growth is mature.

Potting: Dendrobiums have fine roots and demand a well-drained medium, bark, tree fern, stone or charcoal. Dendrobiums prefer to have small pots for their plant size making it necessary to use clay pots, stone or crockery drainage and staking the plant.

Flowering: Dendrobiums have a reputation for being difficult to flower. Their specific requirements have led to this belief. The following chart should assist in the promotion of flowering Dendrobiums. There are six main groups of Dendrobiums, which are listed below:

Cultural Group	Growth Period	End of Growth Period	Flower Bud Formation	Examples
Phalaenopsis, Section Phalaenanthe	**Warm**	**Warm, wet**	**Warm, wet**	**biggibum superbiens phalaenopsis**
Antelope, Section Spathulata	**Warm**	**Inter, dry**	**Inter, wet**	**gouldii undulatum stratiotes**
Dearei, Section Formosae	**Warm**	**Inter, Short dry**	**Inter, wet**	**dearei formosum sanderae**
Deciduous, Section Dendrobium	**Inter.**	**Inter, dry**	**Inter, wet**	**anosmum parishii aggregatum**
Evergreen, Section Callista	**Inter.**	**Cool, wet**	**Inter, wet**	**chrysotoxum densiflorum farmeri**
Nobile, Section Dendrobium	**Inter.**	**Cool, dry**	**Cool, wet**	**nobile chrysanthum wardianum**

ONCIDIUM

General: Oncidium is a large diverse genus of 400 to 750 species from many different habitats. Most demand bright light and good air movement. Most benefit from generous watering and feeding when in active growth, but should dry off rapidly. Many need a seasonal change upon completion of growth in order to promote flowering. Although most are adaptable and easy to grow, the mix must give good drainage as most are intolerant of stale, wet conditions around their roots.

Temperature: Most are intermediate in their temperature demands but some from high altitudes need cooler conditions. Those, with foliage indicating high light conditions, often tolerate lower humidity and higher temperatures since they originate from semi-deserts or the drier Caribbean islands.

Light: Most grow to their optimum with 50% light in summer and comparable intensity in the other seasons. Some demand brighter light for proper growth and flowering: equitants, onustrum, rattail and mule-eared types.

Medium: Medium bark is the preferred mix, with additions or perlite, redwood bark and tree fern possible. The mix must maintain moisture well but provide good aeration to the fine roots. Clay pots that are somewhat on the smaller side allow rapid drying. Some with climbing habits are best grown on slabs with small additions of osmunda or sphagnum moss to establish the roots.

Watering: Water liberally when actively growing, but allow some dry period between waterings. The length of the dry period depends on the plant size and xerophytic nature. Dilute balanced fertilizer on a regular basis is desired with a reduction in the nitrogen level toward maturation of the growth needed to bloom some types.

Humidity: It is sufficient to supply 35 to 50% humidity for most Oncidiums, but 50 to 60% is preferred for optimum cultural conditions by May.

Reference: Wellington Orchid Society's ONCIDIUM, A Cultural Guide

CYMBIDIUM

General: Most Cymbidiums cultivated today are hybrids. These hybrids are divided into two main groups according to plant size, standards being the larger plants with flowers commonly 12 to 15 cm in diameter while the miniatures are smaller (usually) with flowers usually 5 to 8 cm in diameter. Some species Cymbidiums are grown but are particular in their cultural demands.

Temperature: Standards need the cool temperatures during early fall nights (below 10°C) to set flower buds and below 15°C to maintain the buds and flowers. Higher temperatures are tolerated by standards in the summer if good air movement exists and sufficient water is supplied. Miniatures accept warmer temperatures than standards and are therefore more easily grown in homes where cool temperatures are difficult to maintain.

Light: Cymbidiums demand very bright light at all times. Moving them outdoors into full sunlight for the summer is usually necessary, with shading provided only to lower the temperature of the leaves.

Media: Cymbidiums should be repotted after flowering every two or three years. Some say they resent being repotted more often. Any medium that is rich in organic material (compost, decomposed manure, leaf mold) and holds moisture well but does not remain soggy is acceptable. The presence of too much nitrogen-rich organic matter in the mix may prevent flowering the first spring after repotting.

Water: Liberal amounts when actively growing but allow some drier periods as the summer growths reach maturity. During winter, the plants need less water due to lower temperatures and little or no growth.

Summer Outdoors

Move Cymbidiums out in mid to late May when danger of frost is past. The new growth is too tender even though mature growths can tolerate some frost. Gradually move the plants into full light with more air movement compensating for the increased leaf temperatures. Water often to promote strong growth. Cymbidiums are heavy feeders and need large amounts of nutrients for growth and flowering. Bring the plants indoors into a bright and cool place, after treating for insects and slugs, around Thanksgiving or around the time of the first light frosts.

Fertilizing: A rich organic mix ensures good nutrient supplies for the first year. But since they are heavy feeders, you must supplement the mix with fertilizer in the following years. Continuous feeding with dilute balanced fertilizers is recommended early in the growth cycle with diminished nitrogen (10-30-20) after early July to promote the development of flower buds. Minimal feeding is needed during the fall and winter.

SLAB vs POTS

Some orchid plants have a rambling growth habit with large distances, either horizontal and vertical, between growths. This nature makes it difficult to maintain the plant in contact with the potting medium. Another problem that encourages slab culture, is the need to have the plant avoid wet conditions that may exist within a pot.

However, the disadvantages of slab culture are great enough as to discourage you from putting all your plants onto slabs. The plant roots dry very rapidly on the slab unless very high humidity (90%) can be maintained. The plant may need watering daily or even more often when in a strong growth period. Also any mineral content in the water will build up on the slab and kill the roots and then the plant. Slab culture is also more easily achieved in a greenhouse since the water flows off freely making special problems for windowsill culture. Eventually, as needed, the mounted plant can be attached to a larger slab or the plant reattached to a new slab.

Proper compensation in potting by using very coarse fast-drying media (charcoal, tree fir or gravel) can provide good pot conditions for those demanding drier conditions. Larger, shallow pots can be used successfully for the horizontal ramblers. Repotting vertical climbers more often allows for lowering them into the pots.

ORCHID SHOWS

Orchid shows are organized and controlled by a committee of the host club. The rules governing the show are to ensure the best show possible allowing for fairness to all exhibitors.

Everyone has the right to exhibit their orchids at a show but the committee must monitor numbers to meet the limitations of the facilities. To enter a plant, contact the committee member in charge of the layout and reserve a space. Stake your flower at its best presentation and clean the foliage. Display the plant in any appropriate setting. Only plants and displays that are entered for judging will be judged. Plants are placed into classes according to their genus and colours to allow comparable plants to compete against each other. Judging is done on the flowers based on number, colour intensity and uniformity, form and condition. Exceptional plants of a particular type may be considered for AOS awards but must be nominated by one of the judges. These awards are intended to identify superior clones within a species or a particular hybrid cross. The awards in order are:

HCC/AOS	75 to 79 points
AM/AOS	80 to 89 points
FCC/AOS	90 to 100 points (the highest award)

Additional awards exist that recognize cultural or botanical aspects.