During the course of the next three issues we will be presenting three reprinted articles from the late 1960s; all seem as applicable today as when they were written. However, they are products of their time and place and may reflect the trends and practices of that time. Some names of plants have been changed to reflect current taxonomic practice. We hope you enjoy reading them for the first time, or revisiting them.

HINTS ON THE WATERING OF ORCHIDS

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Introduction: In the world of orchid growing – from decrepit growers such as ourselves, down to the novice—there is one eternally Burning Question: HOW OFTEN ARE MY ORCHIDS TO BE WATERED? Even learned orchid judges of many years standing have asked this question. One orchid judge of our acquaintance summed up his despair by saying, "I'll never get this watering down pat." Despair not, despair not, help is on the way. We feel that when you have finished reading this article your questions will be answered in full! Caution: Everything you read should be subjected to your own experiments. Through the years we have come across a great deal of misinformation from books and articles about the growing of orchids. Without doubt their authors were completely sincere in their presentation, as are we, but the possibility remains for error. Sit back in your chair, relax, imbibe if you must, and for a little while follow us into the world of good orchid watering.

Before answering the 'Burning Question', let us start with a hypothetical situation. You have sent for a large shipment of orchids from a nursery which notifies you that the orchids are now on their way, and that you may expect to receive them in a few days. Your order has included plants of cattleyas, epidendrum, etc. However, before reaching you, whether because of a mix up of your order, poor handling on the part of the packers, or ruinous damage on the part of the carrier, every label has been lost, damaged, or obliterated to the point where it is illegible. You are now faced with trying to grow a wide assortment of plants that are nameless, and like most objects that are unnamed, frightening. Arguing the point with the nursery would be too time consuming and anyhow you have decided to accept the challenge of growing these monsters with no information as to the type, culture nor origin. Let us begin.

Epiphytic orchids (and in this article we will deal only with epiphytes) are best grown when grouped together in the greenhouse according to leaf structure and pot size, rather than *just* pot size. The reason for this is twofold. Firstly, those with similar leaves seem to have similar light requirements, and secondly; plants with similar leaves also tend to have similar watering demands. Two factors predominate in orchid leaves, texture and shape. We are faced with growing these various strangers in one greenhouse. In a wide assortment of epiphytic species or cattleya hybrids, perfection for all cannot be achieved in one greenhouse, the perfectionist necessitating different greenhouses to grow many species. Most of us can neither afford many greenhouses nor spare the space for such a venture, and must grow our plants in one greenhouse. Hence, separating the plants as to leaf type is our first step.

Reading figuratively from left to right our first type is the fine-textured ovate leaf illustrated by such plants as stanhopeas, lycastes, anguloas, etc. On the extreme right we have such leaf structures as *Papilionanthe teres, Aerides (Siedenfadenia) mitratum, Dendrobium linguiforme*, and *Scuticaria steelii*. A quick examination of all your plants will quickly reveal their relationship of leaf structure to the above extreme types, and they can be segregated. Further segregation according to pot size is then employed. The stanhopea type of leaf calls for shade, and again moving from the figurative left to right, the succulent and terete type leaves call for brilliant sunshine. Since most growers are cattleya fiends, the best procedure is to modify the light and shading to suit cattleyas, and then place the others as to their light requirements judging from the leaf type in relationship to the ubiquitous cattleyas. Other more eclectic growers will want to adjust their shading for the most numerous type such as masdevallias or catasetums, and working to the left and right for the other plants from there. To repeat, growing a large assortment of plants in one greenhouse will evidently give less than perfect results for all genera. Do not expect to grow all plants to perfection but strive for the ultimate in your greenhouse and under your conditions.

There is, as usual, a fly in the ointment, an exception to the rule, and a square peg for the round hole—phalaenopsis. According to the foregoing rules a phalaenopsis should fit somewhat to the shady side of a cattleya—which it does not—feeling more at home with trolls and moles! Fortunately, the light requirement for a phalaenopsis is so well known that we can afford to ship it immediately to the shadier part of the greenhouse and feel secure. There must be, of course, other exceptions which do not come so readily to mind. However, after burning the leaves of the exceptions,

simply 'cuss' us out roundly and place them in a shadier position.

If you have arranged your plants as suggested they are now lined up for two purposes—light factors and watering factors. Some people fail to realize that there is a correlation between the shape of the leaf and the need for water. In general, plants with leaves having large surfaces need less light and more water for the reason that the large surface collects more light and evaporates more water. Recently, in moving our collection from one city to another, a leaf of *Scuticaria steelii* broke off from the main plant. This terete, quill-like leaf was placed next to the plant and observed. It was many weeks before the detached leaf started showing signs of wrinkling, and many, many more weeks before necrosis set in. Apparently, it would be difficult to underwater a plant with terete leaves.

Happily, oh happily, there is a definite, irrevocable, and immutable law which nature has set up for the watering of epiphytic orchids, which when understood resolves the problem once and for all. What follows has been known to astute growers all along, but none of them in any of their books or articles seem to be able to verbalize their information so that it is available to the home grower. Herewith we attempt to verbalize the information.

It is spring. The birds are on the wing, the aphids are on the roses, and the last growth is going over the edge of the pot. There is on every epiphytic orchid what amounts to a neon sign announcing water needs. Upon the appearance of new roots at first all that can be seen is the root tip which pushes forward. After a short time, depending on the plant involved, the white velamen appears. The length of the green root tip varies from plant to plant. Before the velamen covering appears, most orchid root tips will have elongated between 1/2 to one inch. You are now looking at the most important single factor in the watering dilemma. Most authors state that healthy roots mean a healthy plant. Of course they do, but how does one maintain healthy roots? *The job of the grower is to keep that root tip growing so that it remains at the same size in relation to the distance at which the white velamen follows.*

Because the entire process of watering orchids is contained in that one sentence we will repeat it word for word so that it will not escape attention: *"The job of the grower is to keep that root tip growing so that it remains at the same size in relation to the distance at which the white velamen follows."* Let us play around theoretically with this idea to observe reactions. Let us say the root tips are now touching the potting medium. We water today. For the purposes of experimentation we water again the next day, and throwing all caution to the winds, we water again on the third day. Remembering the idea that roots are reaching out for water we can readily guess what will happen when this much water applied. The root tips, having found water, will slow their growth. If water is applied constantly the root tip growth stops completely, and the white velamen that follows catches up with the tip. (Editor's Note: This covering of the root tip by velamen can also indicate a lack of humidity in the environment, especially in vandaceous orchids. Monitor the humidity levels in the growing area. If they are adequate for the type of orchids being grown, then the observation of the authors holds true.) This, of course, is an extreme case. However, in the average greenhouse, something akin to this is going on. We had occasion recently to check the plant table at an orchid meeting to find that of the one hundred or more plants displayed, only three or four plants showed active, growing root tips. Surely the other plants were in bloom, but we wonder how many more blooms each plant could have achieved with healthy roots! *When the roots are actively growing with healthy root tips the plant is in a condition to receive water.*

The next question is how often? The neon light referred to earlier is the distance of the root tip from the white velamen that follows. Generally when the new roots appear the distance of the tip from the velamen is optimum. The grower here must use his eagle eye, look at these roots or actually measure the distance with a ruler. *In a cattleya the optimum root tip distance is generally between 1/ 2 and one inch!* Once the optimum for any plant is known this is the measurement to strive for during the entire active of those roots. From this point on each plant will tell us how much water is needed. If too much water is applied to a plant, one can watch the green tip rapidly being overwhelmed by the white velamen. Those plants with healthy roots, and only those, will produce the maximum number of blooms with quality texture. All the other plants may bloom, but both the number and quality of the blooms will be deficient. To repeat both postulates together, watering is to be done only when the root tip is actively growing and with the goal of maintaining the green section at its optimum length.

Should the velamen be observed to be overtaking the root tip, start spacing the watering frequency so that if in the summer you water every four days extend it to five days or six days. It will take some time before the root tip has regrown to its original size so don't panic after a week or two, but stay with your new watering schedule before extending the "dry" periods. Our method has been to stop watering altogether until new rootips appear, and then space the watering days farther apart until we achieve the required balance between watering and keeping the root tips at their maximum.

The idea that one can feel the potting medium and determine watering needs is fictional. You will find that in the height of the growing season some plants will need water even when the compost is wet. For a short while during the height of the growing season you will notice plants that have good long growing tips, but the pseudobulb from which the new growth is coming will show signs of wrinkling. If this happens, even if the compost is wet, water, and you will be surprised to find the last pseudobulb filled out again the next day.

We are growing *Dendrobium nobile* and *Brassia antherotes* on tree fern plaques. Both have long green root tips and both show signs of shriveling long, long before the compost had dried. In this case, to feel the growing medium for water content is useless.

It should now be obvious why the plants are to be segregated according to leaf type. Apparently, regardless of the genera, leaf type determines the amount of water needed. Watch out for the exceptions. We can now have *Papilionanthe teres, Dendrobium linguiforme* and *Brassavola nodosa* growing in one spot and be assured that the watering and light requirements are similar.

One question comes to mind immediately. How can one watch the root tips if a plant is grown in a pot? The answer lies in the aforementioned segregation. Surely in a group of several orchids of the same leaf type in the same size pots several will have some roots growing on the surface. Use these plants in front as key plants. If you have ten plants of the same leaf type growing in six-inch pots, and you are using one plant with exposed roots as your key plant, should the root on the key plant diminish in size you can rest assured that is exactly what is happening in the other pots. Whether the root is inside or outside of the pot makes no difference. A plant that is receiving too much water will stop extending its roots both inside and outside of the pot, even though the visible roots are outside and dry out much faster. Individual plants will exhibit roots with different root tip lengths. Lateral roots, at first, tend to have shorter growing tips than roots issuing from the most recent pseudobulb. However, observing the root tips from a new pseudobulb will give you the correct idea on healthy root tips, and the others, although smaller, will have the same shape. Don't depend on only one root. The root tips will vary in size, some just starting out, and others slowing down somewhat. However, all should have good growing tips, and just so long as they do, water can be applied with assurance.

Winter watering is a subject that has been fairly well covered elsewhere. Suffice to say if you have understood the function of the root tip you will also understand winter watering. As the root tip begins to diminish so does the need for water, and after the root tip has been "overcome" by the velamen it is best to spray and water only when shriveling of the backbulbs occurs.

What about underwatering? It is interesting to note that overwatering receives a good deal of publicity, but underwatering is rarely mentioned. In our travels from greenhouse to greenhouse giving advice and care, the amount of underwatering we encounter is surprising. Here too, fortunately, we have definite signs of this. When a plant is constantly underwatered, it shows signs of shriveling. We all know this, but too few of us apply the knowledge. The pseudobulb to be watched is the first one behind the new growing pseudobulb. The older pseudobulbs shrivel to some extent regardless of the care given. When shriveling is noticed on the pseudobulbs directly behind the leading growth in an otherwise healthy plant underwatering is the cause, and the watering period should be stepped up—slowly.

It is as simple as that. *Keep the root tips growing while not allowing the pseudobulbs to shrivel!*

You now know how to water orchids.

Two factors have not been mentioned. Temperature and humidity. In general, most home growers have only one greenhouse with one temperature. We know of no quick way to determine the optimum temperature for any epiphytic orchid except to check its native habitat. In our mythical shipment of orchids this factor is not available from the name of the plant. If you know the name of any plant, of course, check for specific information. With an unknown orchid it is always best to start at an intermediate temperature. Should the plant show signs of improper growth it is necessary then to experiment with heat requirements until a better situation is achieved. Humidity is in the same category. It would be very nice if we could vary the humidity to meet the needs of each individual plant, but since this is not within the power of the home grower little need be said except to keep it up in the 60s and 70s if possible.

What then of good culture? Must we wait to see the blooms to know that our culture has been effective, or is there a way of knowing beforehand that all is well? Yes, yes, oh yes, there is a way! This is another observation of which we find no mention in any book on orchids. *When a plant is being grown to its optimum capacity all new leaves will be wide open upon appearance.* That is, the moment a new leaf appears, whether it be cattleya, vanda, odontoglossum, or even those with semiterete leaves, it should be open and unfolded. If it is closed and fails to open even at the very outset there is something amiss with the culture of the plants. We have seen too many plants on which the new leaves open only when pushed open by the emerging flower sheath or a second leaf in multi-leaved plants. Warning: Do not run into your greenhouse to check your plants to find this condition. Some new leaves may exhibit this quality and some may not. It is utterly impossible in a home greenhouse to achieve the ultimate results for all plants. Be satisfied if you find open leaves on the majority of your plants. The others will bloom too, perhaps not so profusely, but bloom they will.✾

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