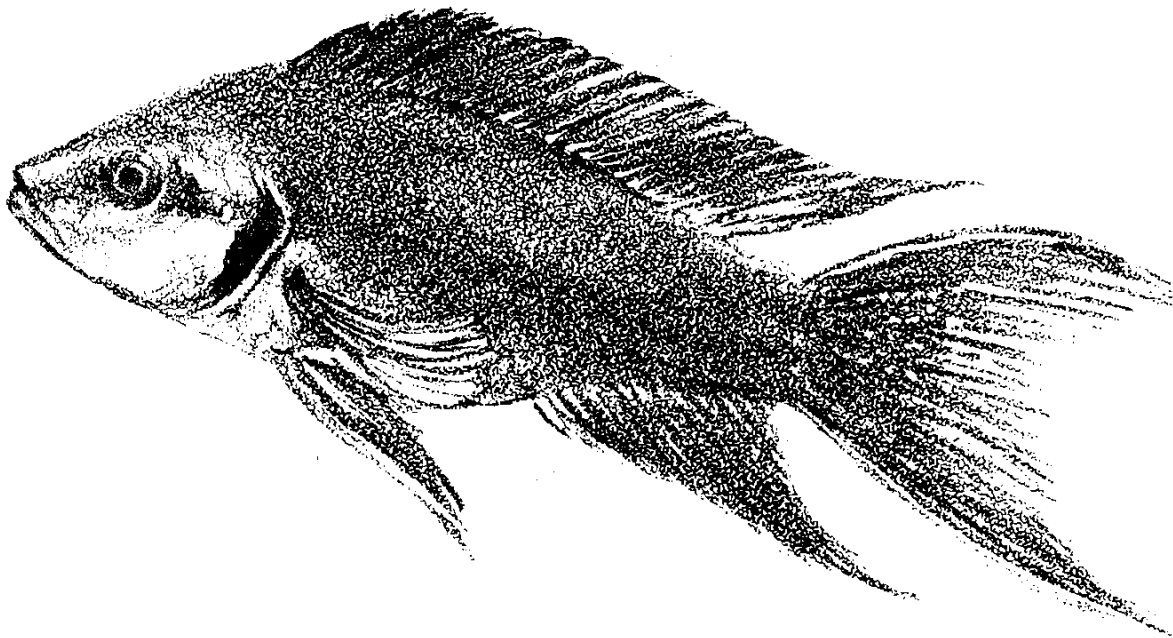


DELTA TALE

Official Publication of the Potomac Valley Aquarium Society

Volume 28 • Number 4

May/June 1997



The *Delta Tale* is published bimonthly for the benefit of the membership of the POTOMAC VALLEY AQUARIUM SOCIETY INC. , a non-profit educational and social organization . The society was founded in 1960 for the purposes of furthering the aquarium hobby by the dissemination of information and advice, and the promotion of good fellowship among the membership by organized activities and competitions.

All correspondence to the society and to *Delta Tale* should be directed to P.O. Box 664, Merrifield, VA 22116.

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PVAS Web site: <http://www.erols.com/dsnell/pvas.htm>

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<u>Vice President</u>	Rick Mckay
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<u>Delta Tale</u>	John Mangan

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FROM THE PRESIDENT:

Gene Aldridge has been able to arrange for Dr. Wayne Liebel to speak at our fall weekend workshop. Dr. Liebel is a Fellow of the American Cichlid Association, past editor of the ACA journal, and author of numerous books and articles in the national hobby magazines. He is a nationally recognized cichlid expert, especially in South American cichlids (as his impressive 30+ series of articles on these fish in Aquarium Fish Monthly demonstrates!). Dr. Liebel's participation in our fall weekend event will make it one of our best ever! Be sure to reserve the weekend of November first and second to become a better, more knowledgeable hobbyist!

So far this year, we have been able to enjoy a string of outstanding monthly programs. But we need your help to continue our success. If you would like to share your experiences, please consider speaking at a future meeting. If you know of someone whose expertise would be enjoyed by your fellow club members, please invite him or her to join us. Please contact Rick McKay or myself to arrange a meeting date. And if public speaking is not your forte, then how about writing an article for the Delta Tale?

And we are still looking for a few good people to take over several club jobs - Ways & Means, Refreshments, Delta Tale editor. PVAS is in desperate need of new blood to keep the club fresh and growing. The only requirement is enthusiasm and commitment. How about YOU?

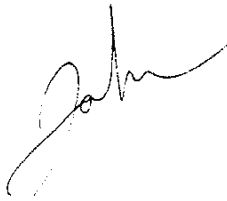
Pete

Frum the editor's desk


The recent auction was a big success, as usual. What did you think of our new method of determining selling order for items? Let any of our board members or officers know your thoughts on this so we can make plans for what we want to do at future auctions. Speaking of which - a July auction is still tentative. The board is exploring several options and a decision will be made at the next board meeting. Plans are also under way for our Fall Workshop. We have Wayne Liebel confirmed as a speaker and several more should be known soon.


If you read Pete's message on the previous page you saw that we are looking for people to take over several PVAS jobs, one of which is *Delta Tale* editor. Due to other commitments (a full time job, a part time job, editing the ALA's journal *Livebearers*, taking care of 30+ tanks of fish, etc. etc. etc.) I'm finding it harder and harder to keep the *Delta Tale* on schedule. Aside from the fact that I am having trouble finding time to put out the quality of magazine that I would like to, and that you should be getting, it's time for some fresh blood. I have been editing *Delta Tale* since the Jan. 1984 issue (except for a short break of about a year). That's somewhere slightly over 100 issues I've put out - up until 1990 *Delta Tale* was published monthly. You don't need any previous experience, I had none when I started. I can easily teach you the little bit you need to know in order to put everything together and will be available for advice, as the late Pat Mahoney was for me when I started. A computer/word processor helps, but isn't necessary. I started with a manual typewriter and have only been using a computer for the past 3 years. I'm not setting a deadline for leaving the job (which is probably a mistake) but I warn everyone that I can't guarantee I'll be able to stay on a very regular publishing schedule. If you don't want to take on this much responsibility there are other jobs that we need help with such as ways & means, refreshments, and probably several others. See Pete, Rick, or me at any PVAS meeting if you're interested in helping out in any way.

Until next time...

A handwritten signature in cursive script, appearing to read "John". The signature is written in dark ink and is positioned below the text "Until next time...".

WHAT'S HAPPENING!

 For up to the minute information on what's happening call the free PVAS hotline anytime. (703) 352-3365.

 Check out the PVAS Web site at <http://www.erols.com/dsnell/pvas.htm>

June 9: PVAS Monthly Meeting. Program- Rainbowfishes by Jim Karanikas of Tropical Fish world, plus - raffles, door prize, mini-auction, bowl show, refreshments and more.

July: We are trying to set up an auction for sometime in mid-July. Details will be on the hotline and will be announced as soon as they are available.

July 14: PVAS Monthly Meeting Program, raffles, door prize, mini-auction, etc., etc.

Aug. 11: PVAS Monthly Meeting.

Sept. 8: PVAS Monthly Meeting

If you know of any "fishy" happenings let me know and they can be included here.

J.M.

TRADING POST

PVAS members may advertise in the trading post at no charge. Send ads to *Delta Tale*, c/o John Mangan, 12633, Oakwood Dr. Woodbridge, VA 22192.

Wanted: Grindal Worm Culture. Must be free of mites or other contaminants.

For Sale: backissue aquarium magazines. Many different titles. Send SASE for catalog.

For Sale: Plastic fish bags. Standard thickness and 3 mil extra heavy. Several sizes of each will be available. See me at any PVAS meeting, or write for a price list (include SASE).

John Mangan, 12633 Oakwood Dr., Woodbridge, VA 22192.

For Sale: *Julidochromis marlieri* 1 - 1 1/2 " \$3.50 each

Neolamprologus brevis (Sunspot) 1 - 1 1/2 " \$3.50 each

Convict Cichlids 1" \$1.50 each

Neolamprologus cylindricus 1 adult \$8.00.

Lorne Williams (301) 630-7674

FAAS Update

Alex Townsend

Say what? FAAS? Huh? Just what the heck is a FAAS and why does it need to be updated? Unfortunately, that probably is what a lot of you thought when you first saw the title of this piece. Actually FAAS is an acronym for Federation of American Aquarium Societies, and PVAS has been a dues-paying member of FAAS for more years than I've been associated with the club. Your lack of familiarity with FAAS is not your fault, however. Rather, the blame is mine, since I am supposed to serve as your official FAAS representative. Accordingly, what I'd like to do -- starting now -- is include in the Delta Tale periodic updates with the latest FAAS news and activities.

First, a little more about FAAS — what it is and what it does for the hobby. The FAAS Report, which PVAS and the other 85 member societies receive every other month, contains the following mission statement: "The Federation of American Aquarium Societies is comprised of individual aquarium societies in the United States, Canada, Central and South America. Its main purposes are to further the growth and activities of aquarium societies; to promote the maintenance, propagation and growth of tropical fishes and other aquatic life forms; and, to represent aquarium societies before government bodies." A few examples might help to clarify this statement.

In regard to helping aquarium societies, FAAS publishes a series of how-to booklets regarding the establishment and running of an aquarium society, as well as how to organize society events and programs. Society events on which FAAS provides information include the running of meetings, shows, workshops and auctions. The FAAS Report always contains articles on one or more of these topics. Most notable in the way of program information is FAAS's leading role in sanctioning and providing the rules for the Breeder's Award Program (BAP) and the Horticultural Award Program (HAP). Many clubs forward their yearly results to FAAS for publication in the Report. FAAS also sponsors a yearly competition for the best article in an aquarium society publication.

What is especially important (and what we often don't see) is FAAS's representation of the hobby (that translates as you and me) before government organizations. Unbeknownst to most of us, there is an unending stream of proposed state and federal legislation with potentially serious implications for the hobby. Not the least of these implications is our ability to purchase and maintain the variety of fishes and plants we currently enjoy, as well as the option to purchase and use certain fish medications. FAAS has been instrumental in ensuring that our position is heard.

Obviously, such a concise discussion cannot hope to capture the full scope of what FAAS is all about. It should be evident, however, that the continued existence of FAAS is important both to individual hobbyists and to aquarium societies.

Here are a few of the highlights from the three issues of the FAAS Report that I have received this year:

January/February

- Aquatic Photo Award Program — FAAS was of a mind to drop this program, but a membership survey indicated continued interest (there were no entries last year). Because of the expression of interest, however, FAAS will continue the program and published the rules in this issue of the Report. FAAS is warning, however, that another year of zero entries likely will result in the program's termination. If anyone is interested in participating, please let me know and I'll be happy to provide you with a copy of the rules.

March/April

- Maxine Gorsline, the current FAAS President, asks that member clubs start sending her copies of their club's publication. (Actually, this is a test to see if our erstwhile Delta Tale editor reads this before inserting it in the next issue; if he does, Maxine's address is 3447 S. 162nd St., Sea Tac, WA 95788).
- This issue contains a summary of the Horticultural Award Program results for 1996.
- The March/April issue contains a lengthy Legislation Report. Included are notes about the impact of the zebra mussel which is threatening the ecology of the Great Lakes and now is moving into the waters of the surrounding states. There also is a fish-eating, three foot, Asian eel that is beginning to have an impact in Georgia by threatening native species. Such "alien invaders" are ranked second in the cause of extinction (habitat destruction is number one). The Invasive Species Act was passed into law last year, authorizing \$29 million annually in the effort to control exotic species. The total cost of control, however, is estimated at over \$3 billion, so results likely will be neither dramatic nor swift.
- The American Livebearer Association announced the creation of the Vern Parish Fund to support education in the field of livebearing fish. The fund was established in honor of Vern Parish, who passed away last March. Contributions may be sent to Jim Langhammer, 2101 N. Vermont, Royal Oak, MI 48073.

May/June

- In a legislation update, the FAAS Report notes that the Asian Rice eel is now present in the Chattahoochee River. Because this fish can be sold legally in the state of Texas, the Texas Parks and Wildlife are very concerned and it is likely the fish will be added to that state's prohibited species list.
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- The St. Catherines Aquarium Society has nominated Ray "Kingfish" Lucas for induction

into the FAAS Hall of Fame. Also enclosed is a ballot for the 1997 FAAS Board of Directors nominations. Nominees are Maxine Gorsline (Greater Seattle Aquarium Society), Leighton A. Irwin (St. Catherines Aquarium Society), Jeff Neese (Circle City Aquarium Club), Hedy Padgett (Circle City), and Joshua Sloan (Champaign Area Fish Exchange).

As I noted, these are only a few of the highlights from the last three FAAS Reports. I chose not to include the many items of more specialized interest. I will try to remember, however, to bring the Report to the monthly meeting so those attending can get a better feel for (and appreciation of) FAAS and its activities. Anyone wanting specific information relating to FAAS (program rules, entry forms, etc.) can contact me by telephone at 703-641-5473 (evenings before 9 or on weekends) or via E-mail (atownsen@erols.com).

Breeder's Award Program

BAP Checkers:

Annandale/Falls Church area: Jeff Burke (703) 941-3230
Montgomery County: Ray Hughes (301) 424- 3531
Montgomery County: Wayne Considine (301) 977-5973
Mt. Vernon/Olde Town area: Gene Moy (703) 765- 0865
Oakton/Vienna area: Rick Mckay (703) 281- 1647
Occoquan/Lake Ridge area: John Mangan (703) 491-4980
Prince George's County: Lorne E. Williams (301) 630-7674
Springfield/Franconia area: Pete Thrift (703) 971-0594
Warrenton/Manassas area: Gerry Hoffman (540) 347-7486

We still could use some more checkers. There are a number of areas where we don't have anyone. Even if there is someone already listed for your area we could always use someone else to help spread the work around.

BAP Standings:

Breeders Award *
Intermediate Breeder **
Advanced Breeder***
Master Breeder****
Grand Master Breeder*****

Jeffrey Burke 445***
Don Kinyon 180**
John Mangan 155**
Lorne Williams 50*
Gene Moy 75*
Gerry Hoffman 10

Recent activity: Gene Moy receives 15 points for *Corydoras aeneus*.

WATERWORKS®

Christopher Wright & PVAS Friends

This month's article will focus on "mechanical" aspects of maintaining a healthy environment for your planted freshwater tanks i.e., filtration and lighting.

Before we begin our exploration of things mechanical, I'd like to give you a little update and some gems of information that just can't wait.

First, I recall that several years ago, *Delta Tales'* editor, John Mangan, decided to try a survey of PVAS's membership. Just as I did, he included a form in an issue; the response was dismal. I believe he got two responses. Initially, I too received exactly two responses (by mail). I was further delighted when one member phoned me and four separate responses were hand-delivered. So, thank you most sincerely Mark, Douglas, Julio, Gene, Pete, Barbara and the (anonymous) person from the auction who gave their survey to John Mangan.

This particular "WaterWorks" *would* have been about my major area of concern (adjusting pH and *keeping* it there) if I'd had any reasonable amount of responses. To refresh your memory, I was looking to adjust pH to neutral or slightly acid and maintain it there without using anything that contained phosphates. Judging from the few responses that I've had, most of you aren't adjusting your pH at all, and many of you are indeed having buffering problems (pH crashes) at any level of acidity or alkalinity. I'd hoped to offer you several different pH adjusters and buffers, but I don't have enough responses to do that. So far, I've experimented with three manufacturer's products, and results have been mixed at best. My poor tanks (and wallet) can only take so much abuse, so either my suggestions to remedy the phosphate/pH/buffer maze will be extremely limited, or you guys are gonna' have to come through!

Meanwhile, I hope to have some long conversations with Jim Karanikas of Tropical Fish World in Gaithersburg (a marine biologist who is extremely knowledgeable of our water chemistry) and our local, public water supply authorities.

Lately, I've also been on the Web...whew! There's some *serious* water chemistry information there, and, as usual, they contradict each other (see disclaimer). I did, however, discover some wonderful Websites.

Try <http://www.malloftheworld.com/aquarium/> for Dan Quackenbush's site. I started there and he/it led me to <http://www.actwin.com/fish/index.cgi> where things got serious real fast, but there were plenty of fun sites at both locations—try it! FYI, Dan authored a two-part series (February and March 1997) in *Freshwater and Marine Aquarium* titled "The Low-Tech Natural Aquarium." This series will perhaps garner him a place in aquatic history as the man who uses kitty litter as substrate. His website offers reprints of the articles with updates, and I *highly* recommend it. In my own search for the ultimate truth, his common sense approach, writing and thinking are the most refreshing I've seen. It certainly didn't hurt that he also suggested some things that jived with some thoughts that've been rumbling around my head for awhile—primarily the use of small internal power filters (see next page), and sand as a substrate (more on that in a later "WaterWorks").

NOTE: Please don't try kitty litter until you read the piece!

Now, to the business at hand; let's try to grow some plants with minimal algae!

FILTRATION: When it comes to filtration, one concept that is absolutely paramount to grasp is this: many algae thrive in high oxygen, turbulent environments. Conversely, these conditions are detrimental to the higher plants, for though most plants don't really mind the circulation, any available CO₂ will be quickly driven off by surface agitation. For these reasons, no airstones or air driven filters, no spray bars that are above the water surface and no air diffusers. In fact, ANY type of return that stirs up the surface will result in unacceptable CO₂ levels, as will any system that adds a lot of oxygen to your water, such as trickle and wet/dry filters.

This is also why it's extremely difficult to achieve good growing conditions with an outside hanging power filter such as the Whisper, Aquaclear, Marineland, Millenium, or Supreme series—not impossible, just difficult. They simply stir up the surface too much. The same goes for undergravels with or without powerheads.

Here's a REAL LIFE example. I tried for months to grow plants with a Whisper One to no avail. It was on a 20 High with the return dampened down to its lowest setting, yet the highest CO₂ readings I ever got were half the acceptable minimum. If you've had results contrary to this, odds are there's something organic in your tank that is slowly decaying and contributing to the CO₂, you have an equivalent filter flow on a much larger tank, you're just plain lucky, or you've struck a perfect balance of fish, plants and environmental factors (*really lucky*—or brilliant).

Oddly enough, I have had limited success on 15 gallon tank with the same filter, but plant growth has been quite slow and, after a year, I'm still battling brush and green algae. I believe the only reason this tank did better than the 20 was the fact that it was slightly overstocked (fish contributed to CO₂), and it contained a good bit of African Rootwood (slow decay) and most importantly, lots of plants.

If you're having some success with a hanging filter, there is one other possibility; you're growing Java Moss (*vesicularia dubyana*) or Java Fern (*microsorium pteropus*). They're also one of the few plants that'll do well with our next entry: the undergravel filter.

With UG's, you have two strikes against you right from the start: the returns create too much surface disturbance and the flow through the gravel is not good for the roots. Open almost any aquarium magazine, and you'll find a Q&A covering the more technical aspects of this substrate flow business. According to most writers, using the Reverse Flow method won't help either. There are a few, however, that *insist* one can grow plants well with UG's—and have the tanks to prove it. This is a prime example of those pesky “aquatic contradictions,” and a hotly debated topic these days. Personally, I'd say, “Forget it.” You're truly fighting an uphill battle.

There are alternatives: internal power filters and external canister filters. I believe it'd be safe to say that most aquatic gardeners (and many fishkeepers) use external canister filters such as those offered by Eheim, Hagen (Fluval), Marineland and Renaissance. Though the startup can be a bit tricky (depending on the model), they're quite versatile in the combinations and types of media that can be added, and there are numerous options in setting up the intake and return.

In a heavily planted, understocked tank where the fish are not overfed, you honestly don't need anything more than good biological filtering coupled with some

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mechanical filtering. All canisters automatically provide both. They have to have some sort of sponge or pad to keep large debris from entering the impeller chamber, so you get mechanical and biological filtering right there. Most canisters require a large sponge, so you've got loads of biological filtering in the sponge and in/on the canister itself (the "good" aerobic bacteria like hard surfaces). Many like to use a basic mechanical filter before the water reaches the sponge, such as filter floss or another sponge or pad. At the bottom of the canister, which is actually the first stage of filtering, is where many place another biological filter: ceramic rings, Siporax®, Bio Beads/Balls, etc. Or you can try, as one friend does, plain gravel, though you will get a larger bacterial colony with a media that has internal areas to harbor them.

Here's what I like: those little internal power filters that you've probably never given two thoughts to. They're very popular in Europe, and I have a hunch that they're more into growing plants than we are. Hence the popularity of these filters. What probably turned you off about these little guys is their diminutive size, but that is deceiving; those sponges and cases can harbor quite a bacterial colony. In a heavily planted tank that is properly stocked (understocked) whose residents are properly fed (lightly), they are completely adequate. For one thing, your plants are already doing a lot of the filtering for you, and their roots feed upon the detritus that works its way into the gravel. The number one best feature about them is that they're easily rigged so their return doesn't disturb the surface. Yes, there is a downside: you have to look at them in your tank—wait a minute—no you don't! They're all covered up by your luxurious plant growth!

So, what's stopping you? Go out and buy one now! Really! Here's why I prefer them: they work. This is not to say that canister filters don't work just fine. The problem with canisters is their power. Let me illustrate; I have a Fluval 203, a medium size canister filter, on a 29 gallon tank. Its flow rate is listed at 111 gallons per hour. From what the experts say, the actual flow rate is probably half the listed rate on *any* filter that is placed below the tank. I've got the spray bar well below the surface, and the flow is cut down to about half of that. Though there is surface movement, there's no ripple on the water surface at all, yet my CO₂ levels are consistently too low. Why? Here's the great part: I don't know! It could be that all that traveling around is aerating the water more than one would think...or it could be that there just aren't enough plants in the tank.

I know, the plants idea doesn't seem logical, but bear with me for awhile while I digress, and we'll get back to filters in just a bit. Right now we're going to take the plunge into the truly strange and mysterious...I have a hypothesis—actually, it's more like a hunch. I believe that there is some sort of great, secret connection between plants and CO₂. Let us call it "The More, The Merrier Syndrome." I've scoured numerous manuscripts, website treatises and dog-eared publications searching for even a hint of this phenomenon without luck, yet I'm sure the truth is out there.

Some background is in order here: have you ever noticed that in all those lovely plant tank photos (in all those lovely plant tank books) there's always LOTS OF PLANTS in those lovely little tanks??? You guessed it! The great mystery REVEALED! One would think that if one put a whole lot of plants in one's tank (without a supplementary CO₂ injector) that the plants would just *instantly* suck up all the CO₂, fall over dead, and start pushing up daisies (cryptos?). I can't state this scientifically, but well, they don't...

Here's what put me onto this—it's more REAL LIFE stuff. I've got this ten gallon that serves as an isolation tank (as opposed to a quarantine tank). It's stuffed to the gills (gills?) with plants. Unable to bring myself to parting with them, I just take all my ragtag rejects, leftovers, and scrawny, practically leafless failures and throw 'em in there with a couple of rebel fish. Conditions in this tank are far from ideal—my little internal filter DOES spray the surface a bit too much, the tank has poor lighting at best, there's no substrate at all, and I almost never add fertilizer to it; yet... THEY GROW! These plants have the *audacity* to all but die in their original home and then bounce back when I put them out to pasture! Most of them came from my aforementioned 20 High: hygrophila, ludwigia, cardamine, echindorus tennellus, myriophyllum...I just couldn't figure it out.

Then I got a CO₂ test kit.

The CO₂ levels in this little tank are consistently good. They're on the low side, but they're adequate enough. There is *something* going on here. It's already common knowledge that you want lots of plants to out-compete the dreaded algae for all available light and suspended nutrients, but I've never found a thing about "The More The Merrier" phenomenon. Many aquatic gardeners may know this almost by instinct, but nobody ever seems to put it in writing. I am still investigating this and will publish an update later. But for now, if you're going to set up a plant tank, get LOTS OF PLANTS! I don't think you'll actually need a jungle in there, but plant heavily *at least* two-thirds of the tank. I also suggest you try just a few floating plants (you don't want so many that they're blocking too much light); hornwort, salvina or amazon frogbit are good bets.

More details on plant selection and the pros and cons of certain plants will be covered in the third installment of this series. Let's get back to rigging those filters.

Virtually all of these filters are designed to give you optimum flexibility in methods of intake and return. The intake isn't that critical. It's the return that you gotta' keep an eye on. Again, get the return *below* the water surface. Try to set it up so that you've got light circulation in the tank and no rippling of the surface.

Here are some other tips on accomplishing these goals. You can enlarge the holes on spray return bars by drilling them. By enlarging the holes, the force of the return is softened, and it spreads out. You'll probably need to reduce the output. Use additional hose to lower or reposition the spray bar. If you want to be truly creative, you can often use the same hose to modify/re-route the return sprays on your internal filters. A few manufacturers offer add-on accessories that will accomplish the same goal.

In my opinion, you'll also want to *undersize* your filter, i.e., use one size smaller than you normally would for that tank. The Fluval 203 that I mentioned earlier is rated for up to a 45 gallon tank. After trying it out, I believe it too powerful for my 29—now I wouldn't run it on anything *smaller* than a 40 gallon tank. Depending on the tank, it'd probably handle up to 75 gallons. I know some of you are squirming in your seats right now, but please bear in mind that we're talking about heavily planted, understocked tanks. Under these circumstances, you only need to turn the water over approximately once an hour.

The aforementioned Dan Quackenbush uses little, teeny, tiny internal power filters in his big tanks...you really should hop on the web and read his articles. He covers many

of these same areas in more depth and adds yet another spin on some timely topics. His thoughts on substrate, fertilizer and algae control are singularly refreshing.

CO²: I imagine that with all this talk about CO² levels, you just might want me to get around to what we're aiming for; O.K.—fifteen!!! That's milligrams per liter, which is real close to parts per million. Basically, your plants aren't going to do much at all (except languish and/or die) until you get the CO² up to at least 8 mg/l. At 10 to 12 mg/l, you will notice marked improvements, and there's a real good chance you'll see less algae. The optimum is 15-20 mg/l; beyond that, you could be flirting with disaster unless you're using a state-of-the-art pH monitor. This is a good time for a brief message from our sponsors:

This may go without saying, but keep in mind the needs of your fish when selecting filters and reducing their output. Watch for any signs of distress! At CO² levels above 25 mg/l, you're entering the danger zone for many fish. I haven't had any problems, and you won't either if things are done properly, for the plants will be creating all the oxygen you could want when they're actively photosynthesizing...you *will* understock your tank and feed lightly, won't you? You *will* have lots of plants, yes? If all other elements (lighting, fertilizer, trace elements) are in balance, you're set!

So, how do you know just how much CO² is in there? A few plant books have a chart that can give you approximate CO² content by comparing pH and carbonate hardness, but this is definitely useless if you're using chemicals or filtering over peat. My suggestion is to break down and buy a *good* CO² test kit. They're hard to find—you'll probably have to resort to mail order—and they ain't cheap. But just think of all the pain and heartbreak of your algae infested tanks! What about all those plants you wound up tossing?

There's only one CO² test kit that I know of and can recommend, and it's manufactured by LaMotte. This is a serious laboratory-type kit, but it's quite easy to use, extremely fast and very accurate. I've been using one for about four months now, and it definitely reflects the conditions (and problems) in my tanks. I can't recommend it enough for someone that's been down that long, hard, slimy, algae-infested road. If you've done everything else right and your plants aren't growing, lack of CO² is probably your problem.

NOTE: when monitoring your CO² levels, keep in mind the basic nature and cycle of plants and carbon dioxide. First, CO² lowers pH. This is how those state-of-the-art CO² systems control its content: by monitoring the pH. As plants use up the available CO² during the day, water becomes more alkaline. During the lights out period, plants give off CO² and take in oxygen. Thus, pH should be at its lowest (more acid) just before lights on in the morning, and CO² would be at its *highest*. The greater the difference in pH between morning and evening, the more CO² is being consumed. A daily shift of .2 in pH is a direct byproduct of the planted aquarium and nothing to be concerned about.

For these reasons, always run your comparison tests for pH and carbon dioxide content at approximately the same time. If your CO² is around 12-15 mg/l during mid afternoon, you're going to be a happy camper.

O.K., now that everybody's happy, your little green friends are going to be looking for the light!

LIGHTING: First off, it is useless to raise the CO₂ without providing proper illumination. **THE TWO GO HAND-IN-HAND.** Plants need the increased CO₂ in order to maximize photosynthesis, but they won't be photosynthesizing much at all if the light is too low. With poor lighting, you've got all this extra CO₂ floating about, and your plants aren't producing the oxygen that's a byproduct of this whole process.

At the onset of the filtration section of this article, I stated "...one concept that is absolutely paramount to grasp is this..." Well, here's another to grab hold of: for a properly balanced environment where plants will reign (as opposed to algae), ALL elements have to be in balance. Most books and articles are telling you, in their way, when they say things like, "it's important to ensure that you properly fertilize," and such; but it never truly hit me until I spent an evening at "The Krib," one of the "heavy" websites that I mentioned earlier (<http://www.cco.caltech.edu/~aquaria/krib/index.html>).

Check out the Sears-Conlin paper under fertilizer. In this incredibly fascinating and informative piece, the authors set about testing exactly which chemical combinations and environmental factors would either aid or hinder the growth of algae and/or plants. Between that article, and several others from the same site, the Big Picture finally dawned on me. A key phrase was "limiting factors." And that's what I'm writing about here: limiting factors. Or, if you will, enabling factors. Lack of CO₂ will hinder plant growth, as will lack of light, fertilizer, trace elements and growing conditions. **IF ANY ONE OF THESE CONDITIONS ARE NOT PROPERLY MET, YOU WILL HAVE PROBLEMS.**

This entire concept should be the cornerstone of anyone's approach to an aquatic garden. It is so important that you may be assured this subject will appear again in "WaterWorks," and it's so important that I had to stick it right here in the middle of the lighting section. Within this article, there have been a number of times that I have gone off on a tangent, but I won't apologize, for all of these subjects are so interrelated that it is indeed difficult *not* to go off on a tangent more often. Back to lights...

I can't think of any area that is more confusing—primarily because there are too many conflicting opinions, methods and claims; and there are A LOT of options. Just to make things worse, they will all probably work for you...

Let's get fixtures out of the way: do whatever you want (and I'm serious about that). Plenty plant people use shop fixtures. Build your own fixture cabinet. Surf the Net for plans and ideas. Just remember that you're dealing with metal, electricity and water. **BE CAREFUL OUT THERE!** And don't be shy about consulting an electrician. And one more thing: no matter what you use for a hood/cover, make sure it's tight fitting. Besides keeping impurities out and your fish in, this, too, will help keep your CO₂ up.

Next! **BULBS:** or I should say, fluorescent tubes. Be forewarned, I know almost nothing about metal halide and such, so we're talkin' "tubes" here.

First off, aquarium bulbs cost too much. If you're like most, you probably will try alternatives to the generally expensive pet supplier/aquarium trade models. My friend Julio says you should check out G.E.'s Chroma 50 as an option. You can't find them at your basic home store, so hook up with a supplier. Most authors say you should stay away from the cool whites. Practically everyone agrees (there's *always* a few

mavericks), that you should be seeking a balanced, FULL SPECTRUM daylight bulb. And here's where it gets interesting, for me at least.

The one fluorescent tube that I consistently hear good, positive things about again and again is the Vita-Lite®. I've tried it. I like it. It's specifically manufactured to create an approximation of natural daylight to the naked eye. They are quite clear in their literature about this. Now this is the interesting part...to me it looks quite *green*, and the tanks look green too. For what it's worth, the Coralife Trichromatic™ is also a full spectrum, daylight bulb and it looks very green to me also.

If I may say a few words in my defense, I was tested extensively for color perception and color blindness in the military, and tested again a few years ago. I also make my living in the graphic arts/printing industry...there's nothing wrong with my eyes. THEM BULBS ARE GREEN!

Yet *green* is not such bad company to keep. People truly love their Vita-Lites, and two different websites dealing with the world of Takashi Amano state that his lights have a green cast...

Anyhow, don't let that color cast put you off, for they are great lights, and the fix is easy. All you have to do is run them in tandem with your typical, everyday pink tubes. The Radionic and PerfectaLamp brand names that come with Perfecto® hoods are an example. So are your basic hardware/home store-type plant lights. I believe Hechingers stocks the G.E. Grolux® and Home Depot has a Philips plant bulb. Virtually every aquarium manufacturer has a pink-type tube.

One tube that I *do* have extensive experience with is Interpet's Triton®...talk about a love/hate relationship...you've probably heard about these little marvels. They are expensive, but if you have the right conditions, they can be a godsend. If you don't, they can be a curse. This is, I must state emphatically, my opinion. But I do know there's at least one veteran plant person who truly hates them. Oh, the poor, misunderstood Triton.

Their paradox is that what makes them so great is precisely what can make them so bad. The manufacturers claim that they're twice as bright as any normal fluorescent tube; I can't say they're twice as bright, but they're real close. I've had one going for more than a year, and it's still plenty bright. They also have a unique feature: they automatically burn out when they no longer produce within acceptable limits. Cool...I'm waiting for mine to blow...if their claims are true, it may be another ten months before it goes. Their long lifespan is what makes the steep price worth it. In the same amount of time, you might have replaced three to four lesser bulbs due to poor output. Do the math.

Let's get into their potential problems. The Triton is a bulb that's doing double duty. My hunch is that it was developed with an eye towards the marine market, but they claim it's great for freshwater plants too. Now before I get off into this "marine" thing, I have to once again go off on a brief tangent so this will make sense...

Many of you know this, but for those that don't, light in the blue spectrum travels deeper into the water than light in the red spectrum. The ocean light that reaches those coral reefs is quite blue at those depths—and quite bright. Hence the popularity of Actinic "blue" bulbs for marine reef tanks. Don't ever buy one of the actinics for a freshwater tank; this may be the only lighting topic that everyone agrees on. Don't do it. Algae thrive in the blue spectrum. Too much blue: bad. A bit o' blue: not bad (maybe).

Which brings us back to the Triton. Its color cast is a bright, white blue, and it's

pretty bright. Remember the pinks and the greens? They make your tank look either pink or green, but the two together look great. To my eye, the Triton looks the most natural (with just a hint of blue). But all that blue and all that bright will give you one heck of an algae problem if all conditions are not optimum. You've got to have a whole lot of light loving plants and adequate CO₂. Your phosphate and nitrate levels certainly must be way low. And Lord help you if you over fertilize, over feed or overstock.

There's one other thing. I strongly suggest that you do not use them unless your tank is at least 20 inches deep. Now, for those of you with those big, deep tanks that have lots of little, low growing, light loving plants in the front, slap in that Triton and watch 'em pop! In this situation, you're getting strong frontal coverage, and it would be perhaps the best application of this product.

Conversely, we have the pink bulbs. Their "red" light doesn't penetrate too deep, which makes them great for shallow tanks and/or low to medium light plants such as the Javas, Crypts and some Swords.

But for the average plant tank, you'll probably want a combination of bulbs. And that is my suggestion—mix 'em up! Closely examine your various plants and their needs, and you may find yourself placing the brightest lamps in the front—which brings us to the next topic.

There's one aspect of lighting that I've never seen specifically addressed in the many books and articles that I've read: coverage. I believe this to be a critical oversight. There's much discussion of the approximate watts per gallon (two as a rule of thumb, three to four in perfectly balanced, optimum condition, heavily planted tanks), but they never discuss *coverage*. Most of these plant nuts have lights the entire width of their tanks, so coverage probably doesn't even cross their minds. But it should.

Let me explain why I am so concerned about this. Let's go back to my REAL LIFE 20 gallon high so that you don't make the same mistake that I did. Knowing that my single light strip was inadequate, I purchased a dual light strip. I now had the requisite minimum of two watts per gallon. Though there were other conditions amiss in the tank, all my light loving plants faded just a bit too quickly. Almost immediately they started dropping their lower leaves, and it just got worse after that. It should have taken them a bit longer to go downhill. I couldn't figure it out.

It was an article on algae-busting by Jonathan Chalmers in the March 1996 issue of *Practical Fishkeeping* that got me to thinking much more introspectively about lighting the aquatic realm. This article eventually turned on a great, big metal halide bulb in my head. A key element of the piece concerns the sun's path across the sky and the subsequent low angles of light in the morning and evening. This action, coupled with the blocking of the sun by shade from trees and plants, means that many plants throughout the world *never* get twelve hours of full daylight every day! With that in mind, he suggests a "break" in the daily light period of three to four hours as a means of controlling algae. It's an important, and intriguing, concept—one you might want to consider.

Of greater personal import was the fact that it really got me to thinking about plants in their natural environment..and COVERAGE. Back to my 20 gallon (and the punch line—though this ain't no joke). It would have behooved me to toss my plastic hood, get a glass cover and buy an additional *single* light strip! By placing said additional

light strip on the front of the tank, I would have gotten *coverage*.

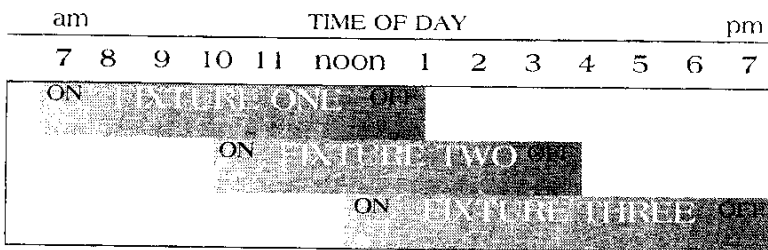
Picture the sun moving across the sky, and...*you've got the picture!* With all my great and glorious 40 watts beaming *directly down* on those poor plants, the lower leaves of the stem plants were starving for light. This isn't nearly as critical with rosette plants (swords, crypts, criniums, echindorus, etc.), but it becomes quite critical for stem plants (hygrophila, myriophyllum, ludwigia, cardamine, anacharis, cabomba, et al.). To that end, if you wanna' be an aquatic farmer, **GET A GLASS HOOD!** Then spread those lights out! If you need more light then, by all means, get a double light strip or two, or try some of those add-on reflectors. But if you really want to be truly creative, check this out.

You gotta' picture me sittin' around pondering my plant problems. Whilst pondering, I got a brand new (brand new to me--see later) idea: wouldn't it be neat if someone invented a light fixture that moved across the tank at an angle just like the sun? Of course, it would have to be straight up around lunch time. It could move on little gear tracks and have a motor and cost so much that I'd never be able to afford it and...

Larry, out of the blue, at the February PVAS meeting says that there is something like this in Europe. I was across the room. Nobody saw my jaw drop. I haven't cornered him and "interrogated" him yet, but I will! This was no pipedream though, for I've arrived upon a method of lighting that could be a lot of fun for you gadget nuts, gear heads and armchair mechanics...and I swear I've never seen or heard or read of this before. **AND** it could be a truly righteous way to just *thrill* your plants and still keep a handle on algae. Do I dare to say that this is a Potomac Valley Aquarium Society **EXCLUSIVE?** Yet *surely* someone has done this before...maybe you...

What you need is a tank at least 18 inches wide, because you're going to place **THREE** light fixtures on it. You'll also need **THREE** timers--do you know where this is going? Sure you do! My friend, you're gonna' be the **SUN KING !!!**

Light fixture **ONE** is in the front and turns on at say, 7 a.m. Light fixture **TWO** is in the middle and turns on at 10 a.m. Light fixture **THREE** is in the back and turns on at, oh, I don't know--noon. They're all set up so the lighting periods overlap, and the only time all three are on is from noon to one, or eleven to one--whatever makes sense to you. All those medical doctors say that the worse time to be in the sun (UV exposure) is between 10 and 2, so you might use that as a guide. Here's a graphic example of the process based on a twelve-hour photo period.



This setup is quite flexible and leaves much room for experimentation. For example, you could mix different tubes to emulate the quality of morning and evening light. This

same concept could be applied to a low-medium light tank by using two fixtures instead of three. The basic goal is to imitate your plants natural environment and photoperiod as closely as possible.

To that end, here's another new idea: what about turning all lights off once a week? Does it not rain quite a bit in the rain forest? I don't think the sun's shining much then! I regularly turn mine off one day a week; and I do it, appropriately enough, when it's raining. My fish certainly don't mind, and my bottom dwellers love it! A note of caution here: remember to keep a sharp eye on your CO₂ levels, and watch your fish for any signs of distress. If the levels in your tank are relatively low (8-12 mg/l), you shouldn't have any problems, and this can also help raise the CO₂ content for the next day. If they are high, set up a spray return, and you'll be even closer to mimicking rain, which would actually oxygenate the water in the "real world". Who knows? Some finicky couple might be prompted to breed...

Whatever you do, have some fun with it, and let me know how things turn out!

Well, my friend, that's a wrap for this installment. You might notice the "WaterWorks One" below. I consider this to be number one, because the first article was pretty much just an introduction and call for support peppered with a good dose of bellyachin'. I still could use some support! It's not too late to get in those surveys! If you have any feedback, questions or comments, you can phone me evenings and weekends at (703) 553-0522. If I had an e-mail address, I'd give it to you. You see, all the typing and page layout for this column comes to you courtesy of my "Big Mac" at work (Lettercomm Type & Graphics in Alexandria)...thanks, Bill! That's why I don't do e-mail, yet get to surf the web; it's all done right here! Anyhow, I will soon be working on a real nuts and bolts water chemistry thing for the next article. This piece will probably also feature reviews of test kits that I've tried. Following that we'll be talking about plants and substrate. After that, if I survive, we'll most likely take a look at some suggested setups. Until then...

Every "WaterWorks" article will contain this little (little?) "disclaimer." It's important that it be understood that, though I have done extensive research, I am not offering myself up as an "expert" in this field. Unless otherwise noted, any information is thought to be that which the MAJORITY of aquarists believe to be true. I have found that for every person who says, "Do it this way," there is someone who comes along and says, "I've always done it the other way." I've encountered this phenomenon at every step--some memorable "aquatic contradictions" will be noted throughout the series. A few ideas and suggestions will be from my own experience. If you read between the lines, they'll be easy to spot.

It should also be duly noted that I'm not going to get too technical. I'm keeping it simple on purpose. If you want to get to the real nitty gritty, hop on the web--or buy some books.

Furthermore, in order to ensure that skeptics, cynics (and attorneys) across the land sleep better at night, let me emphatically state that I have absolutely no connection whatsoever with any manufacturer, distributor, et al. If appear to have any biases (for or against), it is because I tried, or you tried, a product, and I either liked it or found it to be less than satisfactory. These articles are simply one man's search for the truth (and algae-free tanks)...proceed with caution; do your research; your results may vary; shake before using; take two aspirin and call me in the morning; and finally, and even more emphatically, "IF IT AIN'T BROKE, DON'T FIX IT!!!"

W A T E R W O R K S O N E

Notes On Dicrossus Filamentosus

Don Kinyon
PVAS

The lyretail Checkerboard Cichlid has been a favorite of mine since I first saw some in a pet shop tank many years ago. The subtle colors and graceful lines of the body make them ideal ornamental fish, and they can be kept and even spawned without any of the higher-tech and higher priced equipment that seems to be the style of the day, but only if you are willing to spend a little extra effort to accommodate them. I've kept these little cichlids several times over the years, and they always seemed to be healthy, but they never laid eggs, or even acted like they were ready to spawn, until recently.

A year or so ago, I found a group of juvenile fish in a fish store's tank marked "Checkerboard Cichlids" that hadn't started to sex out yet. They were relatively cheap, so I took half a dozen home with me. I lost one of the fish by the time I got them to their tank, but luckily when they did start to mature, I found I had four females and a male, and was later able to trade with another club member for another male.

All the fish were put into a 29 gallon tall tank with fine black gravel and an undergravel filter (why doesn't anyone like these any more?) with one of the uplift tubes connected to a small power filter filled with peat and crushed oak leaves. There is a lot of resinous wood in the tank, mostly locust from the woods near my house, with java fern and java moss for plants. I made sure there was plenty of places for the females to hide, if they needed to. Six neon tetras were added for dither fish, and to keep some movement in the top layers of the tank. I slowly acclimated the fish to 100% rain water, collected from the rain gutters on the house, and kept the temperature at 81 degrees F. The water is a pH of 6.2, and 2 degrees hardness on the German scale, with one third replaced on a weekly basis. They were fed on a diet as varied as possible; dry, frozen, and live food.

With this set up the fish began to spawn like crazy. All three females laid eggs at least once, all with the dominant male (Which, oddly enough, was the smaller of the two). Almost invariably, the second day after spawning, the female would eat the eggs. I let this go until I was convinced that the fish were not going to raise any fry on their own.

The next few batches of eggs I removed as soon as I found to another tank, a 20 high, with the same water as the original, an outside power filter, no gravel, and an air stone to keep fresh water passing over the eggs. Out of the many hundreds of eggs that went through this process, two fry made it to adulthood. The rest of the eggs fungussed and died no matter how I tried to keep them cleaned.

Two fish for all that trouble was little encouragement, but enough to try again with a little different approach. I took the largest pair out of the 29 and set them up in their own 15 gallon long (a home made tank; same as a standard 10, but 1 and 1/2 times as long). Filtration is by two sponge filters (also homemade) buried beneath the gravel. I filtered the water heavily through peat and oak leaves to bring down the pH, and added some whole oak leaves directly into the tank. This brought the level down to under 6.0, and I

Notes On
Dicrossus Filamentosus

Don Kinyon
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had to put in a few drops of pH Down to reach the acidity that I thought was needed. (My primitive test kit only goes down to 6.0, so I had to be careful.) There was one female apistogramma species in the tank already, so she was left there for a dither fish.

After a few days, the pair spawned about 150 eggs on one of the oak leaves, so I removed the leaf to the other tank, and put a soup bowl on the gravel to keep the larvae from falling between the cracks, with a stone on the leaf's stem to hold it down and an air stone next to it for circulation. I put in some acriflavine; about one third the recommended dosage, to help keep the fungus from spreading. As well as I could, I kept the eggs clean, and in about 48 hours, they hatched. The larvae laid on the bottom of the soup bowl with their tails wagging for another week, then they began swimming.

From the 150 eggs, about 50 free-swimming fry were left, and 45 or so by the next week. The youngsters all ate well, fed micro-worms, vinegar eels and newly-hatched brine shrimp. I stepped up water changes to 25% every day, or at least every second day. The fry grew slowly, but in two more weeks had outgrown their tank and had to be split up into two more. They continued growing at their own pace, but by one month old they were eating most of the same foods as the adults.

Hemichromis bimaculatus
Jewel cichlids

Gene Moy, PVAS

Jewels are just that, “jewels in the rough”. Several species are currently recognized and available, but all have iridescent spots over most of their reddish bodies and fins. These small to medium size fish are rough and tough, and should be kept with tank mates able to fend for themselves. Despite their temperament, Jewels are kept for their beauty. Jewels are native to many rivers in Africa. Their overall body is a slightly compressed torpedo shape.

Jewels were among one of the first egg layers that I had bred. Although I’ve bred them in ten gallon tanks, a fifteen or twenty gallon tank would be have been better. I do not know how to differentiate the sex of these fishes, and usually purchase a trio of young fish. This method of getting a pair seems to have worked for me on at least three occasions.

My most recent experience, started with two small, one inch fish. I kept these with larger mbunas in a thirty gallon tank. After several months I moved the Jewels in with several small to medium Central American cichlids into a twenty gallon long. The temperament of the Jewels fit well into both of these scenarios. Certainly their hardiness and adaptability is proven by the above scenarios.

After several months, I add a third fish about the same size as the two I already own. They are now two inches, standard length. The Convicts have recently attempted to breed in the twenty gallon tank, but were not successful with the three Jewels occupying the same tank.

Well, it’s now the Jewels turn. One of the original fish has paired up with the more recent addition. The spawning site is a small piece of shale that is leaning against a flower pot. The egg laying started early in the afternoon. The pair paused when I wanted to see what they were up

to. They resumed later, and have deposited several hundred 1 millimeter light tan eggs. Both parents are positioned nearby, but not on top of the eggs.

The parents chase the other fish away when an intruder get too close. As the fish are all equally matched, the intruder may not go away immediately. I decide to remove the odd Jewel out to another tank. The Convicts are kept in as they seem to be interested in setting up house at the opposite edd of the tank. This could be very interesting scenario.

The Convicts have laid eggs! For the most part both parties have stayed on their respective side of the tank. The is the occasional excursion, usally by the males. The convicts eggs are lost a few days later, so I move them out of the tank.

Two days later, the Jewel eggs have apparently hatched, but I cannot see the fry. The parents are still guarding the area where the eggs were. Although this would be unusual behavior, I suspect that the parents may have eaten the eggs and/or fry to protect them from the Convicts.

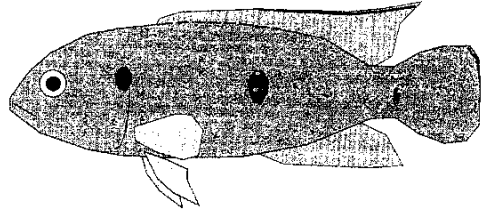
On the third day, the parents have move the fry to underneath the piece of shale. I can see hundreds of wrigglers. I estimate at least 400. Several days later, the fry are free swimming. The young have a dark line along their midsection.

The fry grow well, and after a month the largest are close to 15 mm long. There is a diversity in size of the largest being twice the size of the smallest. The parents are removed from the fry tank and given quarters in a ten gallon tank.

After six weeks, the dark line fades into the three spots that Jewels are known for. They now begin to resemble their parents more. Shortly the fry start developing the irridecent spots.

The parents meanwhile have laid eggs in their new home. The batch number only about 100 eggs.

At two months, the largest fry is at 30 mm total length. I still have more than 100 fry. These should be ready for the next auction.



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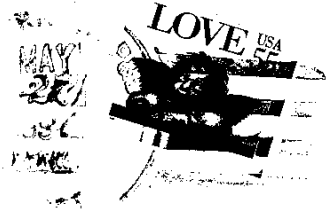
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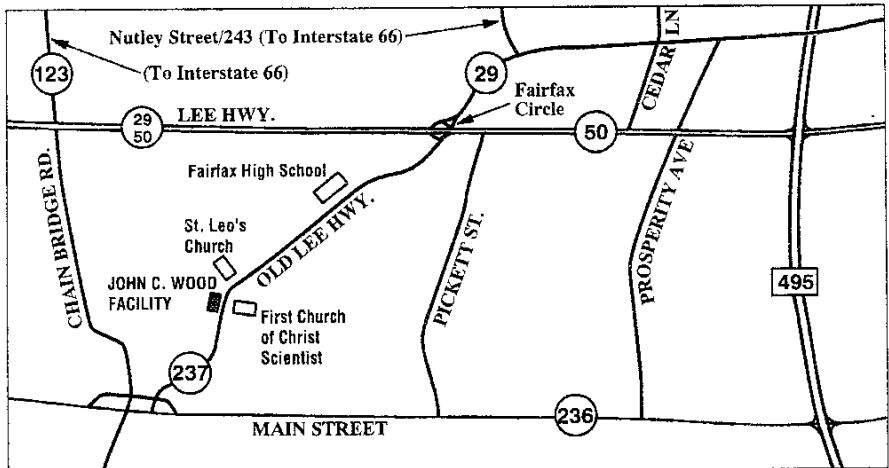
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MEETINGS are held at the John C. Wood Facility, 3730 Old Lee Highway (Route 237), Fairfax City, Virginia. We meet in room 6, which is located behind the police station. Doors open at 7:30 and meetings start at 8:00—EVERYONE IS WELCOME!