GRAND VALLEY AQUARIUM CLUB
TANK NOTES
MARCH 2017 SPECIAL EDITION ISSUE

In Memory of Roger Miller

In December 2016, GVAC unexpectantly lost one of its most loyal and valuable members, Roger Miller. Roger was the long time treasurer for GVAC and was well known for his precise record keeping and speedy return of checks when it came to the club's large auctions. In addition to his role of treasurer, he was also recognized as someone who gave a lot to the club and members in many different ways; always winning raffle items (he'd purchase $20 worth of tickets at every raffle!), helping out members in every way that he could, sharing his vast knowledge on plants, the ways that he contributed are countless.

I still remember when Justin and I first went to his home, which felt like it was in "the middle of nowhere," and I had no idea what to expect. When we stepped into his house you could instantly see his pristene tanks, labeled and super organized air system, and an abundance of gorgeous plants. When we asked about specific plants, he pulled out a hand drawn diagram of each tank so that we knew exctly what we looked at. I had never seen a fish "room" (or house) like it.

This newsletter is a celebration of Roger and his time as a GVAC member, board member and an aquarium hobbyist. In spirit of Roger and his willingess to share knowledge with others, you will find all of his articles (some with his photos) in this special Tank Notes issue. Along with his articles, various club members shared their thoughts, memories of their time with him, and photos from GVAC events. Roger will definitely be missed by many, but his influence will remain for many years to come.

Shealyn Sarns, Tank Notes Editor

How I became a fish keeper (or what was I thinking?)

The last time I had kept any fish was when my children were quite young, which was quite a few years ago. (Unfortunately they happened to meet with an untimely demise brought about by my now ex-wife-but that is another story).

It started out innocently enough. I happened to be wandering through the Thrifty Outlet store (another of my past times is outlet & thrift stores, flea markets, and yard and garage sales — anywhere I might find some kind of bargin on something I probably don't need) where they had a pallet full of cute little 3 gallon fish tanks, complete with undergravel filter, air pump, lighted top, with bulb, for the tidy little sum of $18 plus tax.

Little did I know, at the time, that this was going to be just the first drop in the proverbial bucket.

I purchased the "necessary" accessories (gravel and a couple of plastic (yes, plastic) plants to compliment my little fish tank. I told myself that now all I need to do is set it up, put a couple of fish in it, and I'll be done (Yea, right!) Well I got my little fish tank home, looked around, and realized I didn't have a place where I could put it that would satasify me. Ok, so now what do I do? Well , if your like me, you build something for it. Well since I needed a place for it, I decided to make it the focal point of a combination aquarium stand and book/video case (as I needed a new place for these things anyway). A hundred (or so) dollars, and several hours of determined effort later I had a place to set up my little tank.

I set up my tank, filled it with water, and a couple of days later added my fish, 3 head & tail light tetras. All was good for about two weeks, during which I continued to add fish one or two at a time. Then, for some reason the water in my tank started getting cloudy. I stripped the tank down and cleaned eveything and within a couple of days it was cloudy again. I would change the water but still it always became cloudy again within a day or two. So what is going on? I didn't have a clue. Then a light came on! Why I must need more filtration!! I purchased (about $15) a h.o.b. filter, good for up to a 10 gallon tank, and installed it on my tank. This worked for about 3 or 4 days then I was right back to the same problem.

It was at this point that I decided I needed to do a little research (better late than never). I started with magazines then books about aquariums, tropical fish and tropical fish keeping. Everything I read tried to tell me that I had way to many fish in my tank. Being somewhat dense sometimes, I thought that this couldn't be possible. I only had like 12 (or so) fish in the tank and they still had some room to swim (Ok, ok, so all you would have had to do was add a little oil and you would have had 3 gallons of sardines, although pretty ones).

Finially convinced of my transgression, I realized that I would either, have to get rid of some of my fish or get the poor things a larger home. Well, getting rid of some of my fish wasn't even considered, so I guess you know what happened next.

I purchased a larger (29 gallons) tank setup, complete with lighted hood, h.o.b. filter and heater and built a stand for it, purchased gravel, more plastic plants and a cute little shelf thingy to go in one corner or the tank. (Just for the record, shortly after this I decided to give live plants a try and dumped all the plastic). Finially, a few hundred dollars poorer, I now had a new home for my poor traumatized fishies, where they could be happy. But was I happy? NO! I liked the larger tank so much I decided I wanted and even bigger one, and began planning where I was going to put it. (Do you see a pattern developing here?)

Then next tank, my third, ended up being 90 gallons. This one I I took out a small fire place (the thing was useless anyway) and built the tank and support systems in its place (I don't even want to know what I "invested" into this one). I was very pleased with the way it turned out, but I still wasn't satasfied. I had begun to look around my home and seen, that with a little imagination and effort, that I could create more available space for more tanks!

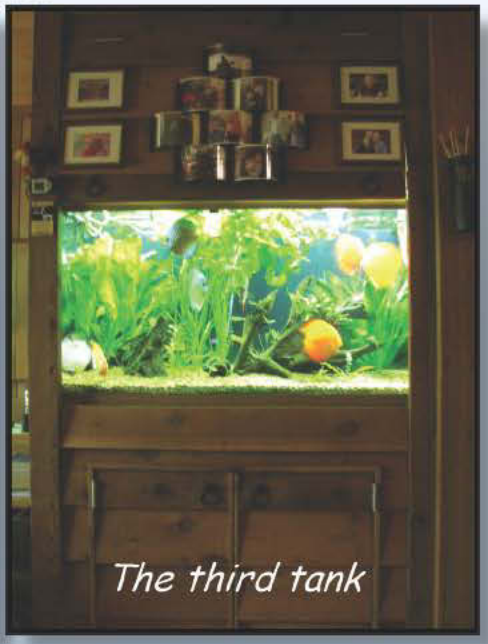
I believe it was about this time that, according to some people, I went "OFF THE DEEP END," so to speak. I started seaching thrift stores, craigs list, ebay or any place else that I might find a deal on fish tanks and/or accessories. I bought fish tanks and accessories like one possessed. I built and refinished aquarium stands until, finially I had filled up all available space. For a short time I actually had an excess of tank space, the key words here being "for a short time".

So there you have it, my confession — of sorts, on how I came to be a "fish keeper". Am I addicted? Probably. Am I looking for a cure? No I'm not, there probably isn't one (short of a lobotomy) anyway. But what I am doing is learnig a few things (hopefully), and having some fun doing it, and for me, that's what it is all about.

Now, if I could just convince my daughter to come get a few more of her things I could...


the beginning


The second tank
(as it appears today)


The third tank

Phyllanthus fluitans – The Red Root Floater

Phyllanthus fluitans, probably more well known as The Red Root Floater, is (as its common name implies) a floating plant with red roots. Its natural habitat includes Brazil, Peru and other South American countries.

Leaf color ranges from light green to red/brown, are almost round in shape and have a diameter of 1-2 cm (approx. ½ - ¾ ")(It has been my experience that the brighter the light the more pronounced the red color becomes).

Available information on cultivation on the species states: (1) needs bright light (as it is a very light hungry plant) , (2) Soft, slightly acid to neutral water, (3) Warm temperatures 25-280 C (77-840 F) & (4) minimal/moderate water movement.

Vegetative propagation is through lateral shoots and it will flower in the aquarium (as I discovered upon returning home from the ALA 2013 convention) under optimal conditions. The flowers are white in color and fairly small at 2mm (less than 1/8") or less in size.

My group of plants are in a 29 gal. aquarium that is lighted 10 hrs./day with a twin tube T5HO fluorescent (6700K & 24 watts each) with water straight from my tap/well (and is considered medium/medium hard) at a temp of 74-740 F. Filtration is provided by a canister filter with the discharge placed 3-4" below the surface to minimize water movement at the surface (if there is too much surface water movement this plant will not do well at all). Flourish and Flourish iron are added weekly (mostly) in the recommended amounts and CO2 is provided 6 hrs./day for other plants in the tank. Note that CO2 is not necessary for the successful cultivation of this species, as it is a floating plant and gets its CO2 from the atmosphere. Even though my water conditions are not what is considered optimal for this particular species it does really well in the tank and reproduces fast enough that it will cover the entire surface in a couple of weeks.

As a little side note: Caution is advised when cultivation floating plants such as Phyllanthus fluitans in tanks that are being supplemented with CO2. It looks really cool when the entire surface is covered with these colorful little plants, especially when there are little flowers all over, but with the surface totally covered gas exchange there all but comes to a halt. Consequently, the water will become saturated with CO2 – the plants love it. Unfortunetly it is very detrimental to aquatic animal life (i.e. fish). Found every fish in this tank expired one morning (fish purchased at the ALA auction) but all the damned snails survived (go figure).

Getting back to Phyllanthus fluitans, I think this is a great little plant. It stays much small than water lettuce or frogbit and substantially larger than duckweed and the light greens, red, and red/brown colors will bring some variety to any tank.

Aponogeton crispus

Aponogeton crispus is sometimes called the ruffled sword or wavy-edged sword plant. It belongs to the Aponogetonacae family to which the beautiful Madagascar lace plant (Aponogeton madagascariensis) also belongs. It is a true aquatic plant that occurs in both brown and green forms (I have seen the brown form myself) with ruffled edged leaves that can get up to 20 inches long. The leaves are somewhat delicate, though not overly so. It is considered by some to be one of the more robust of the Aponogeton species.

Preferences for optimal growth are a fertile substrate, water that is slightly acidic and soft to slightly hard with a temperature range of 68-86 degrees F. It can be kept in harder water if provided with adequate fertilization and CO2. This plant reproduces only by seed - there is no vegetative reproduction. It produces a flower spike which is self-fertile so only one plant is necessary for reproduction. The seeds measure 3/8" long X 1/8" wide with the base end blunt and the opposite it shaped like a rounded spear point. As with other Aponogeton species it can require a period of dormancy although it is not always necessary in the aquarium.

My particular specimen, is green in color, and has been grown in a 29 gal. tank. The substate is plain gravel that was 'seeded' with Flourish tabs. The lighting is a twin tube T5HO fixture with one 6700K bulb and one plant lux bulb for 48 watts of total lighting 12 hours a day. The tank recieves weekly water changes of 75% with the addition of Flourish, Flourish excel, and Flourish iron following the water change.

I have had this plant for well over year . It has grown from a plant with 4 inch leaves and now takes up one whole corner of the tanks and quite a bit of the surface are , with its leaves (which are at least 20 inches long), on that end. In the last few months it has flowered on and off, but this is the first time it has produced seeds. I have found it quite easy to maintain under the conditions I have provided for it. I think this plant is quite attractive and I plant to keep this plant long term and probably a couple more just like it now that I have 'offspring'.

I truly do not know how to write this, I've started three times. I decided to write the first part for the club, for those who may not have known Roger that well. The combination of energy, focus, tenacity, and humbleness that was Roger Miller far exceeds any other person I've met. Roger combined these attributes beautifully.

The first time I saw his fishroom, it was remarkable to me. Roger's fishroom, was organized, functional, and for having so much in such a small area, very spacious. Roger's fishroom perfectly reflected who he was.

I had the honor of working closely with him, as he was treasurer through all my terms as president. Roger's commitment to GVAC, as reflected in his commitment as treasurer, again was a reflection of his energy, focus, tenacity, and humbleness. GVAC wouldn't be the club it is today without Roger's work as treasurer and his input as a B.O.D. member.

The second part of this article is to Roger, and his family. Roger, I'm a better person and fish-keeper, for having known you. I've learned so much from you, your ability to communicate so much, with so few words. This taught me that it's true, often the less we say, the more people listen. You did so much for people, without calling any attention to yourself or your good deeds. These good deeds did not go unnoticed my friend, they inspired me, pushed me to do more. It was not recognition you were looking for, it was the betterment of those around you that was your goal. Although we had a few conversations on these topics, I feel as though your very nature didn't allow to realize how deeply I felt these things. I thank you for all you've done for me and for GVAC, and I miss you my friend.

Mike Monje
Past President of GVAC

Alternanthera reineckii "cardinalis"
Common name: Telanthera

The parent plant, Alternanthera reineckii, occurs naturally in South America. Alternanthera reineckii "cardinalis", being a cultivar of the parent plant, has no natural distribution.

It is a light-hungry stem plant that requires a nutrient rich substrate and CO2 is strongly suggested, and the stems need to be spaced out so as not to interfere and impede each other's growth. If lighting is inadequate, or the stems to close together(blocking light to the lower leaves), the leaves will die.

I purchased my plants ,as tissue cultured specimens, through the local outlet of one of the national chain pet stores. Tissue cultured plants, as the name suggests, are cultured in a nutrient rich gel-like medium, and are advertised as snail and pest free. They were packaged in a sealed plastic bag containing some of the nutrient gel, the bag being enclosed in a cardboard pouch, for display purposes, printed with the plant name and information and cut out so that the plants could be viewed in the package. A neat and tidy little package.

Not having any previous experience with tissue cultured plants, I was somewhat skeptical, as well as curious as to how they would turn out.

The package contained 10-12 small stems (2-2 ½" tall) that were already developing roots. The gel was rinsed off the plants and which were then divided into equal groups then planted (as is my custom) in two separate tanks. One a 90 gallon and the other a 29 gallon. The 90 gallon has flourite (regular) as a substrate while the 29 gallon has 1/3rd of the tank with flourite dark and the remainder is flourite black sand. Both tanks share the same water mix (1/3rd tap & 2/3rd R.O.) are maintained at the same temperature of 82-84 deg. F, and are supplemented with CO2 for 6 ½ hrs. daily, flourish and flourish iron are dosed ,at the recommended levels, weekly with water changes occurring at least biweekly (and usually more often). The 29 gallon is lighted by a twin tube T5HO fixture with 6700K bulbs for 10 ½ hrs. a day while the 90 gallon has one four tube T5HO and one twin tube T5HO light fixtures, both with 6700k bulbs, as this is a larger and much deeper tank. The lighting is on daily as follows: 2 tubes @ 10 ½ hrs. daily, 4 tubes @ 8 ½ hrs. daily, and all 6 tubes @ 4 hrs. daily.

There was very little difference in growth rate of the plants between the two tanks.

Vegetative reproduction is by cuttings. Remove 6-8" below the tip of the stem and replant, the portion remaining in the substrate will then produce lateral side shoots to replace the severed tip.

This is a very colorful plant, the stems and underside of the leaves being a bright red in color with the upper side being a more subdued red, but it needs the bright light and with the proper nutrients and conditions for it to look its best. It is not plant for low tech tanks which means that it will take some effort, in both time and money, to be successful with it. But by adding in a nice splash of red to contrast with all those different shades of green, in your tank you can change its whole appearance and make it look like a completely different tank.

Once you go red, you can't go back!

Aponogeton undulatus

Aponogeton undulatus is a true aquatic plant that is native to India and (likely) some of the surrounding countries. Leaves are a medium green in color and up to 35 cm (14") long with slightly undulate edges with petiole (stem) up to 25 cm (10") long. This species rarely flowers, but it does readily reproduce vegetatively and is the only Aponogeton that does do.

Vegetative reproduction is accomplished by globular tubercles forming on the petiole. From these tubercles leaves, roots & branches grow. After 2-6 weeks these then separate, or can be separated, from the petiole and planted.

From the original 2 plants I started with, I now have a decent size group of plants (10+) not including ones I have sold a auctions. These plants are maintained in a 90 gallon tank where the leaves and petioles grow long enough so that 1/3 to 1/2 of the leaf floats on the water surface. Water in the tank is relatively soft (2/3 r.o. & 1/3 tap) and maintained at a temp. of 82-840 F (this is so for the benefit of the fish species contained within). Lighting is supplied by 6 T5HO fluorescent bulbs (6700K & 54 watts ea.) With 2 on 10 hrs. /day, 4 on 5 hrs. /day and all 6 on 2 hrs. /day. Flourish and Flourish iron and dosed weekly (usually) at something resembling the manufactures recommendations. CO2 is supplied 6 hrs/day, and although not a requirement for this species it is certainly beneficial. A nutrient rich substrate is recommended and even though the substrate, in this particular tank, is a 50/50 mix of fluorite (regular) and gravel over a sand base (don't ask), the plants do quite well. Aponogeton undulatus does not spread out like many Aponogetons, but rather grows up so they don't take up a lot of space, but the leaves floating on the surface do have a tendency to shade plants below , so this needs to be taken into consideration when planting shorter growing species close by.

My experience mirrors available data on the cultivation of this species. Given proper conditions this plant will do exceedingly well providing you with lots of little plants that you will need to find homes for.

Potamogeton gayi
Common name: Slender Pondweed

Potamogeton gayi is an aquatic stem plant native to Southern South America. It is an ideal aquarium plant as it pretty undemanding as to water values (ph & hardness - although water values in its native habitat suggest soft, slightly alkaline might produce the best growth) and only requires moderate lighting. It is no so often commercially available, as it once was, having now been displaced by newer and more decorative species.

I purchased a group of cuttings from and on-line vendor in August of 2012. The cuttings were placed in a 29 gal. tank (that houses several different plants along with 6 blue rams) with a substrate consisting of Flourite black sand. Water is a mix of tap (1/3) and R.O. (2/3) so it is fairly relatively soft, water changes are performed on a biweekly basis. A fluval 205 canister filter handles the filtration and light is provided by a Marineland LED fixture ,specifically made for planted tanks, and is on for 10 ½ hours a day. Dosing of Flourish and Flourish excel is done weekly at the manufacturer recommended levels. CO2 is provided for 6 ½ hours daily (CO2 is not necessary for this species , but is was already being supplied to the tank as most of my plant growing tanks receive CO2 supplementation).

This species did very well right from the start. Growth was exceptional and relatively rapid. As this is a stem plant vegetative reproduction can be accomplished by cuttings, but this plant, once acclimated, also reproduces (quite rapidly) by branching of a creeping rhizome.


Potamogeton gayi

The stem is thin and dainty and the leaves are long and slender giving the plant a delicate and grace full appearance. I think this makes it a nice looking plant and it's a shame that it is not more readily available.

All in all, this plant is very easy to care for, grows quite quickly, reproduces readily by creeping rhizome and doesn't have any special needs. The only possible drawback, is that once it starts sending out rhizomes there will be plants appearing where you might not want them. Other than that it is a great little plant.

Ammannia gracillis
Syn: Ammannia diffusa

Ammannia gracillis is a marsh plant whose natural habitat is a place called Senegambia (Kasselmann).

Where the h___ is Senegambia?, is what I asked myself. Senegambia is (or was) on the west side (Atlantic ocean) of the continent of Africa. It was a short lived confederation between Senegal (pop. 12,211,181 & land area of 74,336 sq. miles) and the Republic of Gambia (pop. 1,660,200 & land area of 3,861 sq. miles), which is geographically surrounded by Senegal, that existed between 1982-1989 after which they went their separate ways again. In 1991 they signed a friendship treaty but tensions between the two countries still flare up intermittently. How about that, you get a little world geography and history lesson thrown in for good measure when you are trying to learn about a plant. Get a little of everything being a member of this club, now back to the plant.

The original group of cuttings was purchased from the Moby Dick Pet store when I went on the Big Dog Shop Hop - east on May 19 of this year (2012). For all of those who didn't go – sad to be you – the rest of us had a great time.

Ammannia gracillis is a stem plant with leaves that are a cognac or light chocolate brown (depending upon who is doing the description) which is not a color often seen in aquarium plants. Due to a lack of tank space I was unable to place the stems in multiple tanks so they all ended up in on tank. I did, however, split them into two groups at opposite ends of the tank (fortunately it worked out for the best this time). The tank they ended up in is a 29 gallon that 1/3rd of the tank has flourite dark as a substrate with the rest of the tank using flourite black sand. The water in this tank is mixed at a ration of 1/3rd tap water with 2/3rd s R.O. water, making it relatively soft (this for the fish species housed within. The water temperature is kept at 82-84 deg. F with water changes being made biweekly (usually). Flourish and flourish iron are added weekly at the recommended levels along with CO2 being supplied daily for a duration of 6 ½ hrs. Light is supplied for 10 ½ hours a day using a twin tube T5HO fixture with 6700K bulbs. Other plant species in the tank include Echinodorus angustifolia "Vesuvius, Cryptocoryne albida, Alternanthera reineckii "cardinalis" plus a couple of others along with a good size piece of branching drift wood that has a very healthy growth of some species of hair algae. Both groups did well from the beginning and it didn' take long for the stems to grow up to the top of the water and start growing horizontally across the surface.

Being a stem plant, Ammannia gracillis, is propagated by cuttings. This is accomplished by cutting back the stem 6-8" below the tip and replanting the cutting in the substrate and the piece remaining in the substrate with grow lateral shoots to replace the tip and forming new stems.

As stem plants go this one is pretty neat, I like the brown color it brings to the aquatic aquascape and given the right conditions it is relatively easy to grow.

In Aquarium Plants, by Kasselmann, she states that (Ammannia gracillis) needs to be well illuminated and grows best in soft water at temps. above 24 deg. C (76 deg. F). These are the same conditions I provided it with and it did very well for me.

Now if I could find a nice live yellow colored plant to add to the reds, greens and brown, all would be good (or not!)

Orange Laser Cory
(Corydoras sp. (CW010))

The Orange laser Cory is a naturally occurring species from South America. Information as to what country or countries it is found in was not able to be located, lots of pictures but no information as to natural location or habitat. One online source did list one of the common names for it as Peru Orange Stripe cory which, perhaps, may be an indication of where it is found.

This is currently and undescribed Corydoras species which, at this time, has the designation of: Corydoras sp. (CW010). I have no idea what the CW010 part of the designation means so if anyone could enlighten me, feel free to do so.

As is typical of the majority of Corydoras species, they are small catfishes, my four specimens averaging about two inches in total length. General body shape is consistent with the majority of the cory species. Basic body coloration is a dull bronze with an orange stripe (on each side), just below the dorsal fin, that runs form the back of the eye to the adipose fin. The fins and ventral side are also orange in color, matching the body stripe.

The coloration can make for a very eye catching fish, especially when they are in motion, such as when they are in a bag at auction as was the case with the ones I obtained.

My fish were purchased at the G.V.A.C. fall auction of 2011. At home they were placed in a tank (appx. 15 gal.) with several live plants, where they promptly disappeared only rarely to be seen unless they were actively being searched for (to make sure they were still alive).

About four weeks later a few eggs were seen on some plant leaves and the glass. As I prefer to put as little effort as possible, into raising fish, I allowed the eggs, along with the ones from the next spawn about two weeks later, to remain in the tank allowing nature to take its course. When the third spawn occurred, and with no fry having been seen in the tank, the eggs were collected to be hatched separately (as have all subsequent spawns).

The eggs were place in a two quart bowl with an air stone, for water circulation, with a couple of drops of methylene blue to prevent fungus. Hatching occurred two days after collection. The fry were fed microworms exclusively for the first 10 days or so, after which they were supplemented with a commercial powdered fry food. As they grew larger types of sinking foods were introduced.

Now at about ten weeks of age the fry are ¾" – 1" long (including caudal fin) and will eat almost anything that sinks to the tank bottom.

Conditions in the spawning tank are as follows:

Lights (twin tube T5HO) on for 12 hrs. daily (for the plants in the tank), Temperature is 74 degrees F, ph 7.4-7.6, ammonia 0, nitrite 0, nitrate 5ppm, kh 7-8 dg., & gh 12 dg.

FROM THE ARTIFICAL TO THE LIVING AND CO2

When I was getting back into fish keeping (after a hiatus of many years). I decorated the tank in the same fashion as the one(s) I had before - gravel for substrate, rock, artifical decor (trying to imitate underwater landscapes) and plastic plants. Ocassionally it was necessary to remove the "plants" and decor to remove the algae and other nasy stuff that insisted on growing upon them. That was the way it always had been,and would always be - wasn't it?

In time the pictures and articles, in the hobby magazines and books, about live plants and planted tanks caught my eye and interest. The tanks and plants were beautiful and comparing them to the non-living decor in my tank(s)was all the incentive I needed to give living plants and planted tanks a try (I had only 2 , a 3gal. and a 29gal., at the time). Unfortunetely the selection of live plants at the stores I frequented at the time (mostly chain stores) was somewhat limited and uninspiring (to be generous). Fortunetely it was about this time I came across G.V.A.C. and attended my first tropical fish auction (something I'd never heard of) and was very much suprised by the large variety of everything (including live plants) being offered for sale. Eventually the plastic "plants" were replaced by living ones.

Some survived and and did fair, others struggled to stay alive, while others morphed into a kind of green & brown goo. Though somewhat disappointing I was not discouraged as I was having some success, though very limited, and it just intensified the desire to succeed.

The next step , which should have been one of the first things done, but wasn't (but because I ,sometimes, subscribe to the school of thought that - "if all else fails try reading/following directions"), was to do some research and reading. Books and magazines were relied upon for the bulk of the information. Interesting topics such as photosynthesis, photo peroids, nutrient requirements, lighting, to fertilize or not fertilize, to filter or not filter, plant specific substrates and the list goes one. Lots of information is out there to be found if one has the desire/need.

All this knowledge came with a price, literally. The existing lighting on my tanks (by this time I was a member of G.V.A.C. and had more than the original two tanks - no more explanation necessary) was insufficient and was upgraded from lighted hoods with single T8/T12 florescent bulb to twin tube T5 HO florescent fixtures with glass canopies for tank covers (eventually the glass canopies were removed, and the tanks left uncovered, for two reasons: No 1 - Even though glass is transparent is does restrict light transmission into the tank to a small degree. & No.2 (and the most important) They needed to be cleaned more often than I wanted to be bothered with.

Gravel was gradually replaced (one tank at a time) with substrates specifically created for cultivating live plants (Seachem Flourite substrates are my planted tank substrates of choice) and the addition of liquid plant supplements/fertilizers was begun (Again choosing Seachem products - Flourish, Flourish Excel, & Flourish Iron). Eventually plants began to show noticeable improvements in color, growth , overall appearance with some species reproducing vegetatively (enough to garner a few H.A.P. points).

At this point I had reached a crossroads of sorts. I could contiue in the same direction or change course with the hopefull expectation that continued improvment in growth could be achieved. I chose the latter.

Information gained from the eariler research had pointed to CO2 as a probable limiting factor on plant growth in the aquatic environment.

From DIANA WALSTAD's book, "The Ecology Of The Planted Aquarium " quote: "Freshwater aquatic plants face major problems in getting the carbon (both CO2 and bicarbonates) they need for photosynthesis. Carbon is often scarce in freshwater and levels fluctuate rapidly. During rapid photosynthesis, aquatic plants and algae often deplete lake waters of carbon by midday. Photosynthesis will often be highest in midmorning and gradually decrease throughout the rest of the day, even when light and other nutrients are plentiful" (page 94) and "Generally, aquarium plants will grow much better with added CO2. This is because CO2 is often the limiting nutrient in most aquariums, including my own, if only because so many other nutrients, such as nitrogen and phosphorus are so plentiful" (from Q & A column, pg. 100).

Flourish Excel, a liquid carbon supplement, was the carbon supplement of choice at this time and the results had been good. This, however, seeemed to be the one variable were a change could be made - the method in how the CO2 is delivered, from a liquid supplement to a gas.

A pressurized gas system, as opposed to a yeast reactor system, was determined to be the most suitable for my application, as it would be advantageous to supply multiple tanks off of a single system.

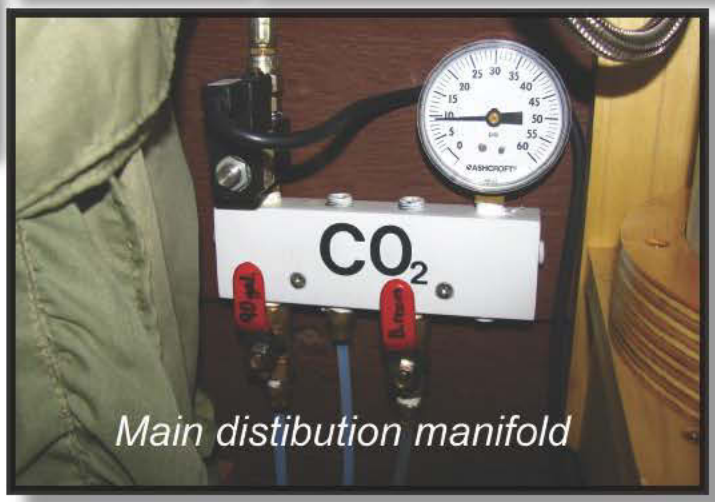
The CO2 system.

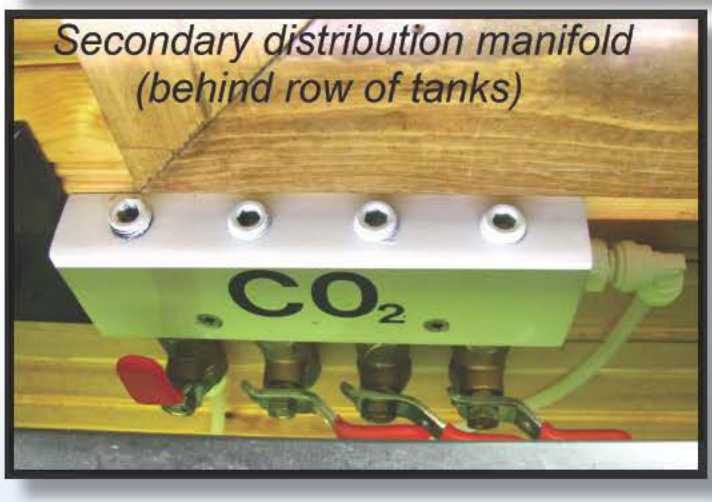
Components:

- CO2 regulator
- 5 lb aluminum CO2 cylinder (purchased to eliminate rental charges)
- Distribution mainifolds (2 - custom made)
- Assorted brass compression type fittings for 1/4" o.d. tubing
- 1/4" o.d. polyethylene tubing
- Brass ball valves (w/modified handles)
- Pressure gauge 0 - 60 p.s.i.
- Solenoid valve 120 volt a.c.
- Needle valves
- Glass CO2 diffusers w/built in bubble counters (I like the glass ones because they look cool when operating)
- Silicone (blue) aquarium air tubing
- Marineland 24 hr. light timer
- CO2 cylinder stand (custom built)
- Miscellaneous pipe fittings, screws and asst. hardwar

Components were purchased a piece/pieces at a time, spreading the cost over several weeks. Most were purchased locally with a few being acquired online. Approximate total cost was just under $500.00.

Installation was spread out over several days (2 or 3 hrs. daily). Most of the supply tubing was installed under the floors, to keep things tidy, and to supply tanks in rooms seperate from the CO2 supply.Tanks had to be drained & moved(to allow installation of some components





and supply feeds), then moved back into position, and refilled - without removing the inhabitants, plants and most decor.

Initially two tanks were hooked up to the system with others being added over time (A total of 5 tanks, 1- 90 gal. & 4- 29 gal., at the time this was written). Lighting is maintained for 12 hrs. per day (as it always has been) and CO2 is supplied for 8 hrs. daily.

The effects of CO2 supplementation began to show up within a few short weeks and has been dramatic. Plants that I have maintained for, peroids ranging from, 1 to 2+ years are showing significant increases (est. 25% in some species) in size and rapidity of new growth/regrowth and vegetative reproduction. Many are sending up flowering stalks with some flowering. Nuisance algae growth has been severly reduced and pratically eliminated in at least one tank. There are some downsides, if you choose to call them that, in that it is now necessary to spend more time timming/pruning and controlling excess or undesireable plant growth and expansion. Some of the excess is/can be sold at meetings and auctions (to earn H.A.P. points and help pay for the hobby) while others must be disposed of - afterall, how many often can you sell 5 lbs. of Pistia stratiotes (Water lettuce).

Though not insignificant in cost (in both time/effort and money) once purchased and installed, maintenance costs are minimal. A 5 lb. cylinder of CO2 lasts me between 6 & 8 weeks (I'm still making adjustments to optimize usage) and costs $10.00 to have refilled. This is offset by the money saved by no longer using Floruish Excel in my tanks being supplemented with gaseous CO2.

Was it all worth it? The plants are doing great, except for 1 or 2 (there is an exception to every rule), they look great and they make my tanks look great, and that was ultimately my goal. So, yes, it was worth it to me.

If you've reached a crossroads with your plants and planted tanks, as I did, maybe you should give CO2 supplementation a try. Now, if I hook up CO2 to my wallet, maybe I can get some of missing green to grow back!

Limia perugiae

This species was first described by Evermann & Clark, in 1906, in "New fishes from Santa Domingo." It is found in the Dominican Republic from Santa Domingo to Lago Enriquillo, where it inhabits waters that have an average temperature of 80 deg. F (27 deg. C).

The fish are deep bodiedwith a somewhat pointed head. The females typically being larger (1 3/4 - 3 1/4 inches) than the males (1 3/4 - 2 3/4 inches). While these fish are not brightly colored (which probably explains why I have never seen them in any of the local fish/pet stores), the male of the species can be quite attractive and is the most colorfull.

The bodies of the males (of my specimens) have a greyish brown background coloration while the scales exhibit an irridescent blue color. The dorsal fin and rays are outlined in black and the caudal fin is yellow and also outlined in black. While not bright and flashy they are still quite pretty (the dominant male in the tank being the most brightly colored). The females, on the other hand, are kind of drab being a greyish brown in color over the entire body with no additional coloration on the body or fins.

I found these fish easy to take care of and to breed. I just put them (2 pair) in a 5 gallon tank with live plants ,a gravel substrate and a sponge filter for filtration. The water was kept at a temperature of 76 - 78 deg. F, with water changes of approximately 75% being done two to three times a week.

I fed them a variety of foods (flake, frozen & live) and in just a few weeks time there were fry in the tank. As long as the parents were well fed they didn't seen to bother their young.

In conclusion, then, if you want to keep and breed these fish all you need to do is make them comfortable, keep them happy, feed them well and they will do what comes naturally.

Historical and location information from the Atlas of Livebearers of the World (a t.f.h. book) by Lothar Wischanath.

Ancistrus sp. (Dwarf Albino Bristle-Nose pleco)

The Ancistrus species of catfish are found in fast running streams and rivers in South America. They are often called bristle-nose catfrish, brushy-nose catfish or evern bristle-nose plecos.

They derive their nickname(s) from the characteristic tentacles which grow on their snouts. Though these tentacles (which are not hard or stiff as their nickname(s) inply) may be present in both sexes (depending upon species), they are usually much more developed in the males, often growing quite large and branching one or more times.

They are predominatly vegetarian and are known as efficient algae eaters. As with most types of algae eating fish they will eat some types of algae but not others. Fortunately or unfortunately, depending upon your prespective, they will soon clean out the tank of, what they consider, edible algae and will need to be provided with a diet high in vegetable matter - boiled/blanched lettuce leaves, spinach, zucchini, etc. (Mine seem to prefer spinach).

The two specimens that I have were purchased, individually, as junenile fish (approx. 2") at the 2009 G.V.A.C. spring auction (the first fish auction I have ever attended). Upon arrival at home they were placed in separate tanks. I didn't think much about them after that as I only seen them occasionally after that as each tank had an abundance of live plants and decor (rock, driftwood, etc.) which provided numerous locations where they could conceal themselves - which they took very seriously.

It wasn't until early this year (2011) when both fish happened to be out in the open on the same day about the same time, when I was performing some maintenance on one of my other tanks, that I became aware that I had both a male and a female.

Up until this time I had not thought about attempting to try to spawn these fish, but with the realization that I had a pair I decided to attempt it and see what would happen.

I made a tank available for them and transferred them into it. The transferring was easier said than done, as many of you well know, because they can be amazingly fast, dart from hiding place to hiding place, and wedge themselves into spots that yhou cannot get them out of until they are ready to come out on their own. I managed to net the male, from the tank that he was in, without rearranging it too much. The female, however, mad things somewhat more difficult. After chasing her around the tank, and removing the dirftwood and most of the rock in the process, She wedged herself into a hole in the one remaining piece of rock in the tank and refused to be removed from it, forcing me to transfer rock and all to the waiting tank (I removed the rock the next day after she vacated it).

The tank is approximately 15 gallons with live plants, a couple small pieces of driftwood and two "cichlid stones" (which are ceramic caves crafted to appear like rocks or stones). It is filled with untreated tap water (from a well) with a ph of 7.4 - 7.6 and a GH of 12 - 14. Filtration is accomplished by a small h.o.b. power filter, temperature is maintained at 74 - 76 degeees F, and the lighting is a twin tube T5 fixture (48 watts total) and is on for 12 hours a day (for the plants). A water change replacing 50 - 75% is done once a week using tap water.

Many Ancistrus species, if given the right conditions, will readily spawn in the aquarium, and mine were no exception (Their preferred spawing location is usually a cave, tube, pipe or whatever with only one opening for the male to guard and once the eggs are laid the female is done and the male takes over as the sole guardian until the eggs hatch).

The pair chose one of the "cichlid stones" to spawn in and it wasn't long before I seen the first fry. The first spawn resulted in only 6 fry, one of which died before the 60 day requirement for B.A.P., making me wait until the next spawning which wasn't long in coming. Subsequent spawns have been substantially larger, 20 - 30+ fry. The adults have no interest in the fry and leave them alone so they can remain with the parents without worry. The fry readily eat what the adults are fed (sinking algae waffers and spinach) and even thought they are vegetarian they have never bothered any of the live plants in the tank(s).

The fry grow relatively quickly reaching 1 1/4" - 1 1/2" in ten to twelve weeks, after which body length growth slows some as they start to put on body mass also.

They are a very peaceful species and one to be recommended for a peaceful community tank. Adults grow to 3 1/2" - 4 1/2".

I didn't know Roger when he first took over as the treasurer of GVAC, but I remembered wondering what this pony-tailed guy that worked at American Seating could possibly know about book keeping.

I soon found out that Roger was the most organized person I had ever met. He carried a virtual mobile office to every meeting. If I ever needed a form or forgot something, Roger had it. He also was the kindest, most calm person I knew. I never saw him flustered or angry. His book keeping was impeccable and he got checks out from auctions faster than anyone. I used to joke that I had to rush home from an auction in order to beat the check home. He was the standard that other clubs even looked to.

When Roger was the treasurer for the American Livebearer Association convention, he had the books done and all checks out in 2 weeks. The previous convention was not done from the year prior.

Roger was also very creative. He decided we needed permanent paddles for the auctions and just decided to make a couple of hundred on his own time at work. He was a master with aquatic plants and often just donated the proceeds to the club when he put them in an auction.

I knew there must be a girl involved when Roger cut off the pony tail and finally decided to give up the treasurer job. I was right, I met her at Roger's funeral. She was delightful and I was happy Roger found her.

I'm going to miss Roger a lot and no one was more worthy of be honored by the club with a "Fellowship." We just had no idea how timely the award was.

Tim Boelema

Photo from 2016 GVAC Christmas Party, where Roger was made a fellow of GVAC

Microgeophagus ramirezi – The Blue Ram

Microgeophagus ramirezi, more commonly known as the Blue Ram, is a popular aquarium fish that is know by almost everyone with a little fish keeping experience. It is one of the so called "Dwarf Cichlids" because it stays fairly small – maxing out at about 3 inches in length. While quite peacefull , especially for a cichlid, the will show some aggression when protecting a spawn/spawning site or fry – just enough to keep an intruder at bay, but not enough to cause physical damage to the interloper.

One quality, that I find quite endearing (being that I like to cultivate live plants in many of my tanks), is that Microgeophagus ramirezi does not possess is the desire to constantly rearrange the substrate and tank décor as many cichlid species find necessary to do. This makes them ideal candidates to inhabit a planted tank where they do seem to really appreciate the security/cover provided by live plants.

Relatively soft water (I use 2/3 reverse osmosis water mixed with 1/3 tap water), slightly acid with a temperature of 82-860 F are the water conditions needed to allow this species to thrive. Combine these optimum conditions with good nutrition and the blue, yellow & red coloration of the fish will become quite brilliant, making for quite a stunning looking fish.

I purchased 6 juvenile/young adult fish with the intention (hope) of getting a pair or two as they grew up, and then trying to induce them to spawn. The fish were housed in a 29 gal., heavily planted tank with driftwood, rocks, & some "cichlid stones", and allowed to grow. As they grew older 2 pairs formed. With the above mentioned water conditions and by feeding them a varied diet of live blackworms, a variety of frozen foods, and assorted flake foods it did not take them long to start spawning. Most of the time the different pairs would spawn at different times, though occasionally they would do so at the same time. Sometimes they would spawn on a piece of driftwood, other times a rock or cichlid stone and once-in-a-while a pair would dig a small pit in the substrate where they would spawn.

Several of the first spawns (of both pairs) were left with the pair with the hope that they would raise them on their own. After spawning, the pair would guard the eggs for a day or two after which they would eat them. Obviously they were not interested in becoming parents (I was starting to think they might be on to something here , after surviving the raising 3 teenagers of my own). After this I started removing the eggs to try to raise the artificially. Eggs were placed in a small plastic container of water with some methylene blue and an air stone (for aeration) , usually, after three days the eggs would hatch and there would be lots of "wigglers". Then after another 4 or 5 days the fry would have used up their yolk sacks and needed to feed. It was at this point that I lost many spawns. The fry are so tiny they cannot even eat microworms (which is what I was attempting to feed them) and they would starve to death. Obviously a source of smaller food was required. I knew that infusoria was what I needed and I knew the process/procedure for growing an culturing. My problem being that every time I've tried it, I failed miserably.

The saying is that "necessity is the mother of invention" (or something to that effect) but in this case desperation played a very large roll. Into another plastic container of water I added a few pieces of hornwort, some dried plant matter and a little "sponge grunge". The container was then placed were it would be under light several hours a day and allowed to age. A few days later the latest spawn had changed from wigglers to fry and needed to fed. The fry were transferred (carefully) to the container I had prepared earlier hoping that by now there would be something growing in it that would be small enough for the ram fry to eat. An air some was added and every day very, very small amounts of microworms and powdered flake were added just for good measure. Every second or third day I would check to see if any were still alive (some were) and I would change about half of the water. Enough survived, using this method, to get big enough to eat baby brine and eventually finely crushed flake. Finally, after several months of trying , I'd managed to raise enough for a BAP with several left over (saying I was pleased is somewhat of an understatement).

Spawning and raising Microgeophagus ramirezi proved to be quite and challenge for me along with being an interesting learning experience. But as I have more yet to learn and as long as I have Blue Rams that will spawn I'll continue on attempting to improve and refine my technique.


Microgeophagus ramirezi - guarding eggs

Sagittaria platyphylla – Giant Sag

Sagitaria platyphylla is a marsh plant in its natural environment, which is Central America and the Southern United States. This particular Sagittaria species is known as Giant Sag, not because of its height/size, but because of the width of its leaves.

Leaves in a rosette are medium green in color, grow to a length of 8-10 inches and have a width of approx. ¾ inch, when grown submersed (emersed growth is substantially larger). A nutrient rich substrate, temperature between 680-750 F, and intense lighting are the recommended conditions for successful cultivation of the species. Grown under submersed conditions the plant is undemanding and slow growing.

According to Kasslemann (Aquarium Plants) "Propagation through runners is rare". It does occur, however, as this was the method through which the plants I have under cultivation reproduced in the tank. My small group of plants are in a 29 gal. tank, water temp of about 760 F, with a twin tube T5HO fluorescent light fixture (48 watts total & 6500K rating), which are basically the recommended growing conditions for the species. Plant supplements Flourish & Flourish iron were added weekly (usually).

It makes a very nice mid-ground species which can be planted individually or in a small group. Care should be taken that it is planted in a free-standing location, as it does take up a lot of "acreage" in relation to its height, and should not be shaded by taller species.

It makes a wonderful aquarium plant, in my opinion, as it is a nice shade of green, won't get to tall, and doesn't need constant trimming/thinning to keep it looking good.

Pogostemon erectus
syn: Rotala verticillaris (erroneous)
Common name: Green Hindi Willow

Pogostemon erectus is a stem plant, that was originally collected for the aquarium hobby, from the Western Indian state of Maharashtra *. Originally presented as Rotala verticillaris it has since been identified as a Pogostemon species and not a rotala. If provided with adequate lighting (the stronger the light the more compact the plant will stay) and CO2 it is a fairly undemanding (relatively speaking) plant.

I had to qualify undemanding with relatively speaking as this is my second attempt with this species. The first attempt, obviously, not turning out so well.

This plant is normally purchased as a potted plant as the stems will develop a fairly vigorous root system. My little pot of plants was purchased locally at an aquarium & pet store in august of 2012. The plants were divided evenly between two separate tanks and placed in approximately the same locations in each tank. One tank uses straight tap water (maintained at 74 – 76 degees F) and the other uses a mix of tap (1/3rd) and R.O. (2/3rd) (maintained at 82 – 84 degees F), water changes are usually performed on a biweekly basis, more often if the mood strikes me. Both have flourite black sand for substrate, use fluval 204/205 canister filters for filtration, are supplemented with CO2 (6 ½ hrs. daily) and are dosed with flourish and flourish iron additives weekly per manufacturers directions. The tap water tank has a twin tube T5HO light fixture (6700K), while the mixed water tank has a Marineland LED planted tank light fixture (6500K), lighting is provided for 10 ½ hours daily.

After about 8 weeks the group of plants in the mixed water tank had grown about 50% larger, in both height and diameter, than the ones in the other tank. This was not done intentionally as test to see how growth rate can be affected by different water parameters, I just like to divide the plants I purchase between two or more tanks to increase my chances of success. It is, however, interesting to note how just one or two small differences can affect plant growth in a very dramatic way.

Vegetative reproduction is accomplished by cuttings, with the remaining base stem forming side shoots after trimming. Pogostemon erectus will thus form compact groups of bright green, conifer-like (think pine tree) stems.

This is a really cool looking stem plant that can be easily maintained as an attractive group or "bush" type plant, with minimal effort, as it is not as fast growing as many stem plants which require constant pruning and replanting.

This one is a keeper

** location information from aquaticplantcentral.com*

Pseudomugil furcatus
(Forktail Blue-eye or Furcatus Rainbow)

Pseudomugil furcatus is a stream-dwelling species form Eastern Papua New Guinea. Maximum size is up to 6 cm (2 ½") with 4-5 cm (1 ½ -2")being the norm. The margins on the dorsal, anal and upper edge on the pectoral fins are yellow. Pelvic fins are completely yellow with narrow black upper and lower margins on the caudal fin (1). It is an attractive fish with the males being much more colorful than the females.

The pectoral fins are high on the body and somewhat elongated and narrow in appearance (the yellow color on the upper margin of the fins make them appear more narrow than they actually are) so much so that they tend to look like small wings (in my opinion) which makes them appear to try to be flying , rather than swimming, through the water. These are very active fish and they are constantly on the move.

The pairs that I have were purchased, from Juergen Kasprick on last years (2011) Big Dog Shop Hop 5, as juveniles. Initially placed in a 5 ½ gal. tank they were transferred to a 10 gal. tank when they attained 1 ½ - 2" (total) in size. This tank is maintained at a temp. of 74 deg. F., and is filled with water directly as it comes from the tap. Filtration is by sponge filter and water changes of 50 – 75% are made weekly. The grouping of tanks containing this tank (five 10 gal. tanks) is lighted by a single 40 watt florescent bulb that is on for nine hours a day.


Pogostemon erectus

Anticipating that spawning would occur, in the tank, a large bunch of Ceratophyllum demersum (hornwort) was placed in the back to provide a spawning medium and provide the fry with places to hide. Several weeks elapsed with no fry appearing in the tank. At this point spawning mops (1 floating & 1 sinking) were placed into the tank. The thought being that maybe the fish did not find the hornwort a suitable spawning medium. Another month came and went , still no fry were apparent in the tank. Being a little discouraged and frustrated, at this point, the spawning mops were removed and checked for eggs. Happily, several eggs were found within the mop(s) strands. These I picked (carefully) from the mops and placed in a small container containing water from the tank to which methylene blue had been added. An air stone was added for water circulation and the container then placed on the self (close to the ceiling) above the tank rack in my "fish room". The container of eggs was kept at the ambient room temp. of 72 deg. F as no heater was used. The container was checked daily ,for several days, for the appearance of fry. Finally on the ninth day (just when I was about to dispose of the eggs thinking them to be infertile) a single fry was found. Over the next eight days 1 or 2 fry (once 3) would appear in the container every day. After the eighth day no more fry appeared and any remaining eggs were disposed of after another 4 days passed. (It is apparent that this species ,rather than laying a group of eggs at once, lays only a few eggs a day over several days).

Fry were removed (as soon as they were found) and placed in a 2 qt. glass bowl (with an air stone) where they were fed a mix of microworms and liquid fry food for several days. After approximately 2 weeks they were big enough to take very finely crushed flake. The fry are very small, when first hatched, and 3 months passed before they reached ¾ - 7/8" (total length) at which point I turned them in for B.A.P..

I am now convinced that spawning has been occurring in the tank for some time but any fry that hatched out quickly became "lunch" for the adult fish.

Pseudomugil furcatus is a peaceful, attractive species, that remains relatively small (under 3"). They would make a good addition to many community tanks by adding a splash of color and a lot of activity.

(1) Location and taxonomic information from:" Rainbowfishes in Nature and in the Aquarium" by Dr. Gerald R. Allen.

At this year's, Christmas party, Roger Miller handed me a stack of "Amazonas Magazines", and I said "Roger, you're the man!" Little did I know that would be the last opportunity I had to speak with him. Roger did little things like this for everyone, often. Roger Miller was a great friend, not to just me, but to everyone he met. I can't think of a kinder person.

Roger was one of the first to people to make me feel welcome at a Grand Valley Aquarium Club meeting. I felt an immediate bond with Roger because we both had recovered from drug and alcohol addictions.

Any time I needed something at a meeting, or auction, whether it be a pen, plastic bag or rubber band, Roger was the first person I asked, and he always came through, even if it was from his personal supply.

I am so thankful that I had the opportunity to have known Roger, and extremely happy that we celebrated all he did for GVAC by bestowing him with the "GVAC Fellowship Award". Roger Miller's presence will truly be missed in our club, and in this world, including his heartwarming laugh that I can still hear every time I think of him.

Chris Carpenter

Lobelia cardinalis (Cardinal Flower)

Lobelia cardinalis is a stem plant that is native to central and eastern North America. It is a marsh plant that can also be found growing along the banks of lakes and rivers. It is a slow-growing species that can reach over 3ft. in height. The flowers are a very decorative , bright red, hence the common name of Cardinal Flower, and for this reason it is often cultivated in gardens.

Coaxing this plant to grow submerged from the emersed form is not without difficulties. In the book Aquarium plants , their identification, cultivation and ecology by Dr Karel Rataj and Thomas J. Hoareman they state: "Emersed plants are propagated; the vegetative tips (10 to 15 cm long) are transplanted under water. Plants from gardens or natural environments are not suitable for this purpose. Only plants grown in high humidity (such as a greenhouse) can be transplanted under water."(pg. 351).

As submerged grow begins the leaf size, shape and color of the plant changes (This is also true of many of the plants that we grow in our aquariums).

It has been my experience, that many of the plants I purchase (both emersed and submerged grown) go through a transition/acclimation phase as they have to adapt to environmental conditions different from where they were previously. Most seem to grow slowly, at first, until the transition has been made, at which point growth increases to a more "normal" rate. A few (as was the case for me with this species – Lobelia cardinalis) have obvious trouble making the adaptation, to the new conditions. In these instances the plant (or plants) refuse to grow and begin to deteriorate and continue to do so until an environmental change is made or (in rare cases) dies.

In getting back to the main topic of the article, I purchased this plant(s) (6 stems 3-4" long, as an H.A.P. by another GVAC member) at the March 2010 membership meeting. Initially the plant(s) were placed in a 90 gal. aquarium. This tank was (at the time) lighted with a compact florescent fixture with 4 65 watt bulbs. Filtration was with a fluval 405 cannister filter. Substrate was a Flourite/ gravel mix and the tank temp. was 82-84 deg. F. Water was a 2/3 r.o. 1/3 tap water mix with weekly water changes of appx. 40%. Flourish, Flourish excel, and Flourish iron were added (at recommended dosages) after each water change. After a period of about 3 months 3 (50%) of the plants had deteriorated to the point that they were no longer viable and the remaining 3 were barely showing even minimal growth. At this point the remaining plants were transplanted to a different tank.

The new environment consisted of a 29 gal. tank with a twin tube T5HO light fixture (48 watts total). Substrate was (and still is) Flourite Black sand and filtration was done by a fluval 205 cannister filter. Water was what came directly from the tap and temp. was 78-80 deg. F. Weekly (usually) water changes of 50-75% were made along with the addition of the same plant additives used in the 90 gal. tank. The plants slowly responded the environmental change by adding new growth. Approximately 10 months later CO_2 supplementation was added to this tank (along with others) to which L. cardinalis responded very well by growing substantially faster that before the addition of CO_2 (It is, however, still a slow growing plant)

L. cardinalis does not send out runners or form adventitious plants in it's leaves, petioles, roots or inflorescenses. Vegetative propagation of this plant is only accomplished the aquarist taking cuttings,(preferably 3-4 in. long), from the "parent" plant and placing them in the substrate, where after a few days (hopefully), they will form adventitious shoots .

I have been cultivating this species for a little over 2 years and I now have a nice group of plants in the original tank along with smaller groups in 2 other tanks, 2 of which have a 50/50 mix of r.o. and tap water with temps in the low to mid 80's (degrees F) and one with tap water in the mid to high 70's (degrees F). I find it a very attractive plant that looks its best in groups or rows. The bright green of the leaves is a nice contrast to the darker greens of many of the other plants I currently maintain. It has been well worth the time and effort I've put into it and I plan to continue the cultivation of this species for the foreseeable future.

Christel Kasselmann in her book Aquarium plants says: "Due to its unproblematic maintenance, L. cardinalis is a recommended and popular aquarium plant. The slow-growing species is undemanding as to water values, substrate and temperature (optimum range is 22-26 deg. C). For the most part I agree with her statement as it is definitely a slow growing plant . I would ,however, like to say that as for it being unproblematic in maintenance and undemanding to water values, etc. , that it is,once it has adapted to the environment provided it –and that can be the challenge!

Roger Miller BAP History

Scientific name	Common name (if one)
Alfaro cultratus	Knife livebearer
Amatillania nigrofasciatus (syn: Cryptoheros nigrofasciatus)	Convict Cichlid
Amatillania siqua (syn: Cryptoheros fasciatus)	Honduran Red Point
Ameca splendens	Butterfly goodeid
Ancistrus sp.	Dwarf Albino Bristle-nose pleco
Aphyosemion austral	Orange Lyretail Killifish
Apistogramma cacatuoides "Double Red"	Cuckoo Cichlid
Asolene spixi	Spixi snail
Astatotilapa latifasciata	Zebra Obliquidens
Ataeniobius toweri	Bluetail goodeid
Caridina cf. cantonensis "zebra"	Zebra shrimp
Cichlasoma boliviense	Bolivian cichlid
Corydoras melini	Bandit Cory
Corydoras sp. (CW010)	Orange laser cory
Clea helena	Assasin snail
Danio erythromicron	Dwarf Emerald rasbora
Fundulopanchax gardneri Lokoja, Nigeria	Gardneri killiefish
Girardinus metallicus	Black Chinned Livebearer
Goodea atripinnis gracilis	Blackfin goodeid
Haludaria fasciata	Mellon barb
Hemichromis bimaculatus	Jewel Cichlid
Heterandria formosa	Least killifish, American mosquito fish
Iodotropheus sprengerae	Rusty Cichlid
Iriatherina werneri	Threadfin Rainbowfish
Julidochromis ornatus	
Labidochromis caeruleus	Electric Yellow Cichlid
Lamprologus caudopunctatus "Red Fin"	
Limia nigrofasciata	Humpback limia
Limia perugiae	
Limia sp. "Tiger"	Tiger Limia
Limia sulphurophilia	Sulphur Limia
Limia vittata	
Macrobrachium assamense	Red-claw macro shrimp
Melanoides tuberculata	Malaysian trumpet snail

Scientific name	Common name (if one)
Melanotaenia Madagascar (Syn: Bedotia geayi)	Madagascar Rainbow Fish
Microgeophagus ramirerezi	Blue Ram, German Blue Ram
Moenkhausia pittieri	Diamond tetra
Neocaridina heteropoda var"red"	Red Cherry shrimp
Neocaridina cf. zhangjiajiensis	Blue Pearl shrimp
Neolamprologus brichardi	
Neolamprologus multifasciatus	Multi's
Pelviachromis pulcher	Kribs
Pelviachromis taeniatus "Moliwe"	
Planorbis corneus	Ramshorn snail
Poceilia sp. "Dalmation molly"	Dalmation molly
Poceilia reticulata	Purple Dragon Guppy
Poecilia velifera	Creamcicle Lyretail molly
Poceilia wingei	Endlers Livebearer
Pomacea bridgesi	Mystery snail
Pseudomugil furcatus	Furcatus Rainbow or Forktail Blue-eye
Pseudomugil cf. paksi	Irian Red Neon Rainbow
Pseudotropheus demasoni	
Pterophyllum sclare	Pearlscale Koi Angelfish
Rasbora espei	
Rhineloricaria sp. "Peru"	Peruvian Whip-tail catfish
Skiffia lermae	Zacapu Sawfin Goodeid
Skiffia multipuncata	Speckled Sawfin Goodeid-aquarium strain
Tanichthys albonubes	White Cloud Mountain minnow
Thorichthys sp. "Mixteca Gold"	
Xenophallus umbriatilis	Golden Teddy livebearer
Xenotoca eiseni	Red- tailed Goodeid
Xenotoca variata	Jewel Goodeid
Xiphophorus helleri	Marigold Sword Tail
Xiphophorus maculatus	Gold Twinbar platy
Xiphophorus maye "Panzos Guatemala" Collection location: Panzos Guatemala	
Xiphophorus nezahualcoyoti	Nezzy sword, Green Mountain sword
Xiphophorus variatus	Green platy – wild type

Roger Miller HAP History

Scientific name	Common name (if one)
Althernanthera reineckii "cardinalis" (V) (F)	Telanthera
Ammannia gracilis (V)	
Ammannia senegalensis (V)	Red Ammannia
Anubias barteri var. nana (V) (F)	Anubias Nana
Anubias barteri var. nana "marble" (V)	Anubias Marble
Anubias coffeefolia (V) (F)	
Aponogeton crispus (F) (S)	Ruffled sword plant
Aponogeton longiplumulosus (F)	
Aponogeton ulvaceus (F)	Ulvaceus
Aponogeton undulatus (V)	
Bacopa monnieri (V) (F)	Moneywort
Blyxa aubertii (V) (F)	
Blyxa japonica (V)	
Cabomba caroliniana (V)	Green Cabomba
Cabomba furcata (V)	Red Cabomba
Cabomba pulcherrima (V) (formerly: Cabomba palaeformis)	Purple Cabomba
Ceratophyllum demersum (V)	Hornwort
Ceratopteris thalictroides (V)	Water Sprite
Cryptocoryne albida (V)	Cryptocoryne albida
Cryptocoryne balansae (V)	
Cryptocoryne bekettii (V)	
Cryptocoryne parva (V)	Crypt parva
Cryptocoryne usteriana (V)	
Cryptocoryne walkeri (V)	
Cryptocoryne wendtii "red" (V)	
Cypress heliferi (F)	
Didiplis diandra (V)	
Echinodorus amazonicus (V) (F)	Amazon Sword Plant
Echinodorus angustifolia (V)	
Echinodorus angustifolia "Vesuvius" (V)	Vesuvius Sword Plant
Echinodorus barthii (V) (F)	Red Melon Sword Plant
Echinodorus bleheri (V)	Amazon Sword Plant
Echinodorus quadricostatus var. xinguensis (V) (F)	Dwarf Sword plant
Echinodorus schlueteri (V)	
Echinodorus sp. "Frans Stoffels" (V) (F)	Frans Stoffels Sword Plant
Echinodorus sp. "Ozelot" (V) (F)	Ozelot Sword Plant
Echinodorus sp. "Red Flame" (V) (F)	Red Flame Sword Plant
Echinodorus "Tanzende Feuerfeder" (V) (F)	Tanzende Feuerfeder Sword Plant
Egeria densa (V)	Anacharis
Egeria najas (V)	Narrow leaf anacharis
Eichhornia crassipes (V) (F)	Water Hyacinth
Eleocharis acicularis (V)	Dwarf Hairgrass
Eleocharis montevidensis (V)	Giant Tall Hairgrass
Glossostigma elatinoides (V)	Glossostigma
Helanthium bolivianum (V) (Syns: Echinodorus latifolius, Echinodorus xinguensis)	Xingu Sword plant
Helanthium tenellus (V)	
Heteranthera zosterifolia (V)	Star Grass
Hydrocotyle sibthorpioides (V)	Dwarf Pennywort
Hydrocotyle leucocephala (V)	Brazillian pennywort
Hydrothrix gardneri (V)	Bamboo Sparks, Water Hair
Hydrotriche hottoniiflora (V)	Hydrotriche hottoniiflora
Hygrophila corymbosa (V)	Giant Hygro
Hygrophila corymbosa "Kompakt" (V)	Hygrophila "Kompakt"
Hygrophila difformis (V)	Wisteria, Water Wisteria
Hygrophila polysperma "tropical sunset" (V)	Dwarf Hygrophila- "tropical sunset"
Hygroryza aristata (V)	Asian Water grass
Lemna minor (V)	Duckweed
Lilaeopsis mauritiana (V)	Narrow leaf micro sword

Scientific name	Common name (if one)
Limnobium laevigatum (V)	Frogbit
Limnophila aromatica "hippuroides" (V)	Limnophila hippuroides, Pink Hippo Grass
Lindernia rotundifolia (V) (F)	Baby tears
Lobelia cardinalis (V)	Cardinal Flower
Ludwigia arcuata (V)	Needle Leaf Ludwigia
Ludwigia palustris (V)	Water Primrose
Ludwigia repens (V)	Ludwigia Broadleaf
Ludwigia sp. "Atlantis" (V)	Ludwiga Atlantis
Lysimachia nummularia (V)	Golden Jenny
Marsiela sp. (V)	Four leaf clover
Mayaca fluviatilis (V)	
Micranthemum umbrosum (V)	Giant Baby Tears
Microsorum pteropus (V)	Java Fern
Microsorum pteropus var. "Narrow" (V)	Narrow leaf java fern
Myriophyllum mattogrossense (V)	
Myriophyllum simulans (V)	Filligree Frill
Myriophyllum tuberculatum (V)	Red Myro, Dragon Fire Fox tail
Najas guadalupensis (V)	Najas grass
Nesaea crassicaulis (V) (syn: Ammania crassicaulis)	
Nesaea pedicellata "Golden" (V)	Nesaea Golden
Nuphar japonica (V) (F)	
Nymphaea lotus zenkeri "red" (V)	Red Tiger Lotus
Nyphaea sp. "Taiwan" (V)	
Persicaria kawagoeanum (V) (F) (S) (syn: Polygonum kawagoeanum "Makino")	Red Bamboo
Pyhllanthus fluitans (V) (F)	Red Root Floater
Pistia stratiotes (V) (F)	Water lettuce
Pogostemon erectus (V)	
Pogostemon helferi (V)	Downi, Little Star
Potamogeton gayi (V)	Slender Pondweed
Riccia fluitans (V)	Crystalwort
Rotala macrandra (V)	
Rotala magenta (V)	
Rotala nanjenshan (V)	
Rotala rotundifolia (V)	
Rotala sp. "Bangladesh" (V)	
Rotala sp. "Vietnam" (V)	
Rotala wallichii (V)	
Sagittaria platyphylla (V)	Giant Sagittaria
Sagittaria subulata (V)	Dwarf sag
Salvinia cucullata (V)	Asian Water Moss
Salvinia natans (V)	
Salvinia oblongifolia (V)	Giant Salvinia
Shinnersia rivularis (V)	Mexican Oakleaf
Spathiphyllum wallisii (F)	Peace Lily
Spirodela polyrhiza (V)	Giant Duckweed
Staurogyne repens (V)	
Utricularia gibba (V)	Bladderwort
Vallisneria americana var. americana (V) (syn: Vallisneria gigantea)	Jungle Val
Vallisneria americana var. biwaensis (V) (syn: Vallisneria biwaensis)	Corckscrew Val
Vallisneria nana (V)	
Vallisneria spiralis (V)	Italian Val
Vesicularia dubyana (V)	Java Moss

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Address correction required