Mail Delivery Difficulties?

If you have had inordinate delays in receiving your FIDDLEHEAD FORUM issues or if some have not arrived at all, please let us know so that we can look into the matter of delivery procedures. (Anyone not receiving this issue should tell us immediately.) We may not be able to do anything about it, but then again, we might.

Be Creative with Epiphytic Mixes

Epiphytic soil mixes for ferns and other plants can be fabricated out of many types of material. The principles to keep in mind when making an epiphytic mix are that epiphytic plants need well-aerated roots as well as proper moisture balance. Thus, some orchids and bromeliads demand a mix that will actually dry out completely between waterings, whereas most ferns require a uniformly moist substrate.

In compounding an epiphytic mix, leafmold is ideal for its water-holding characteristic. Peat moss and milled sphagnum will also retain water in any mix, but be careful with the sphagnum if you are a generous waterer. To increase the porosity of the mix, small-size (1/2 inch) fir bark, chopped treefern fiber or osmunda root, perlite, cinders or pumice pebbles are all ideal. To stretch the mix, a little sand can be added, but it also adds weight, if that is a consideration in the basket that you are filling. Also, some ferns like a little general potting soil added to the mix; this also stretches the mix. These include Davallia, Nephrolepis and Polypodium (Phlebodium) aureum and its varieties. A good rule of thumb to follow is that if in nature the ferns grow on rock as well as trees, then soil can be added to the mix. However, if the species is a strict epiphyte, then stick to a non-soil mix. Such information is often hard to come by, but by checking the habitat description in a native flora, it is possible to provide the proper mix for individual species.

Ferns and Food Production

It has been recently reported (The Water Fern—Rice Connection by Arthur Galston in Natural History Magazine) that there seems to be a positive correlation between the presence of the water fern Azolla (presumably A. pinnata, though not cited) in rice paddies of North Vietnam and greater rice production. It is suspected that this is due to the universal presence of a blue-green algae, Anabaena azollae, among the leaves of the water fern. Blue-green algae often convert nitrogen to a form usable by higher plants, thus acting as a natural fertilizer manufacturer. The article leaves the story there. There may actually be other factors involved, such as microorganisms in the soil or other blue-green algae in the paddies, the situation is being investigated by plant physiologists at the Royce Thompson Institute in Yonkers, NY, in cooperation with the International Rice Institute in the Philippines. Breeding experiments with Azolla are planned to see if more rapidly growing or more productive forms can be developed, if, in fact, the water fern is the cause of the increased rice production.

MoneyMaking Ferns

Twenty Shillings.

There may not be much money in ferns but there have been ferns in money for the last two hundred years or more, as this drawing of a Colonial Twenty Shilling note testifies. To avoid counterfeiting, Ben Franklin used leaves of plants in the printing process. Each leaf is unique in its details, much like a fingerprint, thus making it very difficult or impossible to duplicate. The actual process whereby the details of the fragile original leaf were transferred to a hard and durable printing surface remains unknown. Franklin did a good job of keeping this a secret. Leaves of willow and blackberry were used in some cases. The note pictured above (redrawn by Ed Poulton) used what would appear to be the evergreen shield fern (Dryopteris intermedia).
PTERRARIA or How to Grow Lush Ferns Indoors Without Becoming a Slave to the Waterpot & Sprayer

BY DAVID ALSORF

A pterrarium is a specially arranged tank, big as you want, designed to give ferns a high humidity and even, long-range water supply without waterlogging or compacting the soil. The object is to grow ferns with a minimum of effort to a jungle-like lushness that soothes your soul and boggles the minds of your visitors. All it takes is some tanks and a little initial work — so read on!

Now, there are a lot of nice things about the pterrarium I am about to describe: (1) they don't suffer from the overheating and condensation problems often encountered with regular sealed terraria; (2) they are arranged so that a local high humidity is maintained — high enough so that you can germinate fern spores on the soil surface, but not so high that you ever encounter mold problems; (3) they can be as big as you want them and are easy to make; and finally, (4) they're good for your health! You only have to add water to them once every 2 or 3 weeks and never have to spray the plants inside, yet the amount of moisture a number of these pterraria can add to your rooms is incredible — the humidity in my apartment never drops below 35%, even in the middle of the winter.

A pterrarium has 4 integral parts — (1) the container, (2) the water supply system, (3) the water reservoir, (4) the soil mixture — and requires (5) adequate lighting.

1. The Container should be 15 gallons (12 x 15 x 20" high tank) or more; less, and you neither have much space in which to grow your plants, nor are you able to have a large enough water reservoir. Unless you are rich, don't go out and buy new tanks — it's an expensive business. Either find them or make them. It's amazing how many people used to grow fish, but don't any more, and how many tanks get thrown out. Don't be put off if the tanks are cracked or are leakers — they can be quite satisfactorily sealed (for our purposes) with clear silicone sealing compound (bathtub caulking). available at most hardware stores. If you feel like making your own tanks, window glass is fine — there's not much pressure on the tank sides (people throw out windows, too). The only thing to remember is that the tank sides must be at least 1 1/2 times as high as the width of the tank in order to maintain a high local humidity in the growing area. My biggest tank (hose-made) is about 95 gallons (19 x 36 x 28" high). After assuring yourself that your tank is leakproof (only the bottom 4 inches; higher up doesn't matter), clean it thoroughly, with soap and chlorine bleach, and rinse it out.

2. The Water Supply System. You can't do without it! It allows you to get large quantities of water — gallons of it — into the reservoir quickly, without washing away or compacting the soil. The system consists of a vertical standpipe and one or more horizontal distributors (Figs. 1-3), and is made of 1" diameter aluminum tubing, available at larger hardware stores. Alternatively, you can use large diameter rigid plastic tubing, or even — for the distributors only — thick walled, large diameter garden hose material. Start out by cutting a piece of tubing about 3" shorter than a diagonal across the base of the tank (use a tubing cutter or hack saw). Tanks 12" wide require only this one diagonal distributor — wider tanks require distributors along the short and long sides of the tank as well. The distributors should have notches cut in them in such a way that there is an opening every 6 to 8" (Fig. 2). Ways to notch the distributors:

Fig. 2
(a) Cut 1/2 circle with cutting tool then push up center with pickets.
(b) Notch with a hack saw.

Now lay the distributors in the tank, notches down (or pointing slightly inwards), so that their ends meet without overlapping at what will be a front corner of the finished pterrarium.

Next, cut the vertical standpipe. It should rest atop the edge of the lip of the diagonal distributor, and just reach to the top of the tank. It is pinned against the corner of the tank at the top either with paper clips or 2 nails bent into "U"s (Fig. 3).

Fig. 3. Fastening the vertical standpipe to the top of the tank.

3. The Water Reservoir. This consists of 2 sizes of marble chips, medium sized ones covering the bottom of the tank and the distributors (a total of about 1 1/2" deep), and a top layer (about 1/2" deep) of small chips. The medium size chips provide lots of space for the water, while the small chips keep the soil mixture from percolating down and filling up the reservoir. With this kind of system, water is evenly supplied to the soil mixture by capillary action, even when the reservoir is almost empty. In large tanks the reservoir can be deeper than 2", and a bottom-most layer of large chips can be used. In any event, buy your marble chips in 50 lb sacks. They are far cheaper this way, and besides you'll be amazed at how many a tank can hold.

Wash off the chips (in a strainer) before putting them into the tank.

A word of WARNING! These pterraria are heavy, which means that if at all possible the tank should be set in its final resting place before adding the stones. Larger pterraria weigh well over 105 lbs!

4. The Soil Mixture. For this you use your own favorite mix, just as long as it contains sterile soil and is light and porous. DO NOT USE STRAIGHT POTTING SOIL; it requires some sort of leavening. I use the following mix:

2 parts potting soil (bought in 50 lb sacks)
1 part peat moss (garden variety, bought in pony bales)
1 part Vermiculite (The larger the sacf, the
1 part Perlite cheaper these are)

Also, if you wish, some bone meal and/or lime. Mix thoroughly when dry, then add water and remix. I do all of this in a 7 gallon pail with a tight-fitting lid; it's an ideal, non-messy way to mix and store the mixture.
A pterarria is a specially arranged tank, big as you want, designed to give ferns a high humidity and even, long-range water supply without relying on accidentally complicating the soil or water with mold problems. It is a way to grow ferns with a minimum of effort to a jungle-like lushness that soothes your soul and bojges the minds of your visitors. All it takes is some tanks and a little initial work — so read on!

Now, there are a lot of nice things about the pterarria I am about to describe: (1) they don't suffer from the overheating and condensation problems often encountered with regular sealed terraria; (2) they are arranged so that a local high humidity is maintained high enough so that we can germinate fern spores on the soil surface, but not so high that you ever encounter mold problems; (3) they can be as big as you want them and are easy to make; and finally, (4) they're good for your health! You only have to add water to them every 2 or 3 weeks and never have to dig the plants inside, yet the amount of moisture a number of these pterarria can add to your rooms is incredible — the humidity in my apartment never drops below 35%, even in the middle of the winter.

A pterarria has 4 integral parts — (1) the container, (2) the water supply system, (3) the water reservoir, (4) the soil mixture — and requires (5) adequate lighting.

1. The Container should be 15 gallons (a 12 x 16 x 20" high tank) or more; less, and you neither have much space in which to grow your plants, nor are you able to have a large enough water reservoir. Unless you are rich, don't go out and buy new tanks — it's an expensive business. Either find old wood or make them. It's amazing how many people use them to grow fish, but they don't any more, and how many tanks get thrown out. Don't be put off if the tanks are cracked or leaking — they can be quite satisfactorily sealed for our purposes with clear silicone sealer. The finish on smaller tanks, or any other, is good. If you feel like making your own tanks, window glass is fine — there's not much pressure on the sides (people throw out windows, too). The only thing to remember is that the tank sides must be at least 1 1/2 times as high as the width of the tank in order to maintain a high local humidity in the growing area. My biggest tank (home-made) is about 85 gallons (19 x 28 x 28" high). After assuring yourself that your tank is leak-proof (only the bottom 4 inches; higher up doesn't matter), clean it thoroughly, with soap and chlorine bleach. And rinse it out.

2. The Water Supply System. You can't do without it! It allows you to get large quantities of water — gallons of it — into the reservoir quickly, without washing away or compacting the soil. The system consists of a vertical standpipe and one or more horizontal distributors (Figs. 1-3), and is made of 1" diameter aluminum tubing, available at larger hardware stores. Alternatively, you can use large diameter rigid plastic tubing, or even — for the distributors only — thick walled, large diameter wood or plastic material. Start out by cutting a piece of tubing about 3" shorter than a diagonal across the base of the tank (use a tubing cutter or hack saw). Tanks 12" wide require only this one diagonal distributor — wider tanks require distributors along the short and long sides of the tank as well. The distributors should have notches cut in them in such a way that there is an opening every 6 to 8" (Fig. 2). Ways to notch the distributors:

3. The Water Reservoir. This consists of 2 sizes of marble chips, medium sized ones covering the bottom of the tank and the distributors (a total of about 1 1/2" deep), and a top layer (about 1/2" deep) of small chips. The medium size chips provide lots of space for the water, while the small chips keep the soil mixture from percolating down and filling up the reservoir. With this kind of system, water is evenly supplied to the soil mixture by capillary action, even when the reservoir is in almost any shape. Thus, the reservoir can be deeper than 2", and a bottom-most layer of large chips can be used. In any event, buy your marble chips in 50 lb bags. They are far cheaper this way, and besides you'll be amazed at how many a tank can hold.

Wash off the chips (in a strainer) before putting them into the tank. A word of WARNING! These pterarria are HEAVY, which means that if at all possible the tank should be set in its final resting place BEFORE adding the stones. Larger pterarria weigh well over 100 lb.

4. The Soil Mixture. For this you use your own favorite mix, just as long as it contains sterile soil and is light and porous. DO NOT USE STRAIGHT POTTING SOIL; it requires some sort of leaching. I use the following mix:

2 parts potting soil (bought in 50 lb bags)
1 part peat moss (garden variety, bought in pony bags)
1 part Vermiculite (the larger the saces, the 1 part Perlite cheaper these are)

Also, if you wish, some bone meal and / or lime. Mix thoroughly when dry, then add water and remix. I do all of this in a 7 gallon pail with a tight-fitting lid; it's an ideal, non-messy way to mix and store the mixture.

5. Lighting. Unless you can arrange some other sort of nice even top illumination for your pterarria, fluorescent lamps are by far the best way to provide light for your ferns. I use Nature-Escence tubes. They not only look best in an apartment, but also are, I think, best for the plants. The tubes (2, 3, 4 — depending on the width of the tank) are held in fixtures 5" - 8" above the pterarria — a distance which gives the plants plenty of light and yet causes no perceptible heating within the tank.

And that's it! Sit back and watch your ferns grow! You will undoubtedly find, sooner or later, all sorts of prothallia (gametophytes) appearing on the surface of the soil mixture. Spray them gently, and you'll eventually end up with lots of new ferns for raffles and fern sales! — (Dr. Alsop is a professor in the Biology Department at Queens College, of the City University of New York, and a world authority on cockroaches.)
How much of the soil mixture will you need? About 2" size thickness. For a 30 gallon tank this is about 2 gallons (8 quarts) worth.

After adding the soil mixture, fill up the reservoir. I place a big metal funnel into the standpipe to do this. Fill the reservoir to the top of the stones - no farther. The water gets drawn up into the soil by capillary action. The first time, and the first time only, I fill the reservoir with a dilute (1/10 strength) fertilizer solution. DO NOT FERTILIZE thereafter! Remember that as far as the nutrients are concerned, this is virtually a closed system - you are not leaching them out of the soil, like you do when watering plants in pots - the only loss is to the growing plants, and this is not great. From this point on, all you have to do is add plain water to the reservoir - usually at 2-3 week intervals. But remember: NEVER LET THE SOIL DRY OUT! This happens only when the reservoir is virtually empty. Drying is just about the only thing - other than flooding - that will cause the soil mix to compact, and thus lose its porosity.

5. Lighting. Unless you can arrange some other sort of nice even top illumination for your potted ferns, fluorescent lamps are by far the best way to provide light for your ferns. I use Natur-Bestu tubes. They not only look best in an apartment, but also are, I think, best for the plants. The tubes (2, 3, 4 - depending on the width of the tank) are held in fixtures 5-6" above the potted fern - a distance which gives the plants plenty of light and yet causes no perceptible heating within the tank.

And that's it! Sit back and watch your ferns grow! You will undoubtedly find, sooner or later, all sorts of prothallia (gametophytes) appearing on the surface of the soil mixture. Spray them gently, and you'll eventually end up with lots of new ferns for raffles and fern sales! (Dr. Alsop is a professor in the Biology Department at Queens College, of the City University of New York, and a world authority on cockroaches.)

Fern Friend Wanted

Mr. Christopher Goudy, of 14 Rudolph St., Wonilows, Victoria 3030, Australia, would like to correspond with other Australian fern growers, and is particularly interested in finding a pen-friend in New Guinea who grows ferns.

FERN FREAKS

"They're deciding on a Biocentennial Fern...I think that's Massachusetts on top with Boston underneath..."
Q. I am having some difficulty in growing ferns from spore, and not knowing the germination time I don't know whether or not to give up. Could you give me some guidelines to what I should expect?

A. Usually within a month a thin green layer of gametophytes should be visible on the surface of whatever medium you have chosen. This can vary from tiny individual specks or to a thick mat of fuzzy, intertwined gametophytes, depending on how thick the spores were sown. Two months is a reasonable amount of time to wait and three months is long enough to wait before throwing the cultures out to try again. Some spores appreciate lower light conditions to begin germination but then profit from higher light intensity to develop the gametophyte.

**Patent Medicine for Mealy Bugs and Scale**

These troublesome pests seem to be ever-recurrent invaders of greenhouses and growing spaces devoted to ferns. I have always prescribed a malathion spray (often at half strength) as a curative. Malathion is a low toxicity pesticide but should always be used with caution. Often, however, I have had cases of burned foliage due to this treatment.

Lately, I have been using wettable powder malathion rather than the water soluble emulsion that comes in liquid form. The wettable powder malathion has given good results. A medium-strength concentration (1 teaspoon/qt. of water) has been successful in killing mealy bugs, scale, and aphids on ferns without much damage to the fronds. This treatment has been especially successful with maidenhair ferns with only minor damage to new growth.

Write to the following producers for the merchant nearest you with this product for sale:

Stauffer Chemical Co. New York, New York 10017 manufactures Cythion 25 WP which is a 25% malathion product, and Malathion 25 Wettable Powder manufactured by F.M.C. Chemical Co., Agricultural Chemical Division, Middletown, N.Y. 14105.

**Request for Maidenhairs**

I am looking for spores or plants of Adiantum tenerum Lady Moxham and Adiantum tenerum Marshall's Pride. I have had no success locating these cultivars and would appreciate hearing from anyone who has them or knows where they can be obtained.—Thomas A. Milos, P.O. Box 273, Eastford, CT 06032.

**Spore Information Wanted**

I am compiling information on fern propagation by spore and would like input from others. If you have propagated spore, please send me a card indicating what species you grew, the source of your spore, how long it took for prothallia to appear (approx. germination time), and the time it took for the sporophyte to appear. Any additional notes would be appreciated.—M. Repasko, 3000 Sandy Ct, Kensington, MD 20728.

**Tropical Florida Fern Societies**

Fern fanciers in southern Florida now have two fern societies to choose from: the INTERNATIONAL TROPICAL FERN SOCIETY, 8720 S.W. 34th St., Miami, Fl. 33155, and the SOUTH FLORIDA FERN SOCIETY, P.O. Box 55-7275 Ludlam Branch, Miami, Fl. 33155. They are very similar in many respects; they both are amateur-oriented, horticulturally active, with monthly meetings, occasional field trips, and monthly newsletter. Each has annual dues of $4 for a single membership or $5 for a couple. We suggest you try them both out and join the one or ones which best suit your needs.

**On Growing Fern Gametophytes**

Janet Kuhn (of J & L Orchids, Easton, Conn.) uses a neat system to grow fern gametophytes. This consists of a plastic tub from a spreadable margarine manufacturer that holds a single peat plug—the kind that comes dry, compressed and is covered with a bit of thin plastic net. These may be sterilized and expanded with boiling water. The expanded plug is covered with a clear plastic cocktail glass. A small amount of water in the plastic dish will keep the plug evenly moist.

Once sporophytes are produced and are growing in the peat plug it will be necessary to transplant them. This can be facilitated by cutting the plastic net into a number of pieces with a sharp pair of scissors, being careful to just clip the net and not the fern roots.

**Recommended Booklets**

In response to your note in "Fiddlehead Forum", I have recently come across two booklets on ferns:

"Gardening With Ferns" by Rex E. Mabe, illustrated by R. Gabriel Pothourt Press 1973 P.O. Box 10312, Greenboro, N.C. 27404

This is a soft cover booklet ($1.98) that covers about 20 different tender ferns for the house such as some Adiantums, Polystichum tsus-simense, Staghoorn ferns, etc., and their culture. There are also 10 pages on general culture: humidity, watering, potting and soil mixes, etc. There are a few spelling mistakes, but it looks like a good source of information for novices.

"Ferns to Know in Oregon" Cooperative Extension Service State University, Corvallis, Ore. Extension Bulletin 705, reprinted Aug. 1971

This was first printed in 1914 and some of the names are old, such as Dryopteris Iimaean for Oak Fern, but it has photographs of herbarium specimens, sketches, and lots of chatty information about the 17 most common Northwest ferns, and briefly describes 12 more. It was given to me, but I think costs no more than $2.50.—Carol Johnston, Oyster Bay, L.I., N.Y. (Peggy Tabor, Corvallis, OR., and Noble Bashor, Salem, OR., have also called this booklet to our attention. It looks good.—Ed.)
The Greeks had a word for it
Ferns have been applied in the treatment of human ailments for thousands of years. As far back as 300 B.C., Theophrastus, the Greek botanist and physician, prescribed an oil extract of a fern to expel worms from the body. And it worked; this medicine made from the roots of the Bracken fern (*Pteridium aquilinum*) and the Male fern (*Dryopteris filix-mas*) was the drug of choice until very recently. But do not be misled; the Theophrastus prescription is the rare exception. Most pharmaceuticals derived from ferns are ineffective and in some instances harmful. The medicinal merits ascribed to a particular fern in olden days were based on a mixture of fact, fiction, fantasy and fables, to which were added fraud, fakery and falsehoods. Mysticism, necromancy, demonology, mythology, philosophy, astrology and witchcraft (the art of using magic herbs) were blended in varying amounts with botany, medicine, pharmacy, and scientific study in deciding the healing properties of ferns. However, the problem then as now, remains the same — how to know which fern is effective against which disease.

The earliest attempts were by trial and error with humans serving as guinea pigs. More often than not, the plant prescriptions were harmless but in some instances they brought relief to the sufferer by either curing or killing the patient. Drug dispensers — doctors, herbalists, astrologers, sorcerers, shamans, and medicine men — supplemented their limited knowledge with whatever means they had at their disposal with no holds barred. They studied the characteristics of the plant with the hope that the plant itself would suggest clues for its proper medicinal uses.

The Doctrine of Signatures — the Sign of the Fern

In the sixteenth century Theophrastus Bohenstein alias Theophrastus Bombastus alias Paracelsus, the same by which he has come down in history, fathered a theory that associated a specific plant with a specific part of the body — the Doctrine of Signature. He held that every plant was "signed" by a mystical bond to a given human ailment and was under the influence of a star or planet. The signature was inscribed in the shape, size, color, aroma, texture and habitat of the plant and its position with respect to the heavenly bodies. Astrological medicine gained great popularity and was very fashionable in the XVIIth and XVIIIth centuries. Despite its charlatanry and fraudulence these beliefs still persist among astrologers and food faddists.

Dr. John T. Nickel
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Fiddleheads and Fiddlesticks

By a remarkable coincidence both medieval Europeans and early American Indians, though widely separated in time and space, viewed rolled up fiddleheads as curled snakes or worms and therefore used them for killing and expelling worms from the body. The Cherokee Indians also placed great value and faith on fiddleheads of several ferns as a remedy for rheumatism. They observed how a form from emerges from the curled up fiddlehead and reasoned that fiddleheads were good for straightening out knotted muscles and rheumatic limbs.