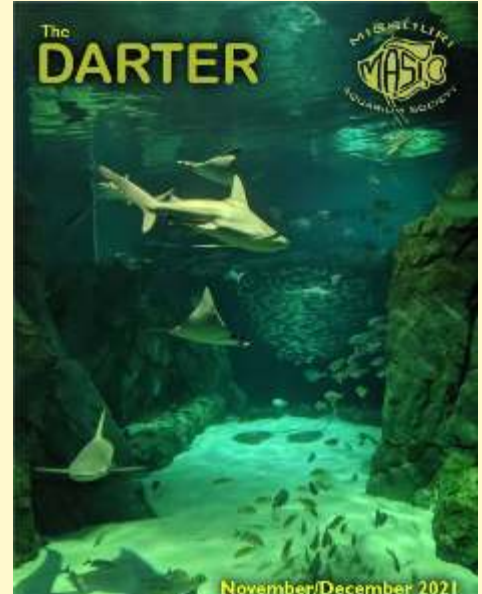
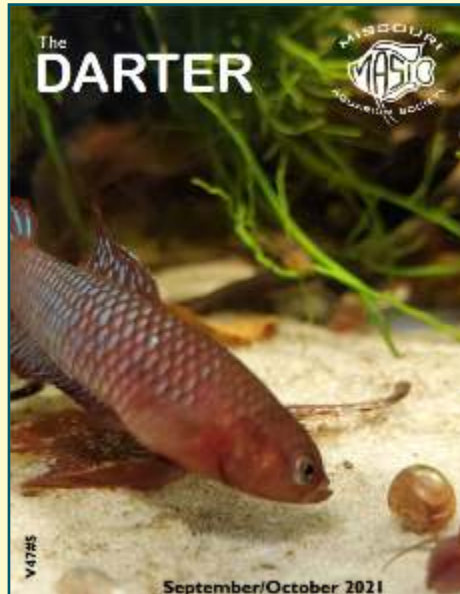
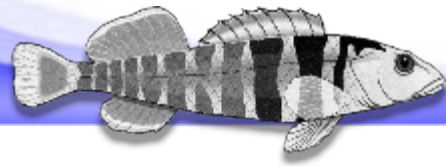


The **DARTER**



**Missouri Aquarium Society
Newsletter articles - 2021
Volume 47, Issues 1 - 6**



The DARTER

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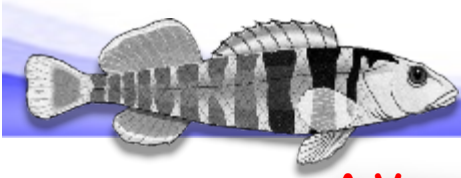
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Join or renew membership at any meeting, most club events, by PayPal from the MASI Website's Membership Page or by contacting the membership chair.

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A Very Special Edition of The DARTER celebrating Missouri Aquarium Society Members' contributions in 2021

2021, as the 2nd year of a pandemic, was still a difficult year for many organized clubs.

2021 began still under an influence of the pandemic with mostly Virtual meetings. We replaced auctions and swap meets with Bag for Bag outdoor swaps to keep programs such as the BAP & HAP moving and viable. Only in 2nd quarter was MASI able to resume F2F meetings.

Summer pandemic conditions allowed us to host both the American Killifish Association (AKA) and the American Cichlid Association (ACA), making the St Louis area a nexus of the Aquatic Hobby for 2021.

We were able to resume F2F general meetings through a member's generosity. Jerry Jost, a long time member, avid supporter of the Missouri Aquarium Society, co-owner of Jost Chemical and known by many for his expertise in breeding rare Corydoras- donated a portion of one of his warehouses for the Missouri Aquarium Society's use for future F2F events. We are now fully moved in and will use this facility for the first full year in 2022.

MASI leverages Social Media to promote the hobby:

- Holly Paoni, Eric Bazzel, Jake Harris and Steve Coxon all help administer a very active Social Media presence.
- Although FaceBook continues to be in the mix, much of our Social Media now occurs on BAND, as an more

T HIS EDITION OF The DARTER has been compiled as a Thank You for participation in the programs and events of the Missouri Aquarium Society during the 2021 Membership Year.

MASI members appreciate the work and dedication by the authors that went into these articles. Those Editors and Exchange Editors who see newsletters from other Aquarium clubs and Societies also appreciate the efforts that go into these contents. As a result of both first time and established authors, MASI's "The DARTER" annually contains some of the best collections of information about the Aquatic Hobby available.

This Very Special Edition is also meant to serve as inspiration and possible guide for others who would like to contribute information about the hobby. As you find yourself with time or enthusiasm, consider writing about your

easily managed platform. As such we are also now able to support other activities not previously possible.

- Monthly programs are often F2F but supported on-line using a variety of virtual methods such as ZOOM, YouTube and Streamyard, maintaining our educational outreach to members and the public.
- Auctions, Swaps, Annual Awards, Christmas Party and other F2F events are slowly coming back on track.

Throughout the year the Darter and the written information continued to be important, keeping current members and an influx of new members involved in the Hobby and the Society informed of hobby happenings and information.

Many Thanks to those Authors who contributed to the well being of the hobby by writing for the Darter.

The Missouri Aquarium Society numbering over 250 members, enters 2022 on a positive note.



hobby experiences for the Editors to use spreading information and promoting the hobby. It is an editor's responsibility to guide and help insure your efforts promote yourself and the hobby in general.

I am often asked, "What should I write about?" My answer is always, "Write about your own interests." No matter what those may be there will be someone who shares those interests or finds them interesting.

In this collection there is a very wide diversity of articles. Such information is readily used in Club publications to help promote the our Hobby.

If you need an added writing incentive, some clubs, including MASI, offer cash incentives or rewards for writing.

BEGIN WRITING, IT HELPS EVERYONE, including YOU!



The
DARTER



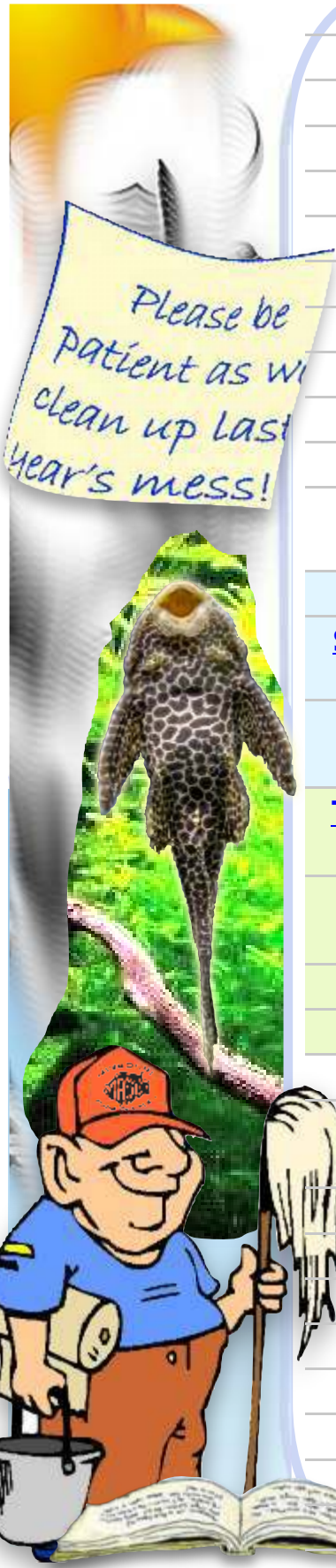
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*Over 200
Members!*



January/February 2021

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My Outdoor Paradise

By Chuck Bell

HOMEBOUND WITH THE winter "blahs"? Anticipating the Spring, and pond season, brings out the excitement of working with plants and fish, and a renewed creation for the upcoming season.

This article will hopefully be fun, and bring back memories of our outdoor season. Being retired, and having a bad hip, the pond and plants bring me many hours of enjoyment and relaxation. I incorporate many pond, bog plants, tropical, and flowering plants.

I move my aquarium fish to the ponds around mid-May by putting outside swordtails, pleco's, kribensis, angels, and assorted catfish. They seem to thrive in the outdoor setting with minimal effort.

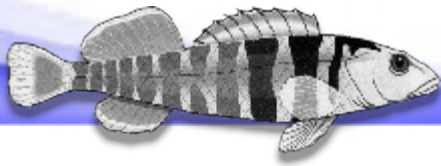
You get the benefits of water changes from the ponds and aquariums. Many hobbyist just flush their waste water, but it is fantastic for outdoor plants, and as an additive to winter gardens. As in these pictures, plants grow fuller, taller and have more blooms when fertilized with the waste water.

My elephant ear plants routinely grow to 6 feet and the flowering plants have an abundance of blooms. The combination of pond, bog, and ornamental plants create a picturesque, peaceful and relaxing landscape. Along with feeding the fish, and neighbors stopping by to enjoy the combination of the plants and fish, it's made a much more enjoyable outdoor season in these crazy times.

Enjoy this article, and pictures. Remember, the most important tidbit I would share, is that beautiful fish make better looking plants!

Don't throw out that liquid gold! Use it in your garden!





Sharing the Aquarium Hobby with Children

By Steve Coxon

I F YOU HAD told me a few years ago that I would have an aquarium with purple gravel or one dedicated to platies, I wouldn't have believed you. And yet, when my then nine-year-old daughter Sage asked for her own aquarium, what could a fishy dad say? My other two kids, Emerson and Mavis, ages 7 and 4 respectively at the time, soon followed in their requests.

Ask just about any aquarist when he or she started in the hobby, and you're likely to hear about a childhood aquarium. My love of the aquarium hobby started with a koi pond at a shopping center on a family



Watch the tank!

Sage's platy and gouramis (age 10)

vacation to Hawaii when I was four. Apparently, I was so enamored with the koi that my folks bought a 10-gallon aquarium for me when we got home. As it turned out, my parents weren't interested in caring for an aquarium and it was soon gone. However, a few years later in elementary school, I sold some toys at a garage sale and used the money to buy a flea market 20 gallon. I have had aquariums ever since.

Now that I have my own children, I've found that there is a lot I can teach them through the aquarium hobby and it is a great way to spend time together. Sage, now 10, often accompanied me to MASI meetings and events pre-pandemic. When she first became interested, I handed her my childhood aquarium

book, Herbert Axelrod's *Starting Your Own Tropical Aquarium* from which she and subsequently my other two children picked the fish that interested them most. Sage keeps platies and gourami, Emerson loves rams (although I steered him away from German blues to the hardier Bolivian), and Mavis has a tank full of dwarf neon (*Melanotaenia praecox*) and ornate rainbowfish (*Rhadinocentrus ornatus*).

Along with being a father and aquarist, I am also a former elementary school teacher and current professor of education. As such, I am very interested in child development and learning. The Austin Aquarium (austinaquarium.com) lists 10 educational benefits summarized here as enhancing vocabulary, hands-on learning, relaxation, imagination, real world learning, family bonding, appreciation of nature, educational engagement, and encouragement of scientific exploration. I have seen these benefits with my children and encourage other hobbyists to engage children in their lives as well.

To help, I offer these general guidelines for engaging children in the aquarium hobby:

1. **Start with a reasonable size tank** for the child. 10-30 gallon aquariums are large enough for water stability but small enough that the child can



Emerson's rams (age 8)



take part in maintenance. Each of my children has a 20 gallon long in my fish room. Sage also has a palludarium for newts in her bedroom.

2. Give children as much choice as reasonable in fish selection. Five-year-old Mavis is very interested in flying fish, but obviously those aren't appropriate for the aquarium so we've sufficed with YouTube videos and the hope that we'll see them next time we visit the ocean. Rainbowfish also piqued her interest and so I sought out some of the smaller species from MASI members. Notably, my personal interests are in dwarf cichlids and killifish and not in livebearers, gourami, or rainbows. However, these interested my children and we can care for them well, so it was an easy decision.

3. Let children decorate or "scape" their own tanks. Help them understand the habitat requirements of the fish they choose, but there's no need to press your aesthetic on them. As you can see from the photos, each of mine has a distinct style. They were able to choose driftwood, rocks, plants and substrate largely from what I already had on hand. However, Mavis was insistent on "pretty" substrate so I splurged on a bag of gaudy purple gravel for her. Emerson bought the dragon decoration with money that he earned.

4. Involve children in age-appropriate maintenance. I do all of the water changes in the fishroom in the evenings after the children are in bed, but Sage helps with water changes on her palludarium. When Mavis was just starting, I always kept

the food out of reach and portioned it for her, but now all of the children have learned the appropriate amounts to feed their aquariums and my 50% weekly water changes reduce overfeeding concerns. All of the children enjoy using the magnetic scraper to remove any algae from the front glass. Sage has enjoyed earning some money by selling extra platy within MASI and a local fish store.

5. Teach them about biology and chemistry in real world situations. The kids all help me test the water and read the results (I'm a bit color blind). Through this, they have learned about different fish requirements, the nitrogen cycle and bacteria, pH, and specific gravity. They have learned about food webs and herbivores, omnivores, and carnivores through the different food we feed. They have even learned a fair bit about reproduction by watching the killifish and Corydoras spawning and helped to raise the fry.

6. Engage children in other aspects of the hobby. There is a lot more to an interest in fish than aquariums.

Sage and Emerson have been snorkeling with me. Mavis enjoys feeding fry with a syringe of baby brine shrimp. Sage started a Walstad-method bowl for cherry shrimp that did so well we had to move the plants and shrimp to a 10 gallon tank. Emerson enjoys aquascaping empty tanks even when he knows we won't be setting them up. All of my children enjoy native fish net, photograph, and release trips to local streams with me. In these interests, children are allowed to explore other areas of the hobby and develop new interests.

Engaging children in the hobby is educational and provides them with many other benefits. It is also vital to the long-term future of our hobby that we engage children to develop future hobbyists. If you have a child in your life that doesn't have an aquarium to call their own, I highly recommend it.



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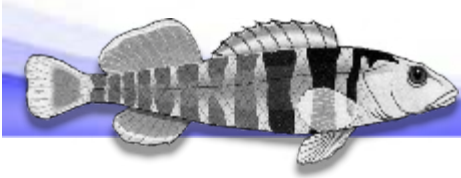
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The DARTER

Minifins

The Celestial Pearl Danio

Danio
(*Celestichthys*)
margaritatus

By Mike Hellweg, CFN
(Certifiable Fish Nut)



© Seriously Fish

ALMOST 15 YEARS ago, in September of 2006, a picture began circulating on the Internet. Rumor was that it was simply a doctored photo, or possibly an actual photo of some sort of hybrid - no fish could look that good that we didn't already know about.

But it was real, and hobbyists around the world were soon reporting breeding success with this new fish, including our own Charles Harrison, who was one of the first hobbyists in the world to breed them. I

give credit where credit is due - Charles beat me out by a couple weeks. They're great fish and don't take up much room, so both Charles and I have had them going in our tanks ever since. But what the heck was it?

Early on it was given the trade name of "Galaxy Rasbora" and also "Fireworks Rasbora". Every once in a while, I still see it on wholesale lists with one of those two names. At the time scientists agreed that it didn't fit into any of the known Cyprinid genera, and on February 28, 2007, Tyson R. Roberts of the Smithsonian Tropical Research Institute released his formal

description of the species, erecting a new genus for it, and giving it a new common name - *Celestichthys margaritatus* - The Celestial Pearl Danio (CPD).

Nomenclature has changed several times over the past 15 years; they have been moved to the genus *Danio*; then separated back out into *Celestichthys* again along with their cousins the emerald dwarf Danio (*Danio erythromicron*), the glowlight Danio (*D. choprae*), the Northern Glowlight Danio (*D. flagrans*) and the newest member of the group the blue glowlight Danio (*D. htamanthinus*).



Native habitat

Yo Hein Htet (Hein Aquarium)



Currently they are back in *Danio*. Stay tuned.

Dr. Roberts coined the common name of Celestial Pearl Danio (CPD) to reflect that they are actually Danionins and not Rasborins as we had thought originally. According to Roberts, he coined the generic name "*Celestichthys*" from the Latin word "*caelestis*" which means "heavenly" and the Greek word "*ichthys*" which we all know means "fish".

He says the specific name "*margaritatus*" is also Latin and means "adorned with pearls". Therefore "*Celestichthys margaritatus*" means "heavenly fish adorned with pearls" - a great descriptive name with which a person not knowing the fish but seeing a picture of them would be easily able to figure out which fish the name was referring to, but a bit awkward to use in conversation.

So he coined a beautiful new common name to reflect both the scientific name and the newly discovered generic relationship to Danios - Celestial Pearl Danio. What a great name for such a cool fish! Of course, in our hyper fast world where we have to shorten everything, we have cheapened this beautiful name to just CPD. Ah, well.

With the subsequent explosion in popularity of both Aquascaping and nano tanks the CPD has also exploded more in popularity, if that's even possible. When I go to swap meets, I usually take 60 to 100 CPDs and I've not yet returned with a single fish, even with many other sellers also selling them. They are always in demand.

Pet shops that I deal with are always asking for them because they can't keep them in stock, either. I even have to regularly purchase them from importers because even raising 100 - 200 fish a month, I can't raise enough of my own fish to meet customer demand. 15 years after it exploded onto the market and it is still in high demand!

This might spell doom for some wild fish, but the wild CPD populations have proven so resilient that despite claims to the contrary, the initial collections did no measurable damage to the wild population. Now it is commercially produced by so many farms and independent breeders around the world that anyone who



Sparring makes



Female

wants them can find captive bred stock without causing any harm at all to the wild stock. In fact, I don't think wild caught fish are even available anymore.

This is a very good thing, but their initial discovery could have been a disaster for the fish and serves as a cautionary tale to all of us. They were first found in a small pond in the mountains of Myanmar (Burma) on the Shan Plateau around the town of Hopong in the outskirts of the Shan state capitol of Taunggyi. Realizing they had something special, collectors quickly caught all of the fish in the pond and sold them.

A few weeks later when scientists went looking for where these amazing new fish had been found, it seemed there were no fish left. They were already being declared extinct, wiped out by the greedy aquarium hobby. But the real reason that the scientists at first couldn't find them was two-fold - one they were using too large of mesh nets to catch the thousands of young fish in the pond, and two the young fish, as part of their survival instinct, dive for cover in the muck on the bottom, where they almost literally disappeared.

Their amazing fecundity was soon revealed in that the young fish are precocious breeders, spawning when they are barely 10 weeks old - long before they are large enough for nets to catch them, and way before they reach adulthood. So very quickly the "empty" pond was completely full of

fish again. What's more, they were subsequently found in literally hundreds of ponds all over the Plateau from about a half mile above sea level to over a mile above sea level. It turns out much of their range is on a huge military base and in the closed areas around it - places where few locals and no Westerners were allowed to go.

This widespread occurrence, plus their ease of breeding and rearing in captivity, allowed the CPD to go from a cautionary tale of disaster to a huge success story that continues to this day. Even though this tale turned out well, as responsible hobbyists we need to make sure it never happens again. Any fish in our tanks should be considered for breeding projects, and we should be willing to both distribute the fish and share information about husbandry, breeding and rearing them with anyone who asks.

The first thing to consider when deciding to keep CPDs is the tank.

They can be easily kept in a small group in a two to five gallon tank, but they are much more at ease in a slightly larger tank, say 10 gallons. It is best to keep fewer males with more females to keep spread out their aggression a little, or keep a larger mixed sex group.



Young fry

Yes, that's right, I said aggression. For tiny fish, male CPDs are remarkably aggressive with their conspecifics, especially other males. Like all Cyprinids, they have pharyngeal teeth in the throat that act like a grinder to make their food small enough to swallow. But like some other miniature Cyprinids, male CPDs also have tooth like structures in the jaw called odontoid processes. While the exact purpose of these is still unclear, when you watch two males sparring, at least one use becomes clear. They bite each other's fins.

This fighting can lead to injury if the weaker fish can't get out of the stronger fish's line of sight, or if other



fish in the tank don't interrupt them. When the CPD first appeared in the hobby and we didn't know about this internecine sparring, many males were lost. Now we know to keep them not unlike Lake Malawi Mbuna - in large groups to disperse aggression. Heavy planting also helps - again, breaking up the line of sight.

Males are easy to pick out as they are dark, inky blue with beautiful pearlescent spots on their flanks and bright red to orange unpaired fins. Many dominant males have red or orange on their bellies as well. Females are generally larger than males and less intensely colored, with a silvery or whitish belly, and they are much less scrappy.

As for water parameters, our local St. Louis County tap water suits them fine. They prefer water that is slightly hard and a bit on the basic side of neutral. One of the great things about them is that they do not need a heater. They can easily handle temperatures down into the 50s, if not lower, so they would be excellent candidates for tubbin' outside. They can be the first species out in the spring, and the last one to come in at the end of the season. Either in the tub or in the tank, be sure to give them large, regular water changes. I try to change 50% of their water every 5 to 6 days.

Heavy planting helps not only break up the line of sight, but it also helps replicate their natural habitat. They aren't picky about the species of plants, so whatever suits you is fine with them. Heavy planting requires decent lighting, and CPDs are not shy when it comes to light, so bright light suits them well. One drawback to heavy planting is that they love swimming in and among the plants, so it can be hard to see them. A simple solution to this in a display tank is to add a small school of their cousin the gold ring Danio - *Danio tinwini*. For some reason this species, and only this species (I've tried several others!), seems to draw a group of CPDs out into the open in a heavily planted tank. Try it, it works!

Feeding is easy. They'll eat literally ANYTHING that fits into their tiny mouth. I have had great success over the years feeding them a staple tiny crumble or pellet diet. I add finely

ground spirulina flakes a few times a week. And every day they get newly hatched brine shrimp and/or microworms. That's it.

Cousins:



Emerald Dwarf Danio
(*Danio erythromicron*)



Glowlight Danio
(*Danio choprae*)



Northern Glowlight Danio
(*Danio flagrans*)



Blue Glowlight Danio
(*Danio htamanthinus*)

If you give a group of them a well planted tank, change the water regularly and feed them well, soon you'll start seeing youngsters. Since the youngsters eat the same foods as the adults and most adults don't seem to be interested in eating the young, you can raise small numbers of young in the tank with the adults and have a colony going continuously for years - that's what both Charles Harrison and I have done. In fact, I think Charles even still has them in the same tank!

Now that I'm trying to increase production, I do things a bit differently. There's no need to do this unless you're trying to produce large

numbers of them - make sure you have room to raise them to adulthood and/or buyers for them before you start churning out dozens of them every month.

I use this same technique with tetras, other small Cyprinids, killies and many other smaller fish. Set up a 10 gallon tank with a sponge filter. Add a layer of fine leafed plants like Java moss, Susswassertang, or something similar on the bottom. You can add a layer of pea gravel or something similar, use a mesh grid over the bottom, or use a spawning mat. Then add a group of maybe a dozen to 20 or so adults. Feed them twice a day with small daphnia or newly hatched brine shrimp. Leave them in the tank for about a week, then remove the adults. Now leave the tank alone for a few days. Soon you'll start seeing tiny fry darting around just above the plants.

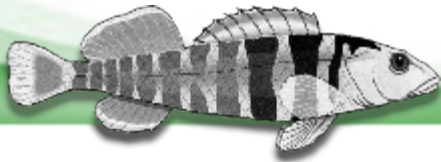
They will find plenty of micro foods living on and around the plants for the first few days. I also add a commercial fry diet like Sera Micron or Golden Pearls to boost the food supply. After about a week, start adding newly hatched brine shrimp and microworms. Don't start doing water changes until they're about a month or so old. Then start slowly with small daily water changes, working up to larger 50% water changes over the course of a couple months. For some reason, Cyprinid fry seem to be sensitive to large water changes for the first month or so. After this, they are tough enough to handle large water changes.

The fry grow quickly, and after just 8 - 10 weeks they are starting to spawn on their own already. At this point they are good to go, but most buyers prefer them a bit larger, so it's a good idea to let them grow until they're about three months old before trying to find new homes for them.

The CPD is a spectacular tiny fish. They make fascinating and colorful additions to a small tank, and a self-sustaining colony can literally be enjoyed for decades.

Whatever you do, don't forget to sit in front of the tank and spend time just watching your fish!





Taming Godzilla

-
Ottelia ulvifolia
"Okavango Delta",
Flowers and seed
-

By Gary Lange



YOU WOULD THINK I would know better than to try a plant this big a second time!

I'm a person that likes smaller fish- most of my rainbowfish are less than four inches, but I have this two foot tall 210 gallon tank with high light and CO2 so it just begs for the big boy plants. For years I've had large stands of *Barclaya longifolia*, *Nymphaea lotus* "Red", and of course my "Queen", *Crinum calamistratum*.

All of these plants take up huge chunks of real estate in my seven foot tank. But six months ago I neglected my *Barclaya* and it failed to spring back so I was in the mood to find



Note the beautiful brown freckles on the adult leaf.

another monster. One that I had before, *Ottelia ulvifolia* sprang to mind.

When I found out that someone with it was going to be at the 2019 AGA conference I went out of my way to obtain some. The last time I had this plant it just proved to be too big. How big you say, well a recent random leaf cutting was 36 inches in length. So if you read about this plant in the latest Kasselmann (English version 2020) realize that she is incorrect in saying that they only grow to 75 cm (30")!

To keep Godzilla (yes, I named it) at bay I use any excuse to trim the leaves. Kasselmann says the leaves are very fragile and for such a big leaf it is. Leaves often get in the way of each

other and push themselves out of the water. Any of those two inch wide leaves with an imperfection are removed and part of keeping Godzilla in check is making sure that I trim at least a dozen leaves off of it each week.

The monster itself, the Okavango Delta version, is a thing of beauty. It is a very pleasant green with





My first problem was trying to understand what happened to the pod. One day it would flower and the next day the flower would be gone. I thought maybe my rainbowfish were eating the flowers and if so I wasn't going to produce any seeds that

interesting brown freckles all over the leaf. At the moment the only way to get plants to other enthusiasts crazy enough to want one is to wait several months. When you can see that it starts to separate into individual plants, usually three to four plants, dig it up, make a mess in the aquarium, split it then replant a small portion but this is not a very productive way of producing more plants. I would love to be able to produce seeds and then have lots of young smaller plants for other hobbyists.

Once it's happy and growing it puts out many stalks that have a large pod that floats to the surface. Each pod contains one beautiful yellow flower. I have done my usual trick and dusted the pistil of the flower with a tiny paintbrush hoping that they were self-fertile.

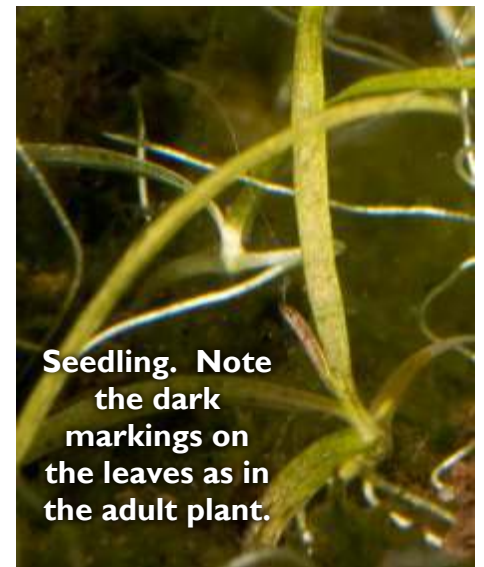
way. After a few days the pod would just totally disappear! Were the rainbowfish eating that too? I know that they relished the white marshmallow insides of *Barclaya longifolia* pods!

I finally started putting a tiny thin raft of Styrofoam under each pod to help prevent rainbowfish from eating the flowers and also help me save the pods and perhaps seeds. What I discovered was that once the seeds ripened inside the pod it disintegrated essentially overnight. The pods had been falling away and the seeds scattering around the bottom of the tank and I could now see the ugly brown mess that was left on the top of each Styrofoam float.

I carefully rinsed the brown rotting pod away from the seeds. They looked like they contained developed seeds which meant the

fertilization process was successful. I also noted that seeds were produced even when I didn't help pollination with my trusty paintbrush.

After removing all of the brown pulp the seeds were put on a bed of white sand in a sealed clear box with a relatively strong LED light above and then I waited. After three weeks no seeds had sprouted. My second try began a few days later. I used a small 6 inch cube aquarium putting a thin layer of dirt on the bottom of the tank and then sealing most of it with a 1/2" layer of white sand. I added about an inch of water and then sealed the top to eliminate as much evaporation as possible. In my greenhouse window it gets a much higher dose of light than I can ever produce in my fishroom with LED's.



Three weeks after this trial Success! The seeds have now sprouted and the plants are about 2 inches tall and just starting to show the characteristic brown spots of the beautiful Okavango color



Translucent Pod Post Flower

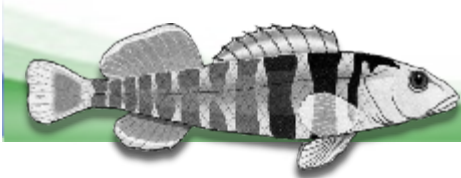


Goo with Seeds



Translucent Pod Pre Flower





Water Hyacinth *Eichhornia crassipes* From Seed

By Gary Lange



Beautiful flower

I'VE HAD WATER Hyacinth in my pond every year for maybe twenty years now as it makes the best "Rainbowfish Mops". The rainbowfish would much rather breed in this than any artificial mop that I could offer them in a pond.

During a "normal year" my Hyacinths often bring a higher bid because people know they may contain some rare and interesting

eggs. With this COVID 2020 year and no auctions I've been doing more to produce some seeds of various plants, both indoors and out, including water hyacinth.

For the Water Hyacinth in particular I would like to grow my own so that I don't have to purchase plants from a pond store each year. Since pond stores often have plants in with goldfish or other fishes that can become a source of potential parasites. I treat as much of the plant as possible with Fenbendazole to hopefully remove



After bloom the flower stalk bends and submerses the seed pod in water.

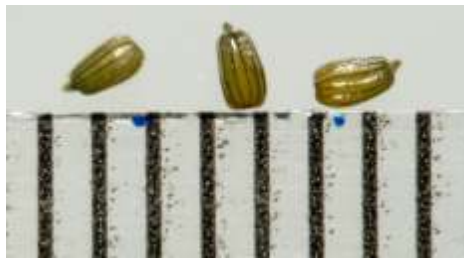


Utricularia gibba intertwined in the roots

those animal parasites. However one pest, the carnivorous plant, *Utricularia gibba*, cannot be removed in this manner. This resulting mass of *U. gibba* is a major source of irritation in the pond some years and if I could grow my own Water Hyacinth I could eliminate this pest too.

I was lamenting to a friend that I never get any seeds from the hyacinth, that the flowers just wilt and die. She said take a closer look as it seemed to her that they were purposely putting the decaying flower stalk into the water. A little reading told me that's exactly what is happening.





After blooming for only a day or two the stalk makes a U-turn and bends into the water. After about a week the stalk starts to decay and at that time I could cut off the stalk and harvest the seeds.

I clean up the seeds and put them on a bed of sand with a layer of dirt underneath and place them in my greenhouse window and hopefully will sprout.

Three weeks later success!
Some of the Eichhornia seeds stay

stuck in the sand so I let them decide when they want to float to the surface.

Other seeds have already floated to the surface but are just underneath the slight film on top of the water. I guess they will have to produce more buoyant leaves or at least jettison the seed covering before they can totally break free.

With a little bit of luck I'll have parasite and U. gibba free water hyacinth blooming again in my pond by summer!



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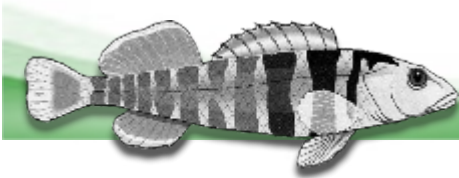
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The DARTER

Pogostemon stellatus

By Gary Lange

THE VARIETY DISCUSSED here is the original thin leafed variety that came into the aquatic hobby as *Eusteralis stellata* although it had previously been named *Pogostemon*.

This plant was moved back into Pogostemon in 1997, already over twenty years ago but can still be seen listed as *E. stellata* on some plant lists. At that time it was kind of the poster child plant for people who had "high tech" planted tanks. That meant lots of light, fertilizer nutrients and certainly CO₂. This species also graced the cover of the 2003 English version of Kasselmann's book.

I had failed miserably with this plant many years ago (early 2000's) when I wasn't using a lot of light on my aquarium. Since that time I have boosted my lighting and also use CO₂ in my seven foot tank. Unfortunately, when initially ready to grow this plant I was only able to find the larger, wider leaved version. This version really doesn't appeal to me though as much as the version with thin wispy leaves.



Pogostemon quadrifolius, often mislabeled as P. stellatus



The wider leaved version supposedly came from Papua, New Guinea so I may have to try both versions as I have a fondness for fish from that island. Another very deep red but also wide leaved version comes from Berry Creek in the Northern Territory of Australia and was discovered by David Wilson in 2018.

Recently I again found the thinned leaved version for sale on the Facebook page "Planted Tank Quick Auctions" and purchased it. The several images posted there assured me that it was the correct plant although I have seen another plant, *Pogostemon quadrifolius*, often misidentified and submitted even to our MASI auctions as *P. stellatus*. Several suppliers and others in the hobby have misidentified *quadrifolius* as *stellatus*. In my opinion *P. quadrifolius*, is as easy to grow as water sprite or *Vallisneria* but *P. stellatus* takes a bit more effort.

Upon receiving these plants I cleared out a spot and simply planted the cuttings with planting tongs- very long tweezers which help

when positioning any sort of stem plant cutting.

My Build My LED™ LED system is multi colored and provide a decent spectrum of light for my plants. The spectra on some lights seem to be better suited for growing algae.

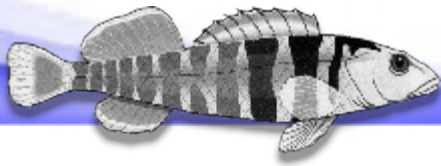
I use Seachem liquid fertilizers although dry fertilizers would do just as well. Seachem does a lot for the planted tank hobby so I support them by buying their products. I use Flourish, Nitrogen, Phosphorus, Potassium, Iron and Trace.

Under these conditions the *Pogostemon stellatus* stems grew and flourished and soon I was cutting them back and making more plants. They are quite easy to grow given the right conditions.

If you have a moderately high tech tank with good quality lights then you should give this plant a try.

Resources: Aquarium Plants by Christel Kasselmann, 2019





Utricularia gibba

By Gary Lange

AS THE SAYING goes "Friends don't let friends drive drunk! My adaption says "Friends don't give friends *Utricularia gibba* knowingly. "

Unfortunately sometime this hitchhiker comes in on some of the plants produced by the aquatic plant nurseries. It came in this year on the Water Hyacinths for the pond and made for a horrible stringy mess. Hopefully our cold winter temperatures will eliminate it.

I have been exceedingly fortunate to get it into only one inside aquarium but it took two months to hunt down every last piece!

Yes, it's a carnivorous bladderwort but I'm not sure if the traps are big enough to catch even our smallest fry, but that's not the point. If you have a large nicely planted tank



this can take over. Questions have been asked on the planted tank pages about how to get rid of this pest where everything from burn the tank, quit the hobby and move have been suggested.

The idea of putting other plants in darkness to outlive this pest was also offered. I tried this with java moss that survives on very little light and *U. gibba* outlasted the low light treatment with Java moss so I'm doubtful the darkness treatment is going to be successful with other more light loving plants.

Removing *U. gibba* comes down to good old fashion patience, keen

eyes and sharp tweezers as the only way to effectively remove it. I would have taken a close-up image of one of the bladders but I was just too grossed out by all of that stringy mess.

The pond was a success in spite of the *Utricularia* as I had lots of *Rhadinocentrus ornatus* fry as well as *Pseudomugil mellis*. I did however not get a single *Chilatherina fasciata* fry.

They are a hair smaller so maybe....

Editor's note: Although Gary mostly covers the nuisance value of *Utricularia gibba* here, it's obvious it is an easily propagated plant. It is also nearly cosmopolitan in its worldwide distribution and is found everywhere in the United States except the Rocky Mountain states and Alaska.

As both photosynthetic and carnivorous plant, *Ug* gets nutrients in two ways: as a normal green plant from sunlight using dissolved nutrients from the water or from the digestion of small microorganisms and protozoans it traps within it's bladders. The organisms trapped are readily digested and provide energy and the major nutrients including Nitrogen and other elements.

To propagate vegetatively, just add water- and it doesn't need much of that! *U. gibba* is a flowering plant but to get it to flower is much more difficult and rarely accomplished.

The stems fragment easily and plants regrow from each fragment like many other aquarium pest plants such as *Najas* or *Lemna* sp. This makes it extremely difficult to get rid of when acquired.

Although the jury is still out if the bladders of *U. gibba* are capable of ingesting any of the smaller fish fry, each bladder opening is ringed with small sensitive trichomes that trigger the

bladder to open and create vacuum when disturbed- similar to the actions triggered by the trichomes of the Venus Fly Trap.

REFERENCE: Wikipedia, Cosmos,, other sources, personal communications.



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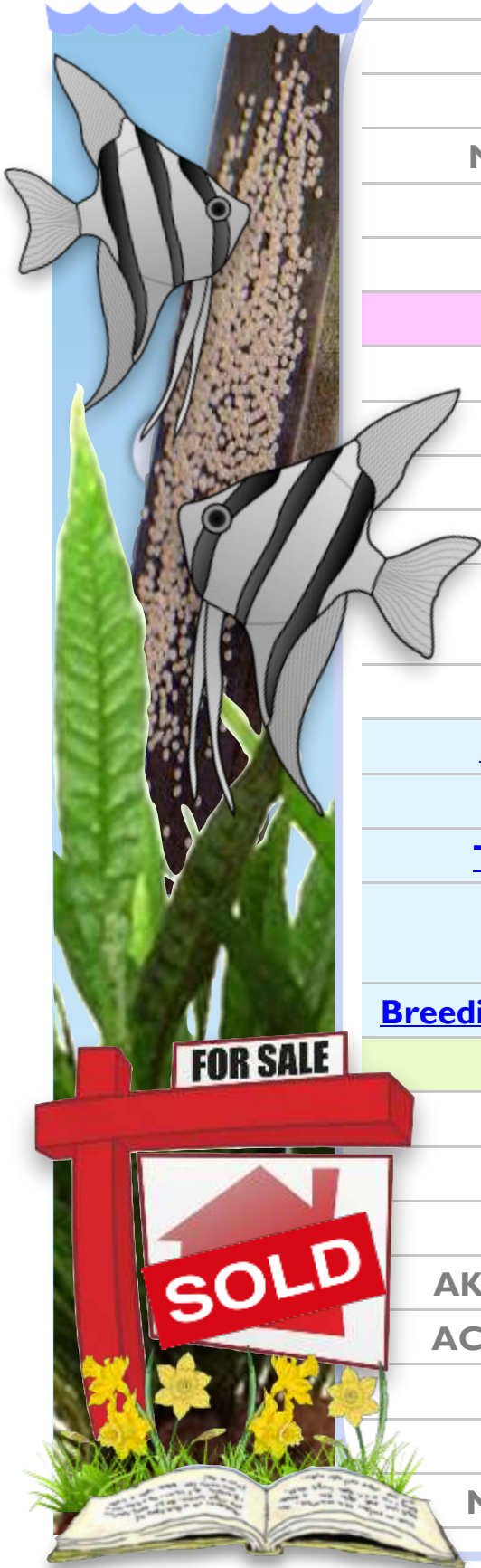
The DARTER



V47#2



March/April 2021

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Ronald D. Huck

Friend and Face of the Missouri Aquarium Society for Many

Born March 9, 1948 - Passed January 11, 2021

Remembrances:

BELOVED HUSBAND OF Jeanette Huck (nee Uebel); loving father of Elissa Huck; dear brother of Randy (JoAnn) and Tom Huck and Debbie Taylor; dear brother-in-law, uncle, great-uncle, cousin and friend.

Funeral Mass were live streamed on St. John Paul II's website, Fri. Jan. 15 at 1:30 p.m. Private interment. Donations to Cardinals Care appreciated. Kutis Affton services.

MASI made a donation to Cardinals Care in Ron Huck's memory.

On January 11th of this year we lost long time MASI member- Ron Huck

RON AND I met many years ago at a MASI meeting. Ron thoroughly enjoyed membership in MASI. He was our membership chair from 2011 to 2017. After that he was our welcoming chairman.

This was the perfect job for Ron. He enjoyed meeting new people and discovering what their interest in our great hobby was. Ron was very sincere in his interest. Over the last year he spent far too much time in hospitals and a nursing home, yet every time I talked to him the first words out of his mouth were "How are You?" It was just like Ron to put others first. I told him the question was "How Are YOU?"

Ron was fortunate to live close to Jim "Junior" Miller. Jim had Ron take care of his fish room while on vacation. Anybody who knew Jim realized you couldn't visit his fish room and not leave with some great plants or fish that he wanted to share with others.

Visiting fish rooms was something Ron thoroughly enjoyed. His own had over 40 tanks operating at any one time. Jim took Ron along on a trip to Chuck Bremer's and Ron couldn't stop talking about how great Chuck's was. Of course he loved visiting Mike Hellweg's, he was like a kid in a candy store.

Ron's favorite fish were emperor tetras and angelfish. He even incorporated emperor tetra into his e-mail address. We will certainly miss Ron and getting to visit with him and talk fish.

Ed Millinger



Meet MASI Fishy Folk - Ron Huck



- **Family members?** There are three members to my family, including my wife, Jeanette, and our daughter, Elissa.



Ron in his fishroom beside the newly conquered Yellow Labs and his next challenge, the *Julidochromis marleri*.

The Face of MASI to new members for over 10 years!

- **Years keeping fish?** I have been keeping fish for 52 years.
- **What was in your first tank?** My first aquarium contained Zebra Danios.
- **How many tanks do you have set up right now?** I have thirty five tanks set up right now.
- **Favorite fish as a pet?** My favorite fish as a pet are marble angelfish.
- **Your dream fish?** My dream fish are black veiltail angelfish.
- **Your dream tank?** My dream tank is a 75 gallon planted tank with angelfish.

55 gallon planted tank with black veiltail angelfish.

- **Your latest fish related accomplishment?** I was able to breed yellow labs.
- **Your latest goal?** My latest goal is to breed *Julidochromis marleri*.**
- **Other pets?** I have a dog and cat.
- **Anything else about you or the hobby you want us to know?**

“I enjoy meeting people and being a member of the Missouri Aquarium Society.”

****Editor’s note:** The last BAP turned in for Ron was the very similar *Julidochromis marleri* at the Parking Lot Swap- 11/8/2020.

In my opinion he attained his goal.



- **Ron’s Pearl Gourami won Best Anabantoid and his Congo Tetra won Best Fish in the 2016 Show**



Ron Huck

THE TITLE FOR this article just never came to me. I mean what could I say? "Ron, MASI asset"? "Ron the friend to all"? "Ron, the man who made it a point to know everyone and make them feel important"?

Ron kept a notebook and pen on him at all times. He told me he did that to make notes on people and situations he encountered. So he could remember. It was a trick he learned from his job in sales. And, he told me it was nice to remember people. If he met you for the first time, he asked about you, and your family. Then when he had time he jotted down what he learned. Not in an intrusive way, just in a way he could remember. The next time he saw you, he could recall your spouse, your kids, and the fish you kept.

Once I had to call him about an urgent MASI matter. He had given me his work number for just such a situation. When I called, the person on the phone chit chatted with me, telling me what a great man Ron was and how "we all just love him". Later, I told Ron that his co-workers held him in esteem. He just kind of "Oh shucks" and waved it off. I really hope he knew how much he was valued at work.

One of Ron's passions were Emperor tetras. If we were discussing ordering fish at Beldt's Aquarium, and Emperors were at a good price and healthy, they were ordered. Mind you, we all liked Emperors too but they were notoriously difficult to keep in a hatchery situation. That did not matter to the Macrums. They would say to us, "be sure Ron knows". They did that for few people.

What always struck me about Ron was his generosity. If he and I were bidding on the same bag of fish and he knew it was me bidding- he would stop. Well, unless he really wanted the fish... But then he would offer me some of the fish later. Or he would promise to give me some once they bred.

His generosity extended to fish knowledge. He never avoided answering



questions about the fish he kept. I got a lot of hands-on info about fish care from Ron. Conversely, he cheerfully asked questions about anything he was curious about. It was always fun talking to him because it was a real conversation. He listened.

Ron made MASI events just a little warmer, friendlier. He greeted everyone like he cared about them. He spoke to people about their lives. And he never cared if they weren't born St Louisians. There was never any "us" and "them". He spoke to kids and adults with the same kindness.

Ron taught me a lot. Especially about listening. Yet, he was so humble, I know he did not know the great person he was. So, the title is how he saw himself. Just plain

"Ron Huck"

Kathy Deutsch



Meeting Ron

SOME YEARS AGO, 10 maybe 15, ...I loose track of time... I was having lunch at the Cecil Whittaker's in Ellisville when a small, bald headed man came in and sat down at the table next to me.

We said hi to each other and exchanged some pleasantries and for the next few minutes, caught each other staring at the other. you could tell we both thought we knew each other from somewhere.

Now I'm not very good at remembering names but once we've met, I won't forget a face and I just knew I knew this man from somewhere. My curiosity got the better of me and as he looked as if he should know me as well, we went about trying to ascertain from where we might know each other.

Our game of 20 questions had begun. First were introductions, sports, addresses, areas we lived in, church, occupations and more but couldn't

come up with anything. Our lunches arrived and as we sat eating, it began to gnaw at me that I couldn't remember where I knew this gentleman from.

And then it hit me! A few weeks prior I had gone to a M.A.S.I. meeting where, you guessed it, a small, bald headed man sat next to me, introduced himself, and welcomed me to the meeting. We sat and talked about fish until Pat Tosi yelled at everyone to settle down (*just kidding, Pat*). Even though I clearly was not (*and still am not*) the aquarist he was, he was genuinely interested.

Back to Cecil Whittaker's... I said to the man, "are you a member of M.A.S.I.?" And of course he replied he was, so I explained to him where we had met.

Through the years, if I ate my lunch late enough, Ron and I would see each other at Cecil Whittaker's and talk fish. I didn't know Ron very well but I will always remember when he went out of his way to welcome me to the club.

He will be missed!

Steve Metzler

Ron Huck

Ron Huck has been around the club for a long time and he has been a friend for almost as long. I'm not sure how long because it just seems like he was always there. Ron's smiling face was at almost every MASI event for as long as I can remember. He was responsible for welcoming new members and he took that very seriously. He gave new members a friendly welcome, talked a bit about their fish, and introduced them to folks in the club who had similar interests.

Ron and I both worked in retail management, so we would commiserate about the weird things corporate would dictate to us, the silly things customers did, the weird things shoplifters tried to get away with, and the strange things employees would do ...or not do. We always had enjoyable conversations about work and I looked forward to hearing his latest story.

Of course, there was always what was going on with the Cardinals, too. He loved to talk about them. I enjoyed hearing his take on the latest trades and on things that happened during the season.

Then of course, there were the fish. Ron's favorite fish was the Emperor Tetra. He was always

disappointed that the local shops wouldn't carry them (they still don't for some reason) so every couple years I would have to make sure to order some for him. When we both had a day off on the same day, he would come over and we would spend time talking about fish, aquarium gadgets, work and the Cardinals. I always looked forward to his visits and to our conversations.

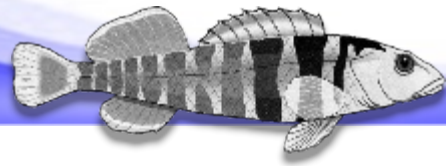
He was so proud of his daughter Elissa. He was always talking about her. I still think of her as the little girl running around the meetings, even though she has grown into a young woman and now graduated from college. I haven't seen her as often as when she was younger, but I still felt like I did because Ron was always talking about her. Ron's last few months were hard on him and on his family. I'm sure he's in a much better place now.

I will miss seeing his smiling face, miss hearing his stories, and miss talking about all the many things we talked about. He always had a joke, an interesting observation, or just a friendly hello and a smile. MASI events won't be quite the same without him.

Rest in peace my friend.

Mike Hellweg





The DARTER

Breeding *Panaqolus* sp. L169

By Derek Walker

L169 IS ONE of the most fascinating species of the *Panaqolus* genus. There are a number species that carry the same pattern and color as the L169, also called the LDA001 or Gold Stripe Panaque.

Planet Catfish reports that LDA001/L169 come from the middle of the Rio Negro. If that is the case this species could come from either of two different waters. At the middle the Rio Negro and Rio Solimões rivers come together creating the phenomenon “Meeting of the Waters” with two different water parameters.



© Loricaridae.info Enrico Richter

The Rio Negro is a blackwater river caused by humic acid- basically the breakdown of organic matter that flows into the river- and has an average temperature of 82 degrees Fahrenheit.

The Rio Solimões has a cream coffee appearance and is known for its rich sediment that flows down from the Andes Mountain. The Rio Solimões has a much faster flow rate and creates the separation of the river when they come together. The Solimões has a cooler temperature of 70 degrees Fahrenheit.

I was able to get a group of four fish, already 3 inches long, from Andrew White. About a week later I lost one for no apparent reason so was down to three appearing to be all

males. I was able to locate more but it would have taken time to get them, however, I found someone who was selling a single fish. When I picked it up I knew it was a female and I had a pair for sure.

Sexing these fish is easy once they reach maturity. Males have large odontodes (dermal teeth) on the interopercula (gill plate) and caudal peduncle. Females have short interopercular odontodes and very small to none on the caudal peduncle.

The group was placed in a bottom 20 long with just a sponge filter, root wood, and a few caves. They were feed all kinds of food but they seemed to enjoy the soft root wood rather than wafers. I kept them in this tank for a while and didn't see any breeding activity whatsoever. After the cold weather arrived my bottom tanks start cooling off in the upper 60's to lower 70's. So I knew it was time to either place a heater in the tank or move them. I decided to move them because I had some Cory cats that needed the cooler temperature.

The LDA001 were moved to a top tank and I tested the bottom tank. The bottom tank temperature was 71 Deg F and the TDS was 280. The PH was around 7.4. After a couple of days I tested the top tank and the temperature was 82 Deg F with TDS of 240 and PH of 7.5. Everything matched except for a much higher temperature.



Rio Negro

Rio Solimões

Photo credit: Terry Feuerborn



One of the plecos did not come out for a week. By looking in the cave I noticed that there were two in the cave- called trapping with plecos. This is when the male traps the female in the cave for a while until the eggs are deposited. This can last up to a week in some species but took the LDA001 about three days.



Male occupying breeding cave

After spawning the male lets the female out and he takes over guarding the eggs. After about 12 days the eggs start to hatch. After four days of beginning hatch the male kicked all the eggs out of the cave which I then placed in a breeder box. This first batch of eggs all hatched yielding a total of 8 fry.



LDA fry before losing yolk sacs

Later the male spawned again with a female which I had thought was a male. After a week with the new eggs, the male didn't kick any of them out and was still guarding them- they remained in the cave with the father. I am not sure how many survived out of that batch as the male kept the fry up in the cave so it was very hard to even see them.

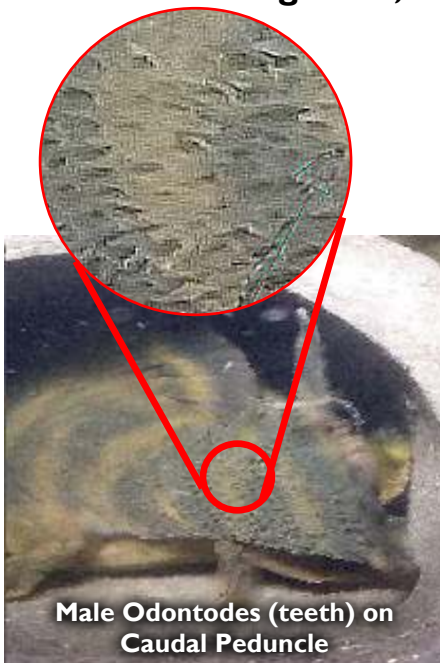
weren't touched either. So I gave them what the parents liked, just a piece of soft wood. I took a piece of root wood and placed it in the breeder box and the fry started to hang on it. The next day the breeder box was full of waste and I had to do a water change- now every day the box gets a water change.

When their yolk sac was completely absorbed, I started to feed the fry. I first tried Hikari carnivore wafers. The fry didn't even touch them and I had to remove them from the breeder box. The same with Marineland shrimp wafers, they



Young LI69 Fry

Sexing LI69, and many Loricarids



Male Odontodes (teeth) on Caudal Peduncle



Female Caudal Peduncle lacks Odontodes

After a month, the fry started to look like the adults and began to develop their tiger pattern. After two months the bellies were nice and fat and the fry looked more and more like the adults.

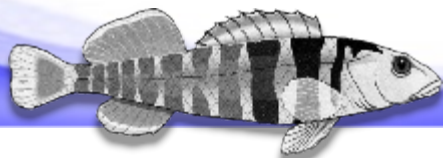
So what was the trigger to get them to spawn? I feel that the LDA001 coming from the junction of the rivers will take a wide range of water parameters but I also believe that cold water to hot water change caused the fish to spawn. Maybe in the wild the temperatures of the waters when they meet has something to do with it.

Sources:

<https://phrynus.wordpress.com/tag/humic-acid/>

<http://www.iflscience.com/environment/what-causes-brazil%E2%80%99s-bizarre-meeting-waters>





Old Tricks from an Old Dog

About My Betta Tank

By Kathy Deutsch

WE WERE ONLINE, watching Mike Hellweg's excellent talk about wild Bettas and I commented in the chat that I cover my betta tank with plastic cross stitch material to keep the betta safe but let air and light get in. Melanie, said she was stealing the idea and if I have any knowledge about this crazy hobby, you are all welcome to it.

This article is about that betta tank, which has been set up since, I think, 2008.

The tank came with an integral filter, and an LED light. The filter has a sponge pad and some carbon in a sack. I rinse both a couple times a year, but:

Check the filter and water daily to be sure it smells and looks ok.

The fastest way to detect a bacteria or fungal problem is by smell. Bettas hide. I cannot always see how he is acting, but a quick look at the water and filter (and a sniff), tells me a lot.

NOTE: the pump on this tank is almost too strong and the current can be so rapid the betta cannot grab any food or relax. I cannot emphasize this too much. Some bettas love the movement; others fade quickly. I lost a lovely betta because he could not grab a



meal. He was shy and the moving water scared him.

When I do my daily check, before I feed, I unplug the filter and turn on the light. In the evening, I see the light, turn it off and plug in the filter. The betta has gone to bed, low in the tank under a plant, so the current swirling about him does not bother him.

The tank is situated smack on my kitchen counter. My criteria: stable temperature, some sunlight, and house activity. Bettas like watching the world go by. Show me a bored betta, and I bet he is ill. I also wanted to keep an eye on the fish, and putting him in my kitchen meant I would see him a couple times a day.

Stable temperature seems to be a key to betta happiness. I used a digital thermometer with a water

probe to check the temp for a couple weeks. Right now, it fluctuates between 69 and 71 degrees Fahrenheit. In the summer, especially with the sun coming in, it will get to 72-75 F.

The bacteria bed is ½ inch of rounded pebbles. It is never disturbed. When I do a water change, I swirl up the water first, which dislodges gunk from the bed and scoop it out in a cup. There are 2 pieces of hardscape: a rock and a nice ledge. They too, are never disturbed unless I am doing a major

clean. Afterward, I put them back as they were.

Most fish need stability, guideposts and touchstones. My bettas have always liked having a rock to hide behind and a ledge to hide under. Most importantly, this area is out of the current and the light -even the sunlight. Most fish crave quiet times after meals and at night. I try to provide it.

Live plants, in my opinion, are as essential as the water fish swim in. They provide cover, company, micro food (fish pick things off plants to eat), and improve water quality. I have a nice Anubias occupying the space by the rock. It's given a wash then snugged back into the rock substrate twice a year.

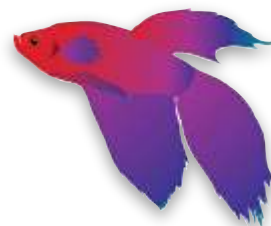
There is a sprig of *Cabomba* near the top where the betta looks for his pelleted food. The cabomba floats in the flow of the water, catching the pellets, bugs, etc. Great betta feeder.

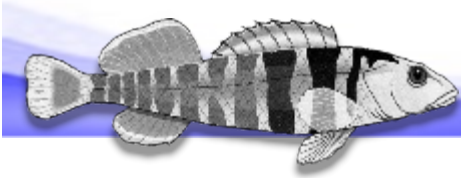
Finally, I do cover my tank with plastic cross stitch material. It has a hole cut in it just about where the light shines down. I poke a spider plant into the hole, with it's base just in the water to grow roots, where the betta loves to swim.

Most fish like plants and use them as feeding stations.

They also hide in them or use them like hammocks. I check the plants in the tanks daily to make sure they are thriving and have good color. Emerged plants like my spider plant provide so much security to the fish that they are worth the work.

In describing my tank and how I keep it going, I have included some things I do to make fish care easier for the fish. I hope these little ideas help you as well.





The DARTER

Minifins

The Kuhli Loach

Pangio spp.

By Mike Hellweg, CFN
(Certifiable Fish Nut)

THE KUHLI LOACH has been a staple of the aquarium hobby for over a Century. Their wormlike bodies covered with alternating black and yellow bands (or black bands on a yellow body, if you prefer) and their ability to wiggle into tiny spaces to chase down morsels of food have endeared them to generations of hobbyists.

Kept in groups, they spend much of the day hiding in small caves or other hideaways, waiting for dusk. Then they pile out of their hideaway like clowns piling out of a clown car. The more, the merrier!

What we call Kuhli Loaches are actually a group of closely related, worm like fishes that are in the family Cobitidae. Formerly in the genus



Subocular spines of a Clown Loach



Pangio sp. © 2008 Hakon



Pangio semicinctus

© Seriously Fish



Pangio myersi

© Seriously Fish

Acanthopthalmus which means "Spine Eye" - named for the spine under each eye that they can flick open in the literal blink of an eye and slash when they feel they are in danger - they are now assigned to the genus *Pangio*.

There are about two dozen species, with about six to eight of them that sometimes come in as *Pangio kuhlii*. This isn't an attempt to deceive, but rather illustrates the fact that many species are similarly patterned enough that they are easily confused. Often

with wild caught shipments you will actually get two or even three species mixed together, though lately most shipments that I've seen are of tiny tank raised specimens only a few months old. Almost always they are *Pangio semicinctus*, the half band Kuhli loach.

The next most frequently encountered is *Pangio myersi*, the giant Kuhli loach, though the term "giant" is relative - they're thicker bodied and maybe a half inch longer



than most other species when they're full grown. In fact, it is likely that the true *Pangio kuhlii* has only rarely been imported, since it is restricted to the island of Java, where little commercial collecting is done.

To have the best chance at spawning them, purchase all of your Kuhli loaches at the same time from the same vendor - that way you'll have the best chance of getting all the same species. In earlier days I think the biggest impediment to spawning these fish was that people only bought one or two at a time, and may have actually mixed species when trying to increase group over time instead of all at once.

Kuhli vs. Coolie

The name "Kuhli" is derived from the name of the early 19th century German naturalist Heinrich Kuhl. Much like the genus name "Betta" has become "Beta", sometime in the early 20th century as the commercial part of the hobby was beginning the spelling "Kuhli" became "Coolie" out of ignorance, though most folks using the term today likely don't know they could be seen as offensive to some. You should be aware this is a racially derogatory term from British Colonial times. **Better left in the past, the use of Coolie should be strongly discouraged.**

Native Habitat

In the wild, Kuhli loaches are found in slow flowing streams, jungle swamps, oxbow lakes and similar bodies of water where there is plenty of cover. They are easily collected in large numbers with bamboo traps, so they likely occur in large groups in the wild. The water is usually slightly acidic, full of decaying plant matter, and is very low in hardness. Often when they first arrive, they are thin and need a few weeks of heavy feeding to fatten them up a bit before they can go into a community tank.

Give them a Home

Almost all of the *Pangio* species like to live in groups and spend a lot of their day hiding in big tangled masses in caves or crevices, so be sure to give them a few caves to choose from. Even so, sometimes they will dig their own hideaway under rockwork, driftwood or even resin or ceramic ornaments.

I've found they really like to hide in the tangle of roots from Anubias plants that are attached to driftwood

and similar features, and they also like to hide in the hollow center of Hydrosponge filters. When I used undergravel (UG) filters in most of my tanks, I kept a lot of Kuhli loaches, and a mass of them could

be found under most of the filters. I would occasionally see them out and about in the evening, but the easiest way to see them was to look up from below the tank!

Feeding

In the wild, Kuhli loaches eat insects, worms, crustaceans and similar fare. In our tanks they will eat flakes, pellets, frozen foods, and live foods with equal gusto. They seem to prefer smaller worms like Grindal worms and white worms, but they aren't too demanding. When work hours demanded I be away a lot, I've had groups of them subsist for long periods of time on nothing but pellets and flakes and be none the worse for it.

Breeding

Kuhli loaches live for about 5 to 6 years, and begin spawning when they are about a year to a year and a half of age. Well fed, healthy adult Kuhli loaches seem to spawn regularly, even in community tanks.

Purchase a group of one to two dozen juveniles all at the same time from the same source, and let them grow up together. You'll know they are ready to start spawning when you see



Kuhli stream in Batang, Indonesia



Two different *Pangio* species from the same shipment



Ball of *Pangio maylayanus*



Female filled with eggs



adult females with swollen green bellies. This is the color of the eggs showing through their belly. If kept in the same tank and fed the same foods, you can assume the males are ready at the same time.

While tank mates are okay, once they are ready to start breeding tank mates will often consume the eggs, so it is best to keep the adults in a tank by themselves.

Set a tank up for spawning with floating plants like water sprite, Najas, hornwort or something similar and with a big bundle of Java moss near the bottom. I often also set it up on a sheet of plastic egg crate about an inch off the bottom to catch many of the eggs that miss the floating plants. Don't pack the tank too full of plants as the adults need room to swim both on the bottom and in the water column.

Continue to feed them heavily with meaty foods. Live Grindal worms or blackworms, frozen bloodworms and brine shrimp, and similar meaty food work best to condition them for spawning. Feed at least a couple times a day for a good week or so before attempting a spawn.

Once the adults are ready, wait until there is a storm front moving through, do a big water change, and wait. The adults can be seen racing up and down the sides of the tank in small groups or pairs.

Eventually, a pair will intertwine near the surface and start splashing across it. The first time I saw this was during a power outage after a storm, and I thought there was something wrong with the fish. It took a little while to figure out what they were doing! After a few false starts, eggs will appear with each encounter.

The eggs float for a few moments, then start sinking. It's a good idea to have some sort of plant matter, with roots, near the surface. Water sprite works well. The eggs will catch on the roots. There are other



contraptions you can make to keep the adults and the eggs separate, but the easiest way is to use a thicket of water sprite, Najas or hornwort floating in the tank as mentioned above. After the spawning event, in which several pairs might spawn at the same time, it is best to remove the adults, otherwise they will hunt and eat most of the eggs.

The fry will hatch in a few days, and can be seen as tiny wriggling

- **Set a tank up for spawning with floating plants.**
- **Feed adults heavily with meaty foods.**

slightly elongate tadpole-like creatures about a week after hatching. They will spend much of the first few weeks hiding in the Java moss, and are likely consuming the microfauna that lives there.

About day 4 after they hatch, start adding microworms or something similar. Be sure to harvest the microworms from both the side and the surface of the culture to get a variety of sizes from newborn to adult microworms. This will ensure that the baby loaches get enough food, regardless of how quickly they are growing. You can also add "sponge grunge" from the sponge filters from healthy tanks. This is covered with ciliates and rotifers, both of which are perfect foods for young loaches. Harvest from a different sponge filter for each feeding and there will be plenty for the first several days.

An easier way?

There are other ways to get them to spawn and successfully raise a few fry without as much work. My first luck with them spawning was when I was keeping fairly large groups of Kuhli loaches in 10 gallon tanks with UG filters and pea gravel substrates. With UG filters, you have to occasionally siphon the detritus from under the filter plate. In the Kuhli loach tanks, when I would do this, I would find both adults and youngsters under the filter plate! Apparently, there was plenty of food for the youngsters, plenty of

circulation, and enough places to hide from the adults.

The first time I found young Kuhli loaches I was shocked. But after a while, it became so commonplace that I pretty much expected it and was surprised when I didn't find young Kuhli loaches. I heard from several other hobbyists at the time that had similar success.

Recent changes in the way we filter tanks has seen the UG filter disappear, but all is not lost. The Hamburg Mattenfilter has become popular. Essentially it is a modification of the UG filter, turning an entire wall of the tank into a filter. Detritus piles up behind the filter plate and should be siphoned out on occasion.

Once while siphoning behind the Mattenfilter in my Giant Kuhli loach tank, I found young Kuhli loaches behind the Mattenfilter! For as long as I had that group of adults, every time I siphoned behind the Mattenfilter I found a couple dozen youngsters.



The Mattenfilter is covered with microscopic life, especially ciliates and rotifers, which along with good water circulation is exactly what the young loaches seem to need. I also let Java moss, Anubias, and Java fern grow on the surface of the Mattenfilter, creating a great, tangled web for catching eggs, too. It turns into the perfect spawning tank, and seems to separate the eggs/fry from the adults without my having to do anything. Give it a try!

Kuhli loaches and their cousins in the genus Pangio are fascinating aquarium residents. Once you learn their habits, even a tank with nothing but Kuhli loaches in it is an amazing thing to observe.

Don't forget to sit in front of the tank and spend time just watching your fish!





Hypsolebias mediopapillatus

“Pindias”

by Joseph
Graffagnino



Reprinted
from:

Greater City
Aquarium
Society, New York, NY
(GCAS) Modern Aquarium
Newsletter
September 2020

MY FRIEND HARRY Faustmann is my main contact for killifish, especially annuals. He contacted me that he had extra *Hypsolebias mediopapillatus* “Pindias” and asked if I wanted to try them.

I rarely turn Harry down, because his killies are spectacular. At the next Greater City Aquarium Society meeting he brought me a bag containing two pairs of these peat-spawning little beauties.

I took them home and placed them in a 10-gallon tank. The water temperature was 75 degrees with a pH of 6.5. I generally use wonton soup pint containers, but I thought this particular species would do better with a deeper pot and additional peat, so I exchanged the plastic container with a 6-inch flower pot. I fed the killies frozen bloodworms or live blackworms daily. I perform weekly water changes of 25%.

After a month I took the peat out of the clay pot, used newspaper to remove most of the wetness until the peat was just slightly moist. The peat moss should be moist enough to feel wet to the touch, but not wet enough to allow water to drip when squeezed. I



then placed the peat, hopefully with killi eggs in it, in a plastic fish bag. Many killi keepers use styrofoam boxes to hold the egg bags for consistency in temperature and humidity.

I labeled the name of the species and date collected, and stored it in a crawl space in my basement. This is the coolest part of the house, and it stays around 70 degrees Fahrenheit. This species requires a minimum of three months for the eggs to incubate and the embryos to mature.

I let them stay for four months, because previously I had tried to hatch the eggs in three months with poor results. On the fourth attempt at collecting the peat and storing the eggs it worked; previously nothing had hatched. When I added the peat to a small plastic container with water from the parents' tank I saw 50-60 babies pop their heads up and swim within 24 hours.

It's important to get the babies out of the original peat they were hatched in, because if left in that environment they often get oodinium. The hobbyist can't see the oodinium on the babies because they are too small and the fry die off fast. Oodinium is a genus of parasitic dinoflagellates. Their hosts are saltwater and freshwater fish, causing a type of 'velvet' disease (also called gold dust disease). The host

typically develops a yellow or gold 'dust' scattered on its head, fins, and body. At this stage, the infestation is already severe.

I moved the fry into a 10-gallon tank, half-filled with water from the parents' tank. The aquarium was bare bottom with only a small sponge filter. The water temperature was 75 degrees Fahrenheit and the pH was 6.5. The fry were large enough to take newly hatched brine shrimp and frozen brine shrimp when live food was not available.

They grew quickly. Daily water changes of 10% kept down the nitrates and ammonia levels (from rotting food and fish waste). Frequent partial water changes enable killi babies to grow faster. After a few months I was able to share the babies with the other local clubs that I belong to. It's good to share your successful spawns.

The species *Hypsolebias mediopapillatus* was recently discovered by Costa in 2006 (as *Simpsonichthys mediopapillatus*). Costa renamed it *Hypsolebias mediopapillatus* in 2016. This species comes from northeastern Brazil and is found in the Rio Sao Domingos drainage.

If you are looking for a new annual “peat spawner” killi, I suggest you try these little beauties.





Breeding Japanese Medaka Ricefish

a.k.a. The Easiest
BAP Points Ever!

By Jill Bridges

Reprinted from:

Atlanta Area Aquarium
Association
(AAAA) Fish Talk
Newsletter
June 2019



SOME OF YOU may remember that I ended up with some tiny hitch hikers after the Fall 2018 AAAA auction.

For about two months, I had no idea what these little fish that hatched from some moss I bought could be. When blue eyes appeared around week six, I thought for sure I had lucked into some *Pseudomugil* fry, but some helpful rainbowfish experts correctly identified my half inch babies as ricefish. Since then, I've had excellent luck with raising more, and they have become one of my favorite fish.

Japanese Medaka Ricefish (*Oryzias Latipes*) are a nano fish that top out around an inch in length. They are one of the most commonly used fish in science, and have even successfully spawned in space!

The most popular variety are the orange medaka, with both males and females showing excellent coloring when mature. Sexing them is a bit difficult for me until the obvious eggs appear, but it seems that in my stock the males have slightly larger anal fins than the females. They spawn before



the fin comparison is possible, though, so it is best to keep a sizeable group together.

When ricefish spawn, the female expels the eggs on a sticky thread.

They gather around her anal fin or trail behind her in a line. She'll carry them around for some time, until the point they get annoying, I imagine, then find a suitable clump of java moss, water lettuce roots or other suitable plant and wiggle between the fine leaves. As she does this, the eggs are transferred from her to the plant.

In my experience once the eggs are deposited, they are ignored by both males and females in the tank. The eggs take two full weeks to hatch. There are two methods that work equally well, and are a matter of personal preference. The more popular method is to move the adults from the tank and raise the fry in the spawning tank.

Because they are daily spawners and the fry grow very slowly, this means that you'd need quite a few tanks to maximize your results. Since I can't seem to keep a tank empty for long, I prefer the second method. I grow water lettuce and java moss in my other tanks, and on the 13th day I pull the egg covered plants and put them in a large pickle jar. I replace them with

new plants and moss, and keep the parents in place.

Older fry will torment younger fry, so until they are about a half of an inch long I keep the spawns separated. I currently keep both the orange and the "galaxy white" varieties, and have their plant rotation synched so that I can use less jars for grow out.

I feed the fry golden pearls and Repashy power (from the jar, not prepared as a gel) until they are big enough to accept microworms and baby brine shrimp, which is typically around 2-3 weeks of age.

I do not use any heaters in my ricefish tanks or hatcheries. They do fine in my soft water, which is typically below 6.0, but seem to do fine in a variety of water types from the research I've done. I feed mine Hikari micro pellets as a staple food, and live BBS or daphnia as an occasional treat.

They don't need much in the way of filtration, and aren't messy fish. Frequent water changes and some plants and they are happy as can be. Other than moving plants from one tank to the next, they are completely hands off.

These have to be the most simple, no fuss BAP fish I've raised so far.



HORTICULTURE AWARD PROGRAM



Ceratophyllum demersum

My experience with Hornwort- *Ceratophyllum demersum*:

I been growing plants in my aquariums for about 10 years now and never had grown hornwort before. So, when I got a small bag of Hornwort at one of the MASI meetings, I was curious to see how it would grow in my tanks. Looking back now, I think it has to be one of the easiest plants to grow.

I brought it home and left the bag on my desk for a few days before remembering that I had it. Because I was in a hurry, I just tossed it in a tank to float with intentions of planting it in the substrate when I had more time.

Fast forward a month later and it had grown enough to start crowding out the small 10-gallon tank!

I now have it in a couple different tanks and it provides great cover for small fry, but also grows so fast that I end up having to throw away large portions of it on a regular basis.

I have read that it inhibits algae growth, either through releasing some chemicals or just through absorbing excess nutrients. So, I'm just now starting an experiment with another tank that has algae to see if there is any improvement.

Brian Woodrick



Vallisneria sp. Jungle Val
MALE flowers - rarely seen

MALE Bloom
Inflorescences



Chuck Bremer

Actual
Male
Blooms



Hymenocallis liliiflora Texas Spider Lily Bloom to Seedling



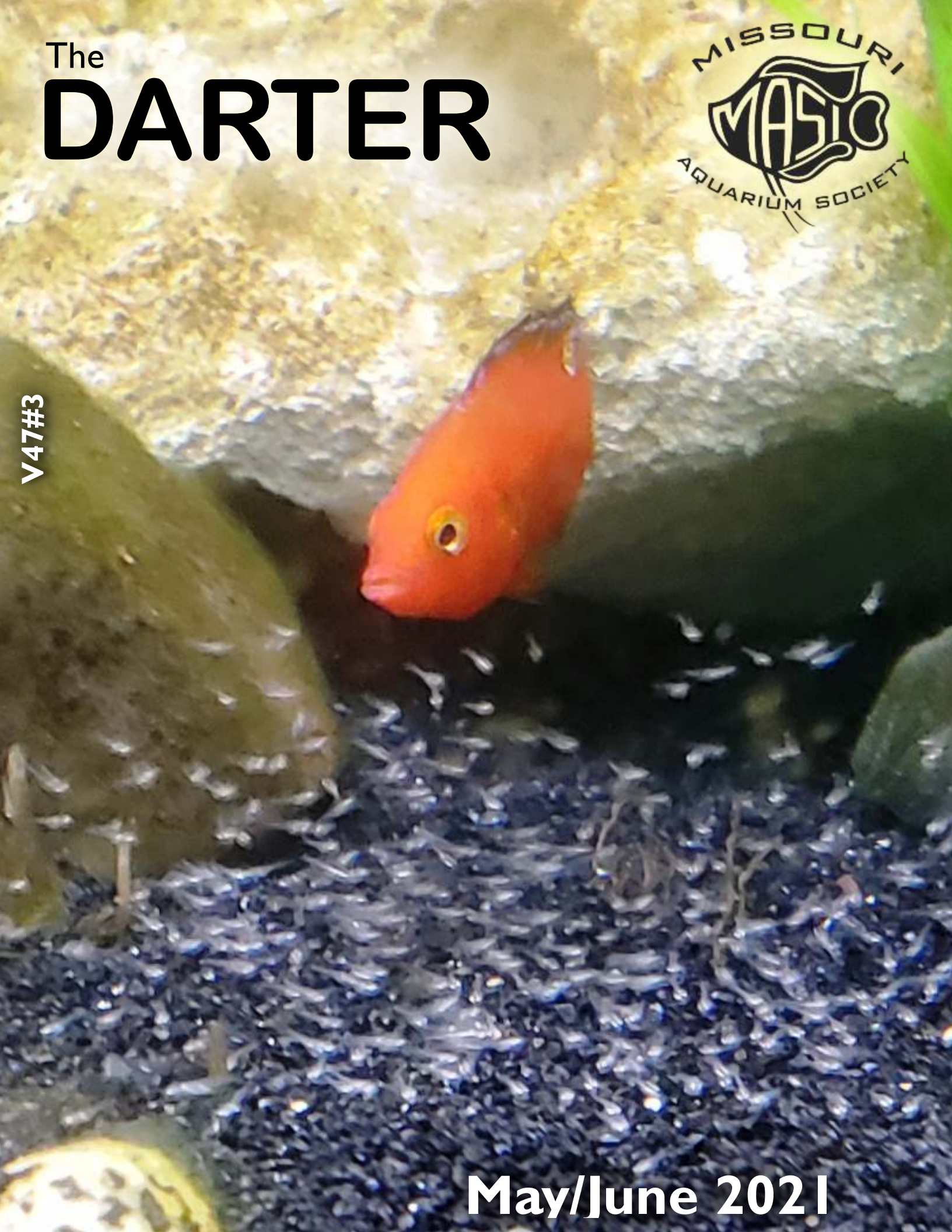
Chuck Bremer



The
DARTER



V47#3



May/June 2021

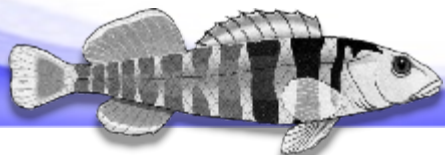
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The DARTER

New Art by *Kathy Deutsch*



NEW on MASI's YouTube Presence

Go on over, look around and get acquainted. Subscribe for notice of new videos as they're posted. The Missouri Aquarium Society's Webinar happens here!

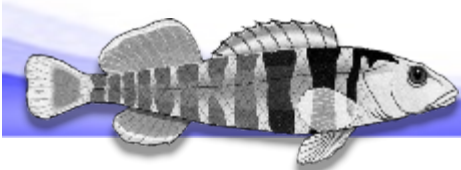
Jake would be glad to give other members a chance to see your Fish Tanks. Just let him know.

Go there easily anytime by using this easy to remember link:



[TinyURL.com/MASI-video](https://www.tinyurl.com/MASI-video)





When is a Jewel not a Jewel?

Hemichromis exsul, the Lake Turkana Jewel Cichlid

By Steve Edie



EVEN OF THE twelve described *Hemichromis* species are fairly well known in the hobby. All are riverine species of West Africa from Guinea to Angola, and live in soft acidic waters. All are aggressive, some very much so.

But *Hemichromis exsul* does not fit that pattern, in fact the opposite. It is found only in Lake Turkana (formerly called Lake Rudolf) in Northern Kenya and Ethiopia. It is the world's largest permanent desert lake and the largest alkaline lake. The pH levels are in the high 8's to the 9's.

***Hemichromis exsul* doesn't fit the usual Jewel pattern... in fact just the opposite!**

Temperature runs from the mid to high eighties.

The name *exsul* means "expelled" in that is dramatically removed from the range of all other *Hemichromis* species. Although this species was formally described in 1933 it has only been seen in the hobby within the last decade.

Given their extreme habitat they are quite comfortable in the home aquarium at a pH of 8.2 and a temperature of 80 degrees. Tank had black sand substrate and various rocks and cichlid stone caves.

They are enthusiastic eaters and will take any standard aquarium fare.



The Desert Lake habitat is unlike the usual Jewel Riverine habitat.

© Wikipedia

© Wikipedia





Female with fry



Juveniles, already outgrown their stripes!



Male in Breeding colors



Female in Breeding colors

They are very non-aggressive, especially considering that they are in fact Jewel Cichlids.

Normal coloration is generally maroon with blue spangles in the fins. Males are much larger than females. Males mature at about 2 1/2 inches; females at 1 1/2 inches.

When courting they turn orange and the blue is less visible. The female seems to be the aggressor for spawning and pops a bright cherry red orange and constantly courts (stalks) the male until he also turns orange and they settle down to business.

The eggs are placed rather secretly, once in a pit behind some

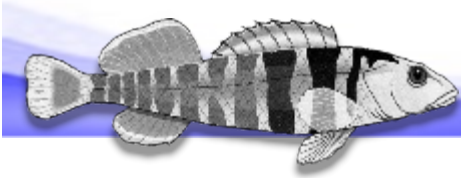
rocks and another time in a cichlid stone cave. Once the fry are free swimming they are herded around in a fairly tight group and other adults in the tank are driven away, but with no damage inflicted.

The spawns number well over a hundred. The fry grow very fast and they do display one common characteristic with the rest of the genus. The juveniles show a black horizontal stripe for a couple of months before assuming their normal coloration.

The fact they were prolific spawners, are attractive, and are not aggressive would seem to indicate they will be a popular fish in the hobby in the coming years.

Photos by the author unless otherwise noted.





The Dwarf Banded Loach

Micronemacheilus cruciatus

-

By Charles Harrison

MICRONEMACHEILUS CRUCIATUS, PREVIOUSLY known as *Yunnanilus cruciatus* is often called the Dwarf Banded Loach. This species is traded under various names including 'Vietnamese multi-banded zebra loach', 'hovering zebra loach',



Male, by author

'Laos pygmy multi-stripe loach', and 'dwarf banded loach'.

I found these fish at the 2019 Fall Swap Meet in Mike Hellweg's bags of fish. After recently successful getting fry from the Hill Stream Loaches I wanted to try my hand at another. Mike had 5 of them in a bag and I took them home to set up and try my fish room settings on them to see if they might like it. They were a little less than an inch and I figured I would start with a 5 gallon and see if they would grow out of it.



Female © Michael Wright

They are lively little fish seemingly unafraid of anything. I started them on Brine Shrimp (artemia) and Grindal worms which they took to at once and cleaned up the black worms with relish. So, things were going great for a while except for an infestation of hydra somehow introduced into the fishroom that I chased from tank to tank with Flubendazole for 6 months.

I fed the little Loaches and changed their water and just kept things maturing for 8 months to a year with nothing new but cute little banded fishes. The adults were seen mostly in front and had grown to a little over an inch.

The males and females are easily distinguished by their body type. The females are deeper bodied and rounder and a little longer than the males. The males also show their bands brighter and more distinctly than the females. There seems to be a spot in the center of the male's caudal peduncle which is clear in the females. Distinguishing the males and females in the adults is relatively easy.

My fish room is kept in the mid 70s and the tanks stay somewhere between 68 and 75 °F. I change as



Yunnanilus cruciatus is known to occur in many of the coastal rivers of Vietnam





above mentioned Hydra in the tank. No wonder I never found fry!

I added a second spawning mop after treating the Hydra. There are now two 10"-100 strand spawning mops in the bottom of their tank.

In December 2020 the fish were over an inch and the females were round and full of eggs for sure. There are a dozen+ Ramshorn snails in the tank. The fish don't seem to bother them and before long there were a few

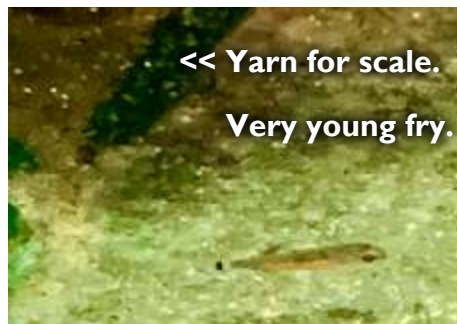


much water out of all the tanks as often as I can and usually that means about every 2 to 3 weeks each tank gets a 90% water change. That was true for the Loaches as well.

I don't use R.O. water or treat in any other way except with Sodium Thiosulfate to remove the Chlorine. This is St. Louis tap water so the hardness ranges from about 120 to 200 ppm and the dissolved solids give me a conductivity meter reading at the time of this writing of 275. The pH is 8.75 in my 55-gallon barrel of holding water and the pH in the tanks ranges from 6 to 8.

When purchased I assumed the fish were about a year old and figured they would be breeding size and age. There was a bunch of Anubis growing in the tank as cover but not enough to hide eggs so I added a 10" 100 strand

spawning mop. It was placed in the center of the tank and pushed the plant clump to the back leaving a clean floor for feeding, etc.



very small, long fish fry picking at the BBS in the front of the tank. Lifting the mop strands exposed a clear 2 mm egg and one fry with the egg sack still attached on the bottom of the tank so I dropped the mop back down and gave the tank a fresh change of water.

These loaches are egg scatterers, laying a few eggs randomly with seemingly no parental care. There is no cluster of eggs and no nest. The loaches don't bother the snails, unlike other species, but are definitely carnivores. Staple foods included BBS, Black Worms and Grindal worms. Adult 2+ year old fish are easily sexed. The females have a more rounded body and less prominent stripes. Both sexes are about 1.5 inches long.

A sponge filter keeps the water moving. I began feeding a little more BBS to the tank because if there were any Loach eggs the fry hatches would need food. At that time I found the



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The DARTER

Missouri Native Plants for Aquaculture

Juncus effusus

Smooth rush, Common rush, Soft rush, Geddy Lee plant, etc.

By Micah L Issitt

K **KNOWN BY MANY** names: Common rush, Soft rush, Geddy Lee plant, and many others, *Juncus effusus* is known locally as the "smooth rush" and is an amazingly handy and interesting plant with many uses in the pond, tub, or aquarium.

Smooth rush is not typically a feature plant in the water garden, but the rush's spikey green stems and dense tufts provide architectural interest and structure that benefits many types of fish and other aquatic denizens.

More specifically speaking, the plant in this focus is *Juncus effusus*, varietas *solutus*. Varietas, or "variety," is a taxonomic category which is below genus, below species, and also below subspecies, but just above "form," the very lowest, oft-ignored rung on the taxonomic ladder. Members of a variety are, essentially, specimens that vary enough from other closely related members to constitute a unique type, but lack specific traits that would justify a new subspecies or species. It's like a very



© ALP* Growth Habit



Root System © ALP*

close cousin, who lives with you, and is almost a sibling.

The family to which *Juncus* belongs, the Juncaceae, was first described by Carl Linnaeus, the famed Swedish botanist often called the father of botanical taxonomics. He formally described the genus *Juncus* in 1753 and used a version of the Latin word "*jungare*," which means to bind, a reference to the plant's horticultural history.

Members of the Juncus genus have long been used by indigenous cultures around the world as a substrate for weaving. In North America, a number of Native American cultures used juncus stems to weave baskets and, in Japan, an Asian *Juncus* species is used to make tatami mats.

The species name for the varietal found in Missouri, "*effusus*," means loosely spreading. This particular species was one of many described by

Merritt Lyndon Fernald (1873-1950) who, in addition to having a distinctly old-timey sounding name, also wrote two editions of Gray's Manual of Botany, one of the early "holy grails" of plant science.

In English speaking countries, all the Juncus plants are known as "rushes." They resemble grasses, but are not closely related. The smooth rush grows in clumps that can reach over a meter high at full maturity. The leafless stems are cylindrical and feel hollow, though actually filled with a spongy pith. They are quite smooth to the touch, as the name suggests. Each stem ends in a point, such that the plant's stems look a little like green



© ALP* Crown



porcupine quills, though not nearly as sharp. *Juncus* will poke, but not impale you.

If, after planting smooth rush, you find you really don't like it, you can burn it. You wouldn't be the first. People have been burning rush for hundreds of years. In the colonial era, smooth rush was harvested to extract the pith from the stems, which they mixed with animal fat. This was then used to make these unique little lights for the home, known as "rushlights," which were said to be longer-lasting and cleaner burning than traditional candles.

The family Juncaceae is interesting from an ecological perspective, because the plant is, as ecologists say, "cosmopolitan," having a more or less global distribution- not that it utilizes private jets when traveling. "Cosmopolitan" is the polar opposite of "endemism," when a species is highly specialized and lives only in a narrow ecological niche.

Why are the Juncaceae cosmopolitan? Did humans carry some ancestor of this plant around the world before recorded history, permanently and dramatically altering their planet in the process? Probably- Yeah. The other answer is generality. Cosmopolitan plants and animals are



Inflorescence

cosmopolitan because their "niche," which can be thought of as the sum of an organism's "job" and relationships with other species and their environment, is generalized. Like humans, *Juncus* can survive in a wider variety of places and spaces, so long as their basic needs are met.

The variety of *Juncus effusus* found in Missouri is found all the way from southern Canada to northern Mexico, but is only found in large numbers in the eastern half of these nations.

The plant colonizes bogs and wetland habitats, but is also widely used by humans to anchor the banks of ponds or streams. *Juncus* is one of those rare plants that can truly be used in a wide variety of places. The plant is quite happy in a rain garden where it will soak up water from any downpour, but might get relatively dry between rains.

Smooth rush can also be used right on the edge of a pond, in dry but frequently flooded soil. Here, smooth rush will spread and expand, forming a dense screen of green that surrounds the pond. The plant does just as well in the pond margins. Planted up to 15-20 cm (6-8 in) below the surface, smooth rush thrives, where it's quill-like dark green stems look stunning rising from the surface of the water.

The primary horticultural use of smooth rush is as a decorative architectural plant. The species produces no showy flowers, but the smooth rounded stems, which flush out deep green, provide a clean backdrop for any wetland scene. In the summer, each stem produces an "inflorescence," a bunch of tiny flowers and fruits. Unusually, the plant's inflorescences emerge from the side of the stem, rather than the tip. Little brownish white flowers dangle from the inflorescences and pollen is carried by the wind. When in flower, stands of rush take on a hazy appearance, seeming to glimmer in the sunlight.

We plant smooth rush on the margins of all of our ponds and in the drainage ditches we create to direct overflow from the ponds and tubs. Smooth rush is an excellent rain garden plant, soaking up any available moisture and helping clean the water that makes its way to municipal sewage systems or other drainage areas. We also use smooth rush in the ponds, planted in containers, preferring to use smaller containers, up to a gallon, which forces the plant into a slightly more compact shape.

While *Juncus effusus* is wonderful in a pond, the plant is also very useful

for container gardening and tubbing. A small clump of smooth rush provides height and structure and a different texture when displayed next to leafy plants.

One benefit of the smooth, cylindrical stems is that duckweed (*Lemna* spp.) will not stick to them, and can be rinsed off far easier than from leafy plants. The dense stands of stalks are also excellent for fry and shrimp, providing many tiny nooks and crannies to escape predators. Dragonflies and damselflies often perch on the erect stems as they plot their pondy crimes.

One of the more interesting ways to use smooth rush is in the indoor aquarium. For those interested in open top "pond style" or "bon-style" aquariums, smooth rush is an excellent choice. Planted into banked soil, or even tucked between rocks with no soil, smooth rush will remain green and will grow well under a grow light. The plant will not gain the same thickness or density as when exposed to strong, direct sun, but I have used smooth rush in many indoor ponds and aquaria to great effect.

Pond experts often say that smooth rush should be chopped back in the winter, and then placed on a lower shelf in the pond to overwinter. I don't bother with this but leave the stems on the rush through the winter. As they die off, the dried stands provide hiding places for hardy creatures and create winter interest for the pond. There is a stark beauty to these faded straw-colored stalks in an icy pondscape.

Repotting, once a year, will produce more vigorous plants. Instead of trading up for a larger



Juncus effusus* var. *spiralis



container, I like to pull the rush out of its pot and divide it. Dense roots and rhizomes mean that it might take some effort to cleave the root mass, but the plant can be spread quite thin and will often come back. For planting, I use a 1:1:1 mix of sand, grit, and clay soil, from my garden. Low nutrient aquatic soil, or clay soil is best. I use a sand cap on top, and put it back in the pond in early to mid-March. New stems come up in April and the plant will reach its full glory in June.

As far as wildlife is concerned, soft rush is, like any other stemmy plant, great for American toads (*Bufo americanus*) and southern leopard frogs (*Lithobates spinocephala*), as the plant provides a place to anchor masses of eggs. Several semi-aquatic birds and mammals have been known to utilize parts of the plant for food and we have witnessed field mice climbing

up through the interior of a clump of rush like furry little mountaineers to snatch the seeds and fruits hanging from the inflorescences. -Obviously, this is awesome!

The full grandeur of this plant is revealed when displayed alongside other native marginals or peripheral plants. Smooth rush looks great intermixed with similarly architectural plants, like *Equisetum hyemale* (horsetail), or alongside leafier plants, like *Thalia dealbata* (hardy canna) or Arrow arum (*Peltandra virginica*). In the wild, smooth rush is often accompanied by terrestrial plants that like slightly moist soil.

Using these plants around the pond, next to one's tubs, or in pots alongside water gardens, allows recreating a Missouri wetland scene. Plants that work for this purpose

include our native *Iris versicolor* (blue flag iris), or the wonderfully unusual *Nothochelone nemorosa*, or "false turtlehead," which produces flowers that are supposed to look like a turtle's head. ([See the Great A'Tuin! A Terry Pratchett SciFi reference from Discworld](#))

In addition to visual appeal and utility as an architectural plant, smooth rush offers a unique tactile dimension.

Walking by one's ponds or tubs, and running one's fingers across the stalks of the rush, one will find that the stems do not brush aside like the leaves of grasses, but offer a little resistance, springing back when bent, making smooth rush **an excellent candidate for "best plant to run one's fingers through,"** which should be a category at any plant show, though it often is not.

PHOTOS: © ALP* = Adrienne Legault Photography.



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The DARTER

Missouri Native Plants for Aquaculture

Thalia dealbata

Hardy Canna,
Powdery Thalia,
or Powdery
Alligator-Flag



© Botanix



© Gateway Garden Center

By Micah L Issitt

THALIA DEALBATA IS a wonderfully unusual aquatic plant native to the Mississippi Valley, from northern Illinois all the way down to northern Mexico.

The plant was formally described by John Fraser (1750-1811), the famed Scottish botanist who collected plants for Catherine the Great, Empress of the Russian Empire. Fraser described this unique species in 1795, and named it after botanical

legend Johannes Thal (1542-1583), famous for his exploration of the Harz Mountains in Germany, published in 1577. The book was the first European text on plants to include all the plants in a region, rather than only ones that had commercial or medicinal uses.

Thal's namesake genus, *Thalia*, is part of the Marantaceae family, also known as the "arrowroots," or "prayer plants." The family includes a number of very popular tropical houseplants, including the eponymous prayer plant (*Maranta lauconeura*) and the painterly-leaved *Stromanthe triostar*. In the commercial domain, this family is also home to *Maranta arundinaceae*, or "arrowroot," a food crop that's been cultivated since at

least the 9th century BCE and is still eaten across South America.

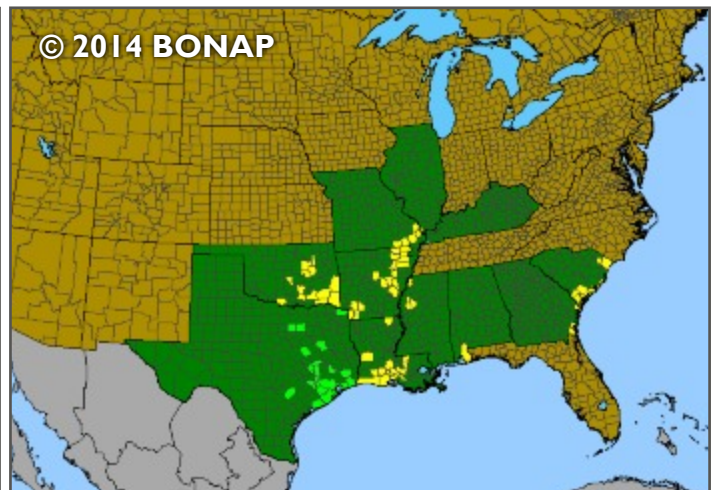
Another thing you will never need to know is that all the plants in the Marantaceae share an unusual pollination mechanism. When a pollinator lands on the flower, and touches the hood above the stamen, it causes the style of the plant (the stalk that connects the stigma to the plant's ovary) to quickly shoot out, coating the visitor with pollen. This is what's known to botanists as an "explosive secondary pollen presentation," and it is one of the fastest examples of plant movement ever recorded.

Thalia dealbata is also known as "hardy canna" because it resembles



Maranta lauconeura

© ALP*



© 2014 BONAP





the ever-popular tropical plant known as the canna lily (*Canna* spp), which is not really a lily, but belongs to its own unique little family of only ten species. The leaves of *Thalia* are lanceolate (shaped like the head of a lance), also true of the *Canna*, which has larger, broader leaves. Unlike the *Canna*, however, *Thalia* does not extend into the tropics and it prefers cooler winters, through which it goes to sleep and may dream of explosive secondary pollen presentation.

While *Thalia* will grow in any loamy soil, it does best when submerged, growing from 6-10 inches under the surface. The leaves are bright green, with a light blue sheen, and rise on thin stalks holding the leaves aloft above the water. The alternating leaves create a wonderful architectural contrast with the background, making *Thalia* an attractive plant for creating large stands in a pond.

***Thalia* grows as tall as 1.5 meters**- much of that height in the plant's flower stalks which grow high above the foliage. Each stalk ends in a panicle (basically a cluster of reproductive structures) that puts out oddly-shaped little purple flowers. The flowers dangle down on zig-zaggy little tendrils looking like something that might appear in an episode of *Star Trek* in the 1970s- Weird, but cool.

Tall tropical looking leaves and this bizarre panicle of flowers look amazing reflected in the water of a pool or pond and the gentle green leaves are a wonderful contrast for many fish viewed from above. The cluster of stalks that develops at the base of the plant provides a convenient hiding place for fry or small fish and often

become entangled with toad spawn in the spring.

Thalia can be placed into a pond or tub in March. The plant doesn't really start growing till the temperature of the water in the tub or pond reaches around 15c (60F) or above, but it can sit out earlier and will slowly put off roots on warmer days.

Though some recommend dropping the plant to a depth of 60-70 centimeters (roughly 2 or so feet) during the winter, to avoid frost, I've never found this plant to be particularly frost sensitive. In fact, I've had *Thalia* freeze in a block of ice and still come back in the spring. So, you can put it out far earlier than any tropical plant and allow it to gradually, slowly acclimate to the warming weather.



Preparing *Thalia* for the pond or tub is easy. I use a mixture of sand, pebbles, and soil, in a 1:1:1 ratio. Low nutrient soil is what you're after. I use St. Louis clay, with a little bit of loose soil from the topsoil layers mixed in. I cap the top with gravel before sinking the plant. Pot them in terra cotta or in leftover plastic pots- anything really.

The plant will grow significantly in a season, so plant in a larger container than you think might be needed. However, constricting the

horizontal growth does have advantages for fish keeping. When growth is constricted, roots emerge from the top and bottom, often forming a dense network. These clusters of roots provide excellent cover for fry and small fish and allow frogs and toads to climb to safety. My *Oryzias* and *Tanichthys* will deposit thousands of eggs in the overflowing roots in the summer, and the tiny fry will hide amidst the roots as they grow.

Young *Thalia* make excellent plants even for smaller tubs, 30 or 40 gallons, where it will be a feature plant by the end of the season and take up significant space. On the pond's margins, rows of *Thalia* can be used to form a dense network of leaves that serve as a wonderful hiding place for tadpole frogs and toads, fish fry, and other little creatures.

Perhaps the most unusual thing about *Thalia* is that the plant's explosive pollination mechanism and strangely shaped flowers, mentioned above, have an unexpectedly deadly side. In Missouri, *Thalia* is pollinated by carpenter bees in the genus *Xylocopa*, such as *Xylocopa virginica* (the eastern carpenter bee).

Carpenter bees are large and powerful (for bees) and are capable of obtaining the flower's nectar without problems. However, many smaller pollinators, especially flies, get stuck in the flowers when the explosive pollination occurs. They are essentially pinched between the nectar-containing cavity and the hood. Lacking cell phone service to call for help, they often die. The panicles of purple flowers, each dangling from a little zig-zag stem, and already looking very otherworldly, take on a positively macabre aspect with the dead bodies of flies and small bees dangling from their ends.



Thalia is not carnivorous, though perhaps it would be better for the plant if it were, given its penchant for accidental insecticide. However, the plant's death toll was so concerning to some British gardeners that they tried to get Thalia banned in the 1990s out of concern for their pollinators. This illustrates one of the primary problems when growing exotic plants, if local insects don't know how to utilize the plant, the species may be dysfunctional and disruptive within an ecosystem.

In Missouri, this is not a concern. Yes, your plant will murder a few insects, but the native insect species of Missouri have evolved alongside Thalia for hundreds of thousands of years and many of our native bees know perfectly well how to deal with the plant. For those rearing larger fish, or insectivores, give the panicles a shake from time to time. You might dislodge some unfortunate insect corpses, which may provide an extra protein snack for your charges.

I do not consider Thalia one of my "core" pond or tub plants, but it makes an awesome substitute for canna lily or other non-natives. Thalia works extremely well when trying to create a "tropical look." Such as having fancy guppies or gourami and wanting to get a jungle feel. There are many exotic plants that can be used for this purpose, but, as a native plant, Thalia will be more robust and, unlike many of the tropicals, provides a benefit for wildlife.

Carpenter bees are a most important part of our local pollinator community, pollinating more plants than honey bees, butterflies, and



Acorus calamus - sweet flag



Pontedaria cordata - Pickerelweed

moths. All Missouri residents are encouraged to hang or post carpenter bee "hotels," where the bees will place larvae in the early spring. For those frightened or allergic to bees, carpenter bees need not worry you. They do not sting, are solitary animals and do not swarm - pretty much harmless in every way. They will bite if you grab them. So...don't grab them- Don't grab bees at all.

The full effect of Thalia is achieved when the plant can be seen in the company of other community plants. *Pontedaria cordata* (pickerelweed) and *Acorus calamus* (sweet flag) work particularly well alongside *Thalia* in the pond or tub. Outside the pond, or surrounding the tub, you can plant or pot native flowers that like moist, but not wet soil. *Monarda fistulosa* (bee balm), *Rudbeckia fulgida* (orange cone flower) and *Helianthus angustifolius* (swamp sunflower) make excellent companions.

Though murderous and bizarre, is an excellent choice for Missouri aquaculturists, either on a large or small scale. After planting in March, you can expect full leaves in April or May, then flowers between June and August.

What is particularly nice about Thalia is its fall and winter form. After the plants have expired in the cold, the dried stalks and leaves harden and turn a pale golden white. When the wind blows across the pond in the winter, the leaves rattle and creak against each other. Some say the ghosts of the insects killed by the Thalia wander the pond in the winter, still trying to find some nectar.

PHOTOS: © ALP* = Adrienne Legault Photography.

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Separating Eggs and Fry from Hungry Parents

By Mike Hellweg, CFN
(Certifiable Fish Nut)

ONE QUESTION THAT is repeated over and over as I've given talks about breeding fish through the years is: What is the **BEST** way to separate egg scatterers (mainly tetras, rasboras, danios, barbs, loaches, shiners and minnows, among others) from their eggs?

The secret is that there is no "best" way to do it. Different methods work better for different species or different hobbyists. This article takes a look at some methods I have found that work well.

Most wild egg scatterers produce lots of tiny eggs and broadcast them over a wide area so that at least a few will fall into a crevice with a chance to hatch. The goal is for each pair to produce a pair of young at least once in their entire life - the biological term is "replacement". In order for a population to remain stable, each fish needs to replace itself with another single fish over its lifetime. If more than one replacement is produced, the population grows. If less, the population shrinks, or even crashes.

Each fish is thinking about three basic things - eating, not being eaten, and reproduction. Our goal as aquarists is to feed well with good food so its not a factor, protect our fish from



© Jeremy Squires

predators, and make reproduction safe for them and their young. I've covered feeding several times, so we'll leave that for now. Keeping them safe from being eaten goes without saying, so this article is about reproduction.

Back in the "old days" there were pretty much two methods of protecting the eggs and fry; one for scatterers that lay non-adhesive eggs and one for scatterers that lay semi-adhesive or adhesive eggs.

The preferred method for those species that lay non-adhesive eggs was using **a grid of glass rods or a pile of marbles** on the tank bottom. The idea was to allow the eggs to fall through the grid or into the interstices of the marbles and be shielded as the hungry parents hunt for food after spawning. These methods still work well today, but finding and working with glass

rods is not easy and can be a bit dangerous if you are not good at paying attention to what you are doing. Most of us have concrete or tile floors in our fishrooms and one can only drop glass rods once.

Anyone who has looked for marbles recently knows that these once common glass orbs are now fairly difficult to find. They're also a bit bulky to store and clunky to work with though I still have a gallon or so ice cream container full of them and I still use them from time to time.

For fish that laid adhesive or semi-adhesive eggs, the spawning substrate of choice was usually a clump of sterilized fine leafed plants into which the pair would lay their eggs. Sterilizing was done with a short soak in potassium permanganate or ammonium alum, which would kill



Glass Rods



Marbles



most of the invertebrates or at least knock them back long enough for the eggs to be laid, hatch and the fry to become free swimming.

The fine leaves would hide many of the eggs so if the hobbyist missed the blessed event the parents would not be able to eat all of their eggs before the adults were removed. This also still works, but over time it has become more and more difficult to find things like potassium permanganate or ammonium alum without causing a stir. *(Don't believe me? Just ask the pharmacist to order a pound of potassium permanganate for you!)* Alum is still used in canning and pickling, but even these supplies have become a challenge to find.



Fine Leaves

With the widespread use of plastics, choices for spawning protection have vastly improved, and there are now so many options that many new hobbyists become confused! Let's look at a few of them that can be found in the craft store or in the craft department of a larger department store.

First, probably the most flexible of all products, is plastic needlepoint canvas. This comes in a sheet about 12 - 14 inches wide and up to 24 inches long. There are various sized mesh depending on the type of craft material, but generally I choose the larger mesh, about an eighth of an inch or so. This is a perfect size for the eggs of most scatterers to fall through without the adults being able to chase after them.

Cut the mesh so that it is as long as the tank and about two inches wider. When you put it into the tank it will create a "u" in the center so any eggs that don't immediately fall through roll and then fall through. Make sure the ends are covered so that



Needlepoint Canvas

the parents can't work their way under it. I do this by wadding Java moss and stuffing it between the the mesh and the aquarium glass. Since the adults will usually only be in the tank for a few hours or overnight, I don't add a filter or even an airstone. Those can be added after spawning is done when the adults and mesh are removed.

Another very useful method is to use a glass "fridge to oven" container designed for storing food. It is made of Pyrex glass with a nice rubber or silicone lid. Remove the lid and use a utility knife to trim out a large opening in the center, with just a half inch or so left on the sides. Use a piece of needlepoint canvas or even something like a quarter inch plastic mesh and cut it to fit over the container. The rubber lid now becomes a ring to seal the top to keep hungry parents out.

Add a clump of Java moss or a



Fridge Dish

similar plant to the glass container and put it into the tank with the adult fish in it. No need to remove the adults after spawning, just remove the glass dish and put it in a separate tank filled with water from the parent's tank. This works great for fish that need more room to spawn, or that only lay a few eggs a day like Congo Tetras. You can leave it safely in the main tank with the parents for up to five days before removing it.

A variation useful for some shiners that in the wild spawn over piles of rocks is using a ROUND glass dish filled with approximately 1" pebbles. Pile them up to a mound over the top edge of the dish, put it in the tank near the filter outlet, and watch the spawning frenzy begin! After the adults finish spawning, simply move the dish with the eggs to a separate tank filled with water from the adult's tank.



Pile O' Rocks

An acrylic yarn mop has become THE go-to spawning medium for fish that lay semi-adhesive or adhesive eggs. A spawning mop can be made by laying a piece of brightly colored yarn about 8 to 10 inches long across the end of a form about 10 - 12 inches long. Magazines or books work well. Then wind green or brown yarn around the form a hundred or so times. Use the original colored yarn to gather and tie



Yarn Spawning Mop





tightly into a knot then cut the green yarn free from the skein.

Wash the mop in hot water and it is ready to use. I tie them to fishing "bobbers" or "floats" to give them buoyancy, but others use everything from chunks of Styrofoam to corks. All work. Place several of the mops into a tank with the adult fish and check them every day or so for eggs. If there are only a few eggs, put the mop back in the tank for another day. If there are a lot of eggs, move the mop to another tank where the fry can hatch out in peace.

For the "lazy" or the "too-busy" hobbyist, an even simpler method for both non-adhesive and adhesive egg layers is setting up a 5 to 10 gallon tank filled from bottom to top with plants and a mature sponge filter. Put it in an area where it gets a little diffuse daylight as the change from dark to predawn is often a trigger for spawning. Add a pair or two of the fish to be spawned, feed them only live foods for a week or so, then move the adults to another tank. After a few days you should start seeing fry swimming in the tank.



The advantage of this method is that there is plenty of food for the fry in the tank since live plants are just covered with all kinds of microscopic

life, as is a mature sponge filter. You don't really have to work too hard to get the fry big enough for newly hatched baby brine shrimp. A disadvantage is that one can rarely see the eggs and you don't know for sure if the pairs spawned until you remove them and see fry a few days after removal. The parents can and do eat some of the eggs- but that's why you're feeding lots of live foods - to keep the parent's bellies full and to keep them distracted from hunting for eggs. If you don't need to raise a lot of fry, this method works very well and has become my preferred method for killies, blue eyes and similar fishes.

A variation on this theme works very well for scatterers like tetras - set up a 10 - 15 gallon tank with a mature sponge filter and a large pile of snail free Java moss covering the entire bottom of the tank to a depth of about six inches. Add a couple pairs of adults and feed well with live foods. About 10 days later start adding a squirt or two of newly hatched baby brine near the bottom of the tank.

When youngsters start gathering where you squirted the baby brine shrimp remove the adults. Gently lift the Java moss and look with a flashlight. You'll be amazed at how many fry there are!

Lately I've been experiencing trouble getting Java moss to grow thickly, but another plant has moved in to take its place - Susswassertang. Add a layer of Susswassertang to the bottom of the tank, enough to cover the entire bottom. The adult fish don't seem to care which and it's even easier to see the fry so you know when to remove the adults. I've used this method so far with about a dozen species of tetras and barbs and it has worked with every one!



One more method that I have found works very well is to use the humble Hamburg Mattenfilter. This works very well for tetras, barbs, loaches, and similar fishes. Just set up a tank with a group of adult fish and a Mattenfilter covering one side of the tank. Add a pile of Java moss or Susswassertang and a pile of 1" diameter rocks about 3" high and coming out about 5 - 6 inches from the base of the Mattenfilter- or even just use the Mattenfilter itself covered with



plants like Java fern, Anubias, Bucephalandra, or something similar.

Well fed, mature adults will spawn regularly in the tank and some eggs will escape their notice. The fry hatch and, I'm not exactly sure how, work their way to the area behind the Mattenfilter where they find a safe, well filtered environment that is full of food. Mattenfilters are home to all kinds of microscopic life, especially ciliates and rotifers, two of the preferred foods for many fry.

This method works very well, so well that one time as I went around the fishroom cleaning tanks, I found fry or juvenile fish behind EVERY Mattenfilter! All I had had to do was care for the adults as I normally do!

You now have several simple methods of separating eggs or fry from their parents without too much effort on your part. Raising the fry will be in a separate article.

Whatever you do, don't forget to sit in front of your tank and just enjoy watching the fish!



The **DARTER**



June/July 2021



V47#4

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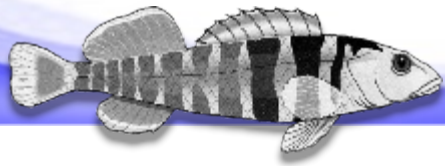
Triple
Dog
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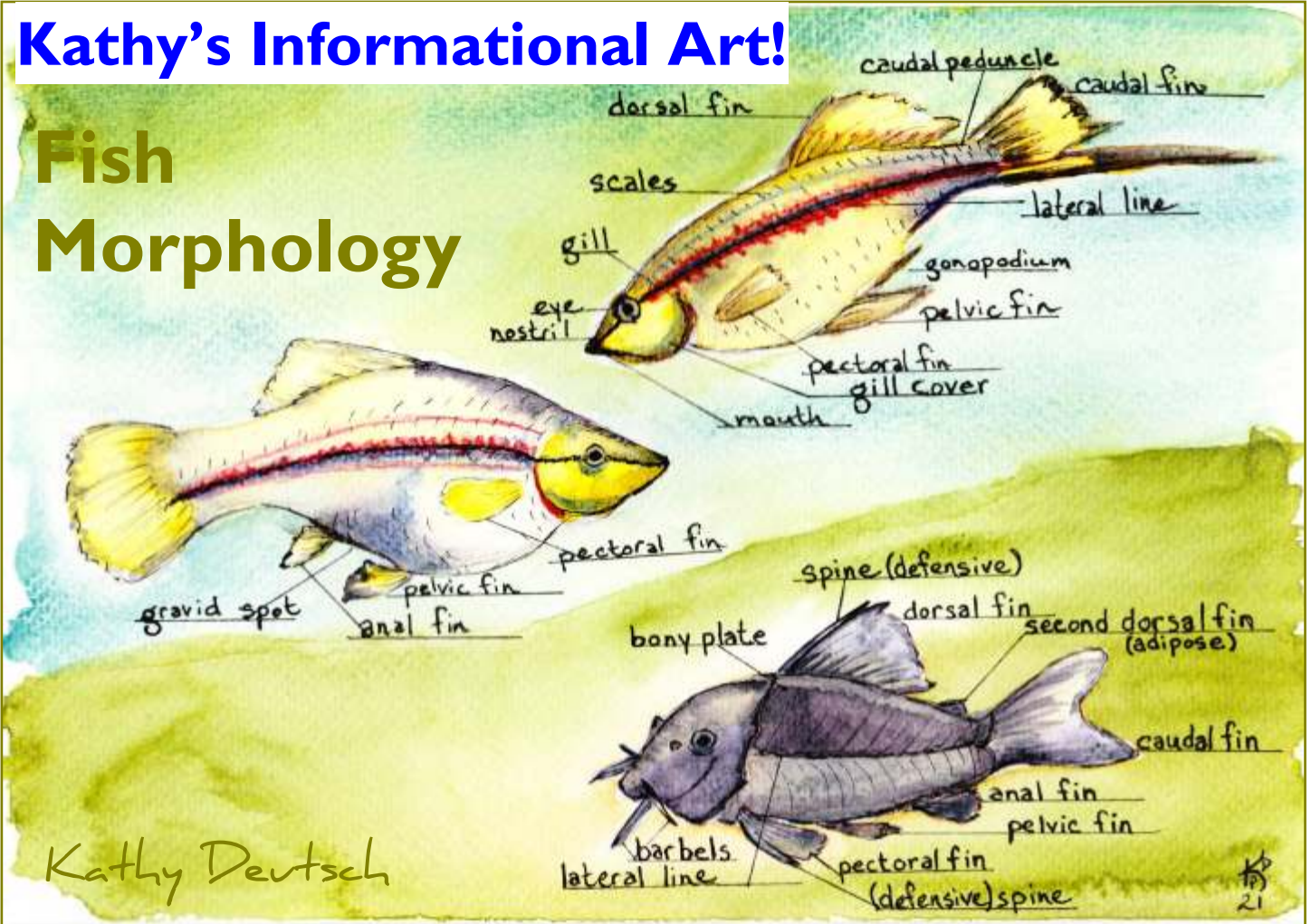




The DARTER

Kathy's Informational Art!

Fish Morphology



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MASI INSULATED FISH BAG

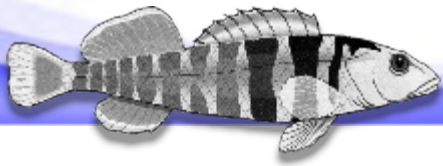
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A Visit to Conservation Fisheries, Inc. in Knoxville, Tennessee

By Steve Coxon

DUE TO THE pandemic, my family put off a visit to meet my new nephew in Knoxville, Tennessee



JR Shute, founder and co-director of CFI, checking for eggs on a spawning mop in a tank of *Fundulus julisia*, the Barrens topminnow as two of my kids watch.

MASI Challenge Extended through 2021!!



A photogenic Okaloosa darter, *Etheostoma okaloosae*, perhaps hoping for a bite from CFI's roomful of daphnia cultures.

last year. Last month, we were finally able to make the trip to meet Felix, now a toddler. Before the trip, I contacted JR Shute, founder and co-director of Conservation Fisheries, Inc (CFI) about the possibility of a visit while I was in town.

I had worked for JR at Aquatic Specialist, a high-end marine aquarium store in Knoxville, for a summer in 1996 when I was a 19-year-old about to enter my second year of college. At that time, CFI was 10 years old, but still in its infancy and not yet a full-time career for JR. Aquatic Specialist was later sold, and with Patrick Rakes, JR has grown CFI to be the preeminent facility in the US to



Fundulus julisia, the Barrens topminnow, is a mop spawner and their tanks at CFI are just like what you could see in a killifish enthusiast's fish room albeit larger than most.

propagate rare, non-game fish for recovery work.

I learned many things working for JR, but one memory stands above the rest: Snorkeling in a Tennessee mountain stream. I had waded in Tennessee streams as a child in search

This year, MASI is continuing the 2020 effort to support CFI through our MASI Challenge.

In particular, CFI hopes to expand their building to offer an area for educational opportunities for the public, such as school groups. I believe that teaching children about the fish near their communities is vital to the future of America's fish populations. Please consider supporting CFI through fish and plant donations at MASI meetings and auctions for the MASI Challenge as well as with direct monetary support for them via check or PayPal via our treasurer at treasurer@missouriaquariumsociety.com.





CFI has many tanks in which I could have photographed the same scene of a Carolina madtom, *Noturus furiosus*, peeking out from its hiding spot.

of crayfish and had been diving on several reefs by the time I worked at Aquatic Specialist, but had never before put the two interests together to look below the surface of a stream.

JR invited me to a chilly mountain stream near Knoxville that summer to snorkel with a group in search of any sign of a fish CFI had bred and previously released there in an effort to reestablish its population. While we did not find the target fish that day, I was amazed to see the variety and color of the fish practically in my backyard. They rivaled the exotic tropical fish that I kept and the experience rivaled my dives on tropical reefs. It changed my perspective.

Visiting CFI in June was similarly mind-blowing, and this time I was able to share the experience with my wife and our 3 young children. JR was kind enough to show us around their facility, a warehouse with more than 600 aquariums, some on chillers, where he and the CFI staff breed some of the most imperiled native fish of the Southeast US. They do this for conservation, largely to reestablish populations extirpated from parts of their native range due to dams and pollution as conditions have been improved in some streams. They do the work in close partnership with state conservation departments.

As you can see from the photos, it was not only a great learning experience for me and my wife, but also for the kids. CFI is doing incredible work for our native fish populations!



My wife thinks I already have too many tanks, but I got some ideas for my future fish room!



My kids showing off a crayfish they found in the Obed River, where we camped for a few nights after our visit to Knoxville. I purchased a three-day Tennessee fishing license online for the trip, but it does not allow for taking non-game fish so everything we found was photographed and immediately returned.

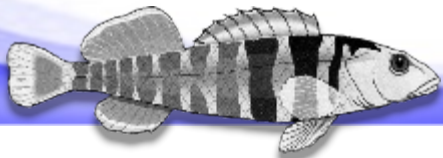
CONSERVATION FISHERIES
PRESERVING THE SOUTHEAST'S AQUATIC BIODIVERSITY
KNOXVILLE, TN



CFI is a non-profit, 501(c)3 organization in Knoxville, Tennessee, dedicated to the **preservation of aquatic biodiversity** in our streams and rivers. They develop techniques to propagate nongame fish, including some of the **most imperiled species** in the region and the first facility in the Southeast to do so.

CFI's primary goal is to **restore fish populations** that have been eliminated because of pollution or habitat destruction but also produce many rare or difficult-to-collect species for other purposes related to aquatic conservation.





AKA 2021 CONVENTION PROGRAM



Pat Tosie,
MASI's
President

Charles
Harrison,
Challenge Issuer

Jack Heller, AKA
George Maier Fund
Treasurer

THE MISSOURI AQUARIUM SOCIETY PRESENTED A CHECK FOR \$2524 TO THE GEORGE MAIER FUND. MASI'S RESPONSE TO A CHALLENGE ISSUED BY CHARLES HARRISON!



SATURDAY EVENING AWARD'S BANQUET





Missouri Native Plants for Aquaculture

Mimulus ringens

Monkey flower,
Allegheny
Monkeyflower,
Square-Stemmed
Monkeyflower

By Micah Issitt & Adrienne Legault

MIMULUS RINGENS, ALSO known as “monkey flower,” or “Allegheny monkeyflower,” is a semi-aquatic bog plant that is not often used by water gardeners, but is one that I believe deserves a closer look.

The genus *Mimulus* is considered to be in the family *Phrymaceae*, otherwise known as the “Lopseed” family.

Oh, the lopseeds. Long may they spread across our world. Found in damp, cool woodlands or in marginal environments and wetlands, the lopseeds are an unusual group that appears around the world and provides an interesting hint to the ancient history of plant migration. While there are a few popular cultivated varieties, the lopseeds are not especially well known in horticulture.

Until relatively recently, the family *Phrymaceae* contained just one species, *Phryma leptostachya*, a small pink-flowered woodland species



that is native to Missouri and is known as the “lopseed.” The term “lop,” means to “droop,” as in the lop-eared bunny, and the seeds of this plant tend to droop over onto the stem on thin pedicels.

This little plant sat all alone in its own little family until 2002 when botanists, using ribosomal DNA, realized that a whole bunch of other plants previously in the family *Scrophulariaceae* (known as the figworts because the family lacked a good PR firm), were actually members of the lopseed clan. As a result, the family *Phrymaceae* swelled from one

species to over 200 species in 13 genera.

Many of the species in the reorganized *Phrymaceae* are of interest to Missouri native gardeners, but the ones in the genus *Mimulus* are perhaps most interesting to outdoor fishkeepers and water gardeners because all of the species really like to have their feet wet and, in fact, die quite quickly when their roots dry out.

All the plants in the genus *Mimulus* have the common name “monkey flowers” because the structure of the flower was once thought to resemble the face of a monkey. The Latin Genus name, *Mimulus*, means “mimic” and this was also meant to reflect the perception that the plant was mimicking some kind of simian.

If you look at one of the flowers head on and squeeze it, it’s supposed to look like the cartoonish face of a monkey opening its mouth. I’ve tried this on a number of occasions and if you squint really hard, in just the right light, and you’ve never actually seen a monkey- perhaps the illusion is good.

In any case, the allegedly simian flowers, which get about 2-3 cm (an inch or so) long, are lovely and most closely resemble the familiar flowers of the snapdragon (*Antirrhinum majus*)

Some Mimulus species native to Missouri:

- *Mimulus alatus* Aiton
- *Mimulus alatus x ringens*
- *Mimulus glabratus* Kunth
- *Mimulus ringens* L.



because they have open corollas with two distinct lips. The snapdragon is yet another flower named because observers saw some animalistic association in the shape of the flowers. While *Mimulus* flowers were thought to resemble primates, the snapdragons were said to look like the heads of tiny little dragons. Think about the monkey flower as sort of a like a wetland snapdragon.



Mimulus alatus
(Sharp wing
monkey flower)

There are five species of *Mimulus* found in Missouri. Two are cultivated and frequently available through specialty native plant vendors. The other three are possible to find, but it is quite a bit more difficult. The most common are *Mimulus ringens* (the Allegheny monkey flower) and *Mimulus alatus* (the sharp wing monkey flower). Both are small herbaceous perennial plants that have dusty lilac flowers. *Mimulus ringens* has brighter-colored flowers with a touch of gold on the lips. Flowers appear in pairs, and stick out from the main stem on thin stalks pedicels.

This year, we cultivated *Mimulus ringens* from seeds, which are truly tiny little things. The resulting plants were kept in a greenhouse until conditions outside were favorable. Though we knew that the monkey flowers were fond of wet, boggy soil, we had never seen the plant offered as a pond or marginal plant and really had no idea if the plant would do well in a water garden. Monkey flowers tend to be woodland plants and there was some additional question about what kind of light and heat the plant would tolerate. To our surprise,

Mimulus ringens turned out to be an excellent doer, as the British gardeners would say, in pretty much any condition.

We grew *M. ringens* in pots of a mix of garden soil, grit, and sand (1:1:1). Some were fertilized with aquarium-safe fertilizer tabs and some were not. A few of the plants were grown in direct full sun, some in partial shade, and three in full shade.

All grew well. In full shade, the plants were thinner and “leggy” because they stretched toward the light, but they still appeared hardy and growth was impressive. In full sun, the plant seemed to droop somewhat in the hottest weather, but the leaves did not burn and recovered quickly in the evenings. Flowers began to appear in mid-spring and continued into summer.

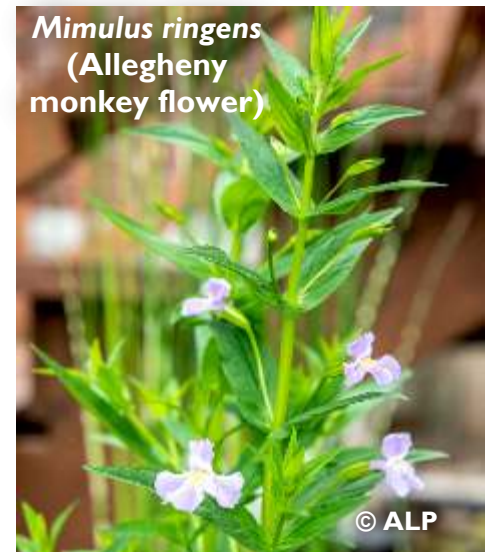
We’ve been playing around in our experimental garden with “bog planters”. These are ceramic pots sealed at the bottom to hold water. We fill these with a mixture of organic garden soil, mud and sand over a layer of clay pellets and styrofoam. Bog plants are added, then we cap with gravel and rocks.

We’ve dotted the bog planters around the garden next to the fish tubs, adding aesthetic interest and allowing us to grow more and more and more plants (insert maniacal laughter). Monkey flowers make an excellent addition to these bog planters because of their more or less upright growth habit. This makes them a perfect choice behind a floppy or sprawling species. *M. ringens* is planted in bog planters alongside *Phyla lanceolata* (Fogfruit) and *Limnobia spongia* (American frogbit).

In tubs or in the pond, *Mimulus ringens* flowers at the same time as *Eichornia* (water hyacinth) and *Pondetaria cordata* (purple pickerelweed), both of which also have purple flowers, and so *Mimulus* might be used as an addition to a purple-themed planting scheme. Alternatively, *Mimulus* might be grown alongside *Nuphar advena* (Spatterdock) or *Nymphaea odorata* (our native water lily), both of which flower at the same time and have bright yellow blooms

that contrasts well with the lilac flowers of *Mimulus*.

While looking lovely in a pond or in a tub, the *Mimuloids* don’t appear to offer anything special for fish and, upright, they don’t provide much shade or cover. Our Medaka (*Oryzias latipes*) seem to like to nibble on the spent flowers when they fall onto the water but we’re not sure if this has any benefit or if they are actually consuming them. I have tried asking my fish if the flowers have a pleasant taste but, so far, none of the fish have been responsive.



Mimulus ringens
(Allegheny
monkey flower)

© ALP

While the plant might not provide any specific benefit as a tub or fish pond plant, *M. ringens* grows quickly and so should provide a nice addition to a water-scrubbing plant population.

For those trying to create native landscapes or biomes, *Mimulus ringens* or its cousin, *M. alatus*, make excellent additions to the rain garden, the pond edge, or any other location with loamy, moist soil. Both species are pollinated by honeybees, but lots of other pollinators like to give it a go as well.

Our garden attracts masses of Halictid bees (often called sweat bees), because we plant a large number of species in the family *Onagraceae*, a favorite of these pygmy pollinators. We’ve noticed that many of the halictids and smaller carpenter bees (*Xylocopa*) also visit the *Mimulus* flowers and root around in what would be, I suppose, the monkey’s mouth? ...I STILL don’t see it.





Missouri Native Plants for
Aquaculture

Pontederia cordata var. *lanceolata*

Pickerelweed,
Purple Pickerel
Rush

By Micah Issitt &
Adrienne Legault



PONTEDERIA CORDATA VAR. *lanceolata*, or “pickerelweed,” is a common Missouri perennial that is widely used in aquaculture, not just locally, but around the world. While typically sold for pond use, pickerelweed is also an excellent candidate for the tub or container garden, where it can serve as both a structural plant and a feature plant, at different times of the year.

Pontederia cordata, of the family *Pontederiaceae*, is often sold as “Purple Pickerel RUSH”, even though the plant is not closely related to the family *Juncaceae*, which are more correctly called “rushes.”

There are seven species in the genus *Pontederia*, stretching from central Canada all the way to the far southern reaches of South America. All species in this genus grow in shallow water, marshes, or muddy lowlands. The species present in Missouri has the specific name “*cordata*”, which reflects

that the bases of the leaves have a rounded structure, known as “cordate”. The native is identified with the varietal name “*lanceolata*”, referring to the lance-head-shaped leaves. In common parlance, all seven species of the genus are properly called “pickerelweed,” and so this common name, while helpful in finding the plant, isn’t necessarily descriptive enough to effectively differentiate the local pickerelweed from the others that stretch across the Americas.

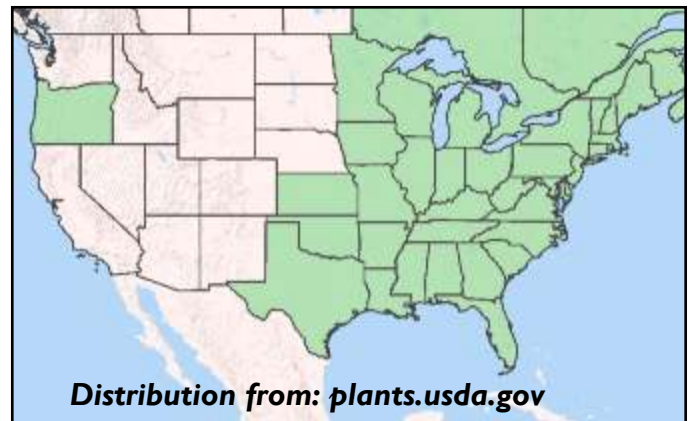
***Pontederia cordata* var. *lanceolata* is a widespread plant,** appearing along the eastern coast of North America, from Southern Canada to Northern Mexico and is common in Texas, Oklahoma, and Nebraska. It is not found further west with the exception of a population in the state of Oregon, probably artificially released by some plant collector back in the day.

***P. cordata* is also not particularly common in**

Missouri, occurring in only a few spots in the far east and west of the state as documented by Julian Steyermark.

Pickerelweed is a very fast-growing plant with stalks as tall as 100cm (3-4 ft) and can spread to nearly a meter wide. The plant prefers calm warm water making it a perfect choice for both ponds and containers. *P. cordata* is quite attractive with glossy bright green arrowhead or “lance shaped” leaves and can grow to nearly 20-25 cm (10 inches) long. Stiff stems hold the leaves aloft, creating shadows and lovely reflections.

The plant flowers in the summer, generally from June through



September or October, depending on temperature. It produces a spike covered with soft, tubular blue to purple flowers. These spikes can be 7-15 cm (3-6 inches) long and look quite impressive, especially when many plants flower en masse. Rich purples are common in the plant world, but not

The local distribution of *Pondetaria cordata* was documented by the late great botanist Julian Steyermark (1909-1988) in the landmark text “Flora of Missouri”.

St. Louis native Julian worked at the Missouri Botanical Garden, and holds a Guinness record for most plants collected by a single botanist.

What was the record you might ask? 130,000 plants, give or take a few.

The guy was seriously prolific!

so common in Missouri water plants and thus pickerelweed provides a palate that is valuable to Missouri water gardeners.

If the plant is relatively happy and has access to plenty of nutrients, the flowers keep coming for months. After the flowers are spent, the stalk softens and the weight of the flower head causes the stem to droop to the water’s surface. The plant can then deposit seeds in the water, laying the groundwork for a new generation.

Removing spent flowers will bring more, but this isn’t entirely necessary to keep the plant flowering through the season. Because pickerelweed is a vigorous plant, we sometimes plant them in nothing more than sand or grit, but often throw in a small amount of garden clay to provide nutrients and to better anchor the fibrous roots. Outside of the pond or

tub, *Pondetaria cordata* should be provided with a dense, rich soil that remains somewhat moist.

Eichhornia crassipes- “water hyacinth”, another familiar water garden plant not native to Missouri, is a close cousin to our native pickerelweed. It and *Pondetaria cordata* are both members of the same family and subfamily. When water reaches 23c (~75 F), both species often flower at once, creating a lovely flush of fresh-looking color across the pond.

Pickerelweed itself is a versatile plant that can create a variety of different biotope displays. With grass-like-plants such as sedges (*Cyperaceae*), rushes (*Juncaceae*), or even grasses (*Poaceae*)- pickerelweed completes the look of a temperate marsh, bog, or pond. Coupled with natives like *Peltandra virginica* (arrow arum), *Thalia dealbata* (powdery thalia), and/or floating plants like *Nymphaea odorata* (fragrant water lily) or *Nuphar advena* (spatterdock), pickerelweed can cultivate a tropical or jungle feel.

In ponds, or tubs, combinations of these plants can perfectly compliment a wide variety of fish. I use pickerelweed in my koi pond, tubs or goldfish and *Oryzias* and these colorful fish look wonderful amidst the shiny green foliage of the pickerelweed. Native fish, like the central mudminnow (*Umbra limi*), or sunfish (*Lepomis*, spp.) also appreciate the presence of pickerelweed and fry take shelter in the plant’s network of stems.

Cultivation is quite easy. We leave our pickerelweed in the ponds over winter, and do not cut it back, though the foliage adds little to the winter scenery as the stalks tend to droop and wither. In spring, we dig bunches of pickerelweed from their pots, cleave them into pieces with murderous fury, and plant those pieces in separate pots. Within a couple seasons, a single plant can be multiplied into a dense stand. Selective breeding has allowed horticulturalists to create several different color varieties of pickerelweed, including magenta, pink, and, on rare occasions, white flowers. These are all the same species and when used together create a multicolored floral display.

This important plant is host for two species of extremely rare bees, *Dufourea novaeangliae* and *Melissodes apicatus*. Scientists believe both these bees are oligoleges, or specialist pollinators, that can only extract pollen from a single species or a single group of plants. Both bee species are believed to rely entirely on the pollen of *Pontederia cordata* but, unfortunately, neither species has been documented in Missouri recently so hobbyist plantings of *P. cordata* will not likely result in additional habitat for these rare and beautiful bees. Instead, a variety of small bees and flies utilize the pollen and anyone growing *P. cordata* will quickly find that the plant is frequently buzzing with various insects searching for summer sustenance.



Whether one wants to cultivate bees along with your flowers or not, pickerelweed is a perfect addition to any water garden and a great compliment to plants of domestic or foreign origin. We find that the plant looks excellent alongside community plants such as *Asclepias incarnata* (swamp milkweed) and *Hibiscus lasiocarpus* (rose mallow) with blooms that are largely white. The mallow’s traces of red and purple bring out the purple in the pickerelweed flowers. These companion plants dislike being raised in standing water, but can be cultivated in rich soil in either pots or beds surrounding or adjacent to pond or tubs, **creating the backdrop of a native Missouri wetland.**





Minifins

Alcolapia ndalalani

The Narrow Mouth Natron Dwarf Cichlid

By Mike Hellweg, CFN
(Certifiable Fish Nut)



© Seriously Fish

WHAT DO ANCIENT Egypt and cichlids have to do with one another? Okay, besides the Nile Tilapia (*Oreochromis niloticus*) which was a symbol of abundance and fertility painted on the walls of Egyptian tombs? ...oh, and pregnant women and those wishing to become pregnant wearing amulets made in the likeness of Nile Tilapia? Maybe I should have asked what do

ancient Egyptian MUMMIES have to do with cichlids? Yes, that would have been a better question.

The ancient Egyptian priests used a type of salt called natron (sodium carbonate) to dry out the bodies for 40 days before they wrapped them in resin soaked linen strips. This natron was collected around the East African soda lakes including Lake Natron in present day Tanzania, just north of Lake Tanganyika. To this day it is still

considered one of the most inhospitable places on earth. At 120 degrees Fahrenheit, the water is too warm for most animals to even swim in, and it is too salty to be useful for agriculture or drinking. Even so, the area is not devoid of life. The lake itself is home to cyanobacteria that give it a characteristic red/orange color, which when eaten by flamingos, gives them their beautiful pink coloration.

The creeks and small springs on the southern edge of the Lake are very warm and very salty, but host a larger variety of life, including the beautiful subject of this article, the Narrow Mouth Natron Dwarf Cichlid, or *Alcolapia ndalalani*. Growing to about 2", the name in print is longer than the fish!

This diminutive schooling cichlid is likely critically endangered in the wild due to its tiny habitat. But as with most endangered cichlids, breeding is NOT a problem. Once the original stock entered the hobby, there was no need ever again to collect any more. Given the right conditions, *Alcolapia ndalalani* breeds prolifically in captivity. In fact, it is challenging to get them to stop spawning once they start! This is a problem since they are not well known in the hobby.

The idea of keeping a fish from a lake with conditions that can



mummify a person seems to scare folks off so it is hard to sell them. But once folks get to know them, giving a small colony a 30 or 40 gallon tank won't seem like such a bad idea. They might even get to really enjoy them as they get to know them!

Before talking about giving them a perfect home, I think I should mention a few personal observations. As with many fish, when they have less cover, they spend more time hiding. Giving them a full wall of piled up cobble sized



Flamingos of Lake Natron

rocks makes them feel like they have plenty of safe spaces to hide so they are comfortable spending more time out in the open. Even so, they are still skittish.

My fish learned that I am the source of food, so after a month or so they stopped hiding every time I approached the tank. Since COVID prevented me from having visitors, they still aren't used to other people moving around in the room and they hide whenever a stranger comes to see them.

They seem to do best in larger groups. In small groups they seem to be stressed and spend much of their time hiding. The males aren't exactly aggressive, but they do spend a lot of time chasing each other, though no harm is done. Females don't need to be removed after holding. They seem to be smart enough to spend some time hiding after they spit their fry, until getting some food and recovering a bit before spawning again- unlike some other species that will literally spawn themselves to death.

A 40 gallon breeder-type tank is a perfect size for a group of up to a dozen adults. Fill the tank with cobble-sized rocks making a rock wall that covers the back and sides of the tank. A fine sand substrate is perfect as they like to rummage through it looking for missed bits of food.

There are two big requirements, both in the water parameters – they like it salty and hard, and they like it warm. I've found they do fine with the addition of a tablespoon of plain salt per two to three gallons of water. To maintain this, before you do a water change, be sure to top off the tank with plain, unsalted water. Then do a regular water change of 30 percent or so. Add the proper amount of salt to the replacement water, and make sure it is fairly warm so the tank temperature doesn't drop too much.

I keep my colony at 84 to 85 degrees Fahrenheit, though I've read some hobbyists keep them at up to 90 degrees Fahrenheit. They seem to enjoy these conditions by showing full color, spending lots of time grazing on every surface in the tank with their underslung mouths, and breeding regularly.

Because of these extreme conditions, they'll likely do best without any companions in their tank. I say "likely" because I've never kept any other fish with them. There are some ramshorn snails in the tank and those are totally ignored, as is the hornwort I added at the start to make them feel more comfortable when I first added them to the tank.

A bit of duckweed came in with the hornwort and started to grow. After a few weeks I was thinking I'd better thin it out, but apparently at about that time they discovered it was edible, and within a week or so it completely disappeared.

In the wild they are primarily a grazer, eating algae, so this should make up a large part of their diet in captivity. I've never cut one open, but as with most grazers, I assume they have a longer gut to facilitate digestion of plant matter. This means they can't eat a lot of high protein foods.

I feed them daphnia, adult brine shrimp or bloodworms only once a week. The rest of the time they graze on algae and eat spirulina based pellets and flakes. I've tried giving them things like squash and zucchini, but my fish didn't seem to like it very much. They do LOVE chunks of

banana, but so do most fish once they realize they're edible.

If you give them a good home, they will do what comes naturally and make more cichlids.

They are pretty typical maternal mouthbrooders, with the male clearing an area about 5 inches in diameter and dancing and flashing his best colors for the female, and, if she's ready to spawn, she follows him to his "pit". Spawning seems to go pretty quickly, and the female soon swims off with a mouthful of eggs.

Some females eat for a few days after spawning, others don't. I'm not sure why. At first, I gently removed the first holding female to a hang-on-tank breeding box as I'd heard they were fry predators, which they might be. But after the first couple of spawns, I started seeing fry of different sizes darting out from the rockwork whenever I added food to the tank. Pretty soon there were a LOT of them, and the adults seemed to ignore them.

The fry eat the same spirulina based flakes and pellets as the adults, and I also added newly hatched baby brine shrimp to the tank on a daily basis, which the fry chased down and the adults ignored. I tried microworms as well, but never really noticed the fry hunting them down.

The fry grow quickly and with enough food can be half grown (about an inch) in just three months. Hopefully as more people become familiar with these diminutive, colorful, and unusual beauties, they will become a mainstay in the hobby as they deserve to be.

As always, don't forget to sit and watch you fish!



Colony Group





Holly's Blooming Pond!! What's your's doing? What fish you got under there?



Canna

With Honduran Red Points Beneath!

These may show up in the next Darter HAP Report!



Myosotis scorpioides
Forget-Me-Not



Mix



Hydrocotyle leucocephala

Brazilian Pennywort



Zephyranthes grandiflora
Pink Rain Lily



Sisyrinchium sagittifernum

Spearbract Blue Eyed Grass



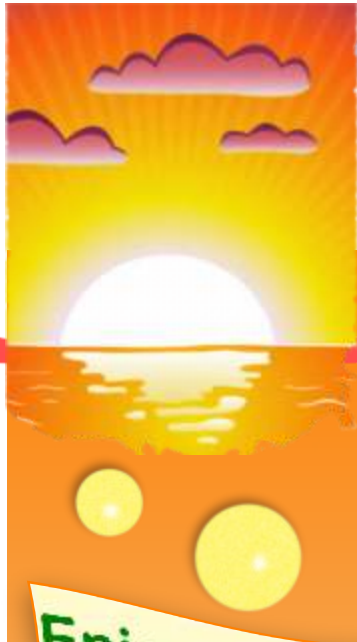
The **DARTER**



V47#5

September/October 2021

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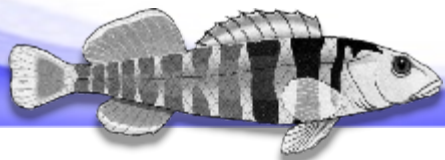
Enjoy Your
Last Days
of Summer
out by the
Pond!



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The DARTER



Neolamprologus ocellatus - Blue!

By Kathy Deutsch

Renew or become a new MASI member if you want to to get your own copy of the DARTER!!

The Missouri Aquarium Society's Annual Voting membership is \$15; an annual Corresponding membership is \$10; both include an electronic subscription to The Darter, published six times per year. Join or renew membership at any meeting, most club events, by PayPal from the MASI [Website's Membership Page](#) or by contacting Robby

Simmons, membership chair,

Email: robby_simmons@yahoo.com.

Help MASI Support the Aquarium Hobby!

Support Locally by shopping our supporters.

Support Nationally & Internationally by supporting the MASI Challenge.



Memberships



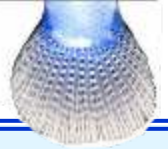


JR Shute, founder and co-director of CFI, checking for eggs on a spawning mop in a tank of *Fundulus julisia*, the Barrens topminnow as Steve Coxon's kids watch.

MASI's 2020 Challenge Extended through 2021!!



CONSERVATION FISHERIES
PRESERVING THE SOUTHEAST'S AQUATIC BIODIVERSITY



CFI is a non-profit, 501(c)3 organization in Knoxville, Tennessee, dedicated to the **preservation of aquatic biodiversity** in our streams and rivers by developing techniques to propagate nongame fish, including **imperiled species** and is the first facility in the Southeast to do so.

CFI's primary goal is to **restore fish populations** that have been eliminated because of pollution or habitat destruction but also produce many rare or **difficult-to-collect species** for other purposes related to aquatic conservation.

History of the MASI Challenge

By Mike Hellweg

EVERY YEAR, THE Missouri Aquarium Society (MASI), makes donations of time, talent, and treasure to various aquarium, fish or hobby-related charities, schools, and research or conservation funds. This is so important to us that it is included in Article 2 of our bylaws as part of our organizational charter.

It's our way of giving back to the hobby and the community. We've been doing this nearly every year, no matter the size of our treasury, since we were first incorporated in 1959, whether it was something small like replacing a pump for an aquatic exhibit at the zoo, or supplying an inner city classroom with a fish tank and then having members visit the classroom and talk to the kids about fish, or something as hopefully long-lasting as helping fund the re-introduction of the once extinct in the wild Goodeid, *Zoogoneticus tequila*, which is now on its way to recovery.

For decades we did this quietly and didn't make a big deal about it. Almost 20 years ago we realized that most aquarium hobby clubs, and many

hobbyists, would talk a good game about support for the many aquarium or conservation related organizations, but actually provide little or nothing in the way of support to these same entities. We decided to make our donations public at a large aquarium hobby event and challenge other clubs and individuals to step up, put their money where their collective mouth is to do the same.

Since then we began to call it the MASI Challenge and over the years we have raised tens of thousands of dollars for various charities and organizations.

The club provides \$300 in seed money to start the Challenge each year, and we promote the Challenge at every club meeting and event throughout the year. We ask folks to donate fish, plants and other aquarium hobby-related items to our monthly meeting auctions for the Challenge, and also allow them to donate items at our semi-annual swaps and quarterly auctions. For our last Challenge, the AKA's George Maier Fund, we raised over \$2500! For this year's Challenge, we're well on our way to topping \$2000 again.

The first year that we made the Challenge, the American Livebearer Association (ALA) was having trouble raising funds to make two small research grants to grad students from their Vern Parish Fund. I stood up, presented our check and made the first MASI Challenge at the ALA annual banquet that year. It quickly spurred on donations from other clubs and individuals such that not only was the ALA able to make both grants, but they were also able to add nearly 50% to the principal of their Vern Parish Fund!

We hope that by making this Challenge public, we can spur you on to making even a small donation to your favorite aquarium-related charity. This year we've chosen Conservation Fisheries right here in the USA. While you're reading this and thinking about it, why not make a donation yourself? Even a small donation such as \$5 or \$10 will make a huge difference in the work they are trying to do to with US native fish.

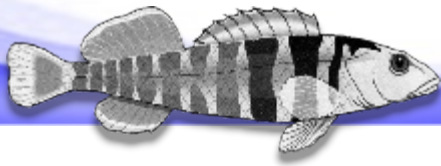
The Missouri Aquarium Society asks members of other aquatic clubs to talk to their leaders and challenge those clubs to step up and join us. If not with money, volunteer to help out with something local, even something as simple as talking to school children about fish.

With all of us working together, there is no limit to the good we can do for our beloved aquatic world!



Appreciation to Phil Nixon, MASI Member and August Program for donating his Speaker's check to MASI's current CFI Challenge.





Tub Breeding Of Paradise Fish

*With some out in the
box thinking!*

By Holly Paoni

LIKE TO EXPERIMENT with DIY and try to keep things as simple and natural as possible. I wanted to tub my young pair of paradise fish this year... in a 29 gal tote, and get a couple fry. I did not want my female getting beat up in the smaller area, especially when you can't see exactly what is going on inside tubs and totes. So I just started thinking out of the box and finally decided on this set up:

A milk crate upside down in the center of the tub added to this crazy idea. I had a planter that hangs over each side of a deck railing. It fit over the side of my tuff tote perfectly and the height of the milk crate was also perfect for support of the planter.

I did get some funny looks from the family... but there is a method to my madness folks! I promise!

I filled the planter with lizards tail. The soil mix would always stay boggy as the planter bottom is about 1/2 inch below waters surface. Lizards tail quickly grows a network of fine long branched roots. These would provide a great place for the male to build a bubble nest, under the shelter of the planter and storms wouldn't destroy a nest hidden back there. The root system would also provide a home for a long list of potential microscopic foods for the newborn fry also.

A bunch of *Riccia fluitans* was also stuffed into the recess. *Riccia* is another



great plant for tiny fry and for sheltering a bubble nest.

With the milk crate in the center, there's about a 1.5 inch clearance on the front and back sides of the tub. Plenty of room for paradise fish to swim around the long way to the other side but the key to the inverted milk crate idea was its honeycomb structure of holes on the sides and bottom.

More lizards tail cuttings, anacharis cuttings, pennywort starts, and Stargrass stems created a maze through the milk crate for the fish. The adults can easily pass through the open holes, but the maze of stems, plants and roots slows them down.

Until the rest of the plants really took off a floating basket with more *Riccia* was added. This basket allowed fry a place of escape where the adults couldn't go. It was removed to make more room for the other plants, half way through the season.

Paradise fish males are very protective of the spawn in a bubble nest. Usually it is best to remove the female as soon as possible after spawning. Males will kill them if they don't leave the area, and both adults will eat the fry shortly after they become free swimming. So for my female to live through the season, and any fry to survive, in a 29 gal tote, planning was crucial.

In nature, there are lots of obstacles and shelter, lots of space, or both. I went for lots and lots of obstacles and shelter, without taking up any real room in the tote.

I was not expecting it to be a huge success and would have been happy with 6 surviving juvies, and my original pair. This was for fun, not to breed gobs of fish. I will not know the total number of juvies till I carefully tear down this tub this fall.

Currently, both adults are routinely seen, we've witnessed 4 bubble nests, have spotted 5 different swarms of new fry by peeking into a 6x6 area, and at any time, can count over a dozen juvies of various sizes. This tote size is close to a 29gal tank, with a wider footprint and not as deep. That's a small sample size and the way it's looking, I'll have plenty to share!

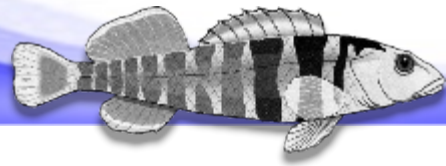
Don't be afraid to try new things or use out of the ordinary items. Just make sure they are clean and, for tubbing, at least water safe for a short time.

This has been one of my favorite tubs to watch this year... partly because of the mystery till tear down. At that time the original pair plus 34 fry and juveniles of 4 distinct sizes were pulled from the 29 gal tote!



© Amy's Guide





The DARTER

Miniature Ponds

Can be put nearly anywhere!

By Chuck Bell

BIGGER ISN'T ALWAYS better. Sometimes good things come in smaller packages. My new additions to the outside garden are my small accent ponds.

For those with limited space, or just wanting to add something small to an existing garden, these can be quite attractive- as well as different. I like to highlight my aquatic plants by surrounding them with summer flowering plants and container gardening.

As shown here, almost any container that holds water can be used. The first miniature water garden utilizes a small 8" deep pond liner that can be purchased at most garden centers. The second is a plastic 55 gallon drum. These containers may



Surrounded by terrestrials in bloom



Deeper half barrel in the sun

need to be sunk into the ground, so they don't overheat in the summer. They also need to be heavily planted, to provide plenty of shade for the water so that it can maintain a cooler temperature.

While they are great for showing off your plants, they are not capable of supporting many fish. I would place 2-4 small male fish in each. The fish are necessary to keep mosquito larvae at bay, and also adds some small movement in the ponds. I like to use swordtails, mollies, guppies and even small goldfish in this type of pond. I also add driftwood and rocks, but feel free to use your imagination and add any other ornamental pieces that you like.

The types of plants used vary with the size of the container. In the smaller pond, I have water hyacinth, a small black elephant ear, lizard tail and flag. The larger pond (barrel) has a water lily, that needs added depth, as well as the same plants that are in the smaller pond.

At times I also incorporate peace lilies. Most aquatic plants will work, and those that need added depth are good in the barrel. These small ponds also work well for starting cuttings from your garden, as I have started coleus, lizard tail, arrowhead, and bamboo with good success.

These small ponds can be fun, and be easily added to your garden, or

even a small deck, as long as there is shade. They are easily placed anywhere in your yard, near the mailbox by the street, or in shady spots by a tree that are often bare.

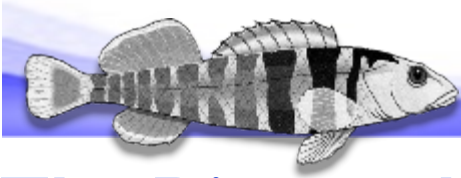
I hope you try a small aquatic pond next summer.

Talk to Caleb Pitman to order one of the new MASI Polo-Shirts



Shallow tub in the shade





The Diamond Tetra

A Subtle Beauty

By Mark England

THE DIAMOND TETRA, *Moenkhausia pittieri*, is not for everyone. It is rather drab as a juvenile with an olive grey base color. However, if you see a school of mature diamonds in a well planted, properly lit tank, you will find them stunning.

With long, flowing fins and glittery scales that reflect the light in tones of pink, silver, and gold, these magnificent fish have a subtle beauty that more experienced hobbyists will appreciate.

The Diamond Tetra is not rare, but retailers do not often stock them because they look so plain when young. You can regularly find them from online sellers. According to SeriouslyFish.com wild fish can be found in Lake Valencia, Venezuela and nearby streams, but almost all fish in the trade are now commercially bred. Diamonds are undemanding in their care and will adapt well to most community tanks. Seriously Fish recommends 75-82° F, 5.5-7.0 pH and 5-12° hardness. They suggest a variety of prepared and frozen foods.

I obtained my diamonds from an online seller. Once out of quarantine, they quickly adapted to life in a 75 gal., densely planted tank. I keep 14 diamonds along with an equal number of Candy Cane Tetras (aka Ornate



Tetras or *Hyphessobrycon bentosi*), and an unknown number of *Otocinclus* and Amanos.

My water is 75° F, 6-7 pH through the day with CO2 added, and the Fluval Stratum substrate softens the water to 3-5° KH. I change 50% of the water twice a week and feed flake, bloodworms, and frozen brine shrimp. Before long several fish were showing interest in each other and spending most of the day burrowed into a thick stand of Octopus weed (*Pogostemon stellatus*).

I didn't think much about it since I couldn't really see their activity well. So I was surprised a month later to see fry swimming free. They had survived on the natural fauna of my planted tank. I moved them to a tank of their own and fed them decapsulated brine shrimp eggs and ground flake food. Within another month, I felt confident in their return to the community tank, and they have been thriving ever since.

Diamond Tetra behavior is typical of tetras, although at 2.5" standard length, they are a bit larger than most. They match well with my Candy Cane Tetras. The diamonds don't bother other fish, but will chase away trespassers when they have chosen an area for spawning.

Courting males will display with their flowing fins erect and bodies tilted towards each other to prove they are worthy of female attention. These are schooling fish and will do best in groups of six or more. Diamonds will school tightly when nervous, but in a densely planted tank the schooling behavior is looser and sporadic.

If you've never had Diamond Tetras and are looking for something a little unusual for your planted tank, try them out. A school of mature diamonds is a treat for the eyes.





1916 U-Boat Delivered Tropical Fish for St. Louis

By Thomas M.
Keevin & Chuck
Bremer



Postcard of the German U-Boat Deutschland on its Maiden Voyage arriving in Baltimore Harbor on 10 July 1916.

THE GERMAN U-BOAT Deutschland Arrived in Baltimore Harbor in 1916 with a Shipment of Tropical Fish Bound for St. Louis, Missouri.

S. Chichester Lloyd became a short side-note in the history of World War I when he sponsored a shipment of tropical fish from Germany during the early part of the war, while the United States was still officially neutral.

Lloyd was a prominent figure in the early history of the aquarium hobby in the United States and St. Louis. Originating in Newark, NJ, Lloyd ultimately moved to St Louis

where he was elected president of the National Aquarium Society of America and likely founded the St. Louis Aquarium Society. In later years Lloyd moved on to California but while in St Louis he was instrumental in early promotion of Goldfish here¹ and, as President of the St. Louis Aquarium Society, was one of the earliest proponents of a public St. Louis City supported aquaria, not to be fulfilled until over a century later.

The fish shipment was transported by a German U-Boat that arrived in Baltimore, Maryland, on 10 July 1916 and then transported to St. Louis by express, the fish being carried by an officer aboard the Deutschland, a friend of Lloyd's.

According to two St. Louis newspapers²⁻³ (15 & 16 July 1916), the shipment included twenty-two fish which had been brought over from Hamburg and Lloyd said were forwarded to him by an officer of the undersea boat Deutschland. Twenty of the fish were "peacock fish (plopoy Poecilia guppy)". Lloyd indicated that the fish were half an inch long and natives of the northern part of South America. He described the peacock fish "as pink in color with large "eyes" of a metallic blue color over its body."

Lloyd noted that the peacock fish population had tripled overnight. These were undoubtedly guppies (*Poecilia reticulata*). The shipment also included two zebra fish (*Danio rerio*). The fish were to be displayed on Monday night (17 July 1916) at the American Hotel, following a banquet of the St. Louis Aquarium Society. Apparently, it didn't take much to get the aquarium hobbyist crowd excited in 1916!

The Deutschland⁴ was built as an unarmed blockade-breaking submarine intended to transport commercial products to the United



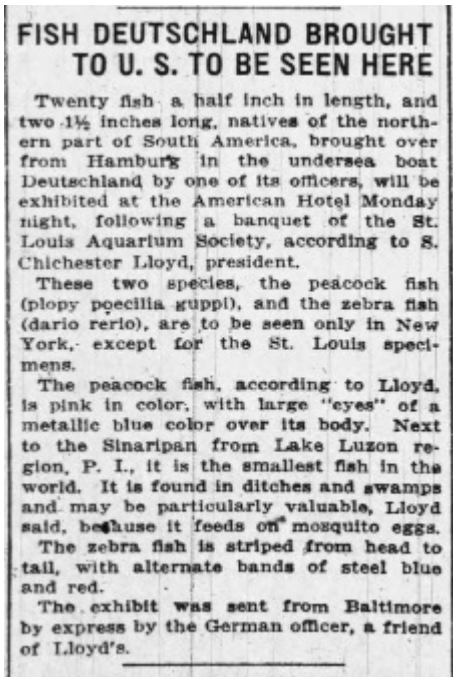
Trinidadian Guppy pair likely to be similar to those delivered by the Deutschland. (Source Wikipedia)



S. Chichester Lloyd at his desk as manager of Elliott Addressing Machine Company in 1927. Aquarium to his left. ⁵



States and return to Germany with raw materials for the war effort. The United States had not entered World War I and was officially neutral at this time. The submarine was the first of seven U-151 class U-boats built and one of only two used as unarmed cargo submarines. Her sister ship, the Bremen, was lost on its maiden voyage to the United States. Due to the United States entry into WW I, the other five submarine freighters were converted into long-range cruiser submarine (U-Kreuzers), equipped with two 150 mm deck guns.



The 22 tropical fish were transported on the Deutschland's maiden voyage. She carried 750 tons of cargo, including 125 tons of highly sought-after chemical dyes, medical drugs, gemstones, and diplomatic mail, with her cargo being worth \$1.5 million (approximately \$36 million today).

There is no official mention of the tropical fish being transported on that voyage. On her return trip to Germany the cargo included 341 tons of nickel, 93 tons of tin, and 348 tons of crude rubber (257 tons of which were carried outside the pressure hull) for the German war effort. Her cargo was valued at \$17.5 million, several times the submarine's construction costs. Possibly fish were sent back to Germany in exchange for the fish sent to the U.S., all on the sly.

The Deutschland made only two voyages to the United States. A third voyage, planned for January 1917, was aborted as German-US relations had worsened following the sinking of shipping bound for the United Kingdom, often just outside US territorial waters. The U.S. declared war on Germany on 6 April 1917.

The Deutschland was taken over by the German Imperial Navy on 19 February 1917 and converted into the U-155, part of the U-Kreuzer Flotilla, being fitted with 6 bow torpedo tubes with 18 torpedoes, and two 15 cm SK L/40 naval guns. Her service to Germany included sinking 42 cargo ships, four from the United States, and damaging one, also from the United States.

So, when you are laying awake at night wondering how tropical fish were transported across the globe in the early days of the aquarium hobby, the answer is by cargo ship ... and occasionally by submarine!

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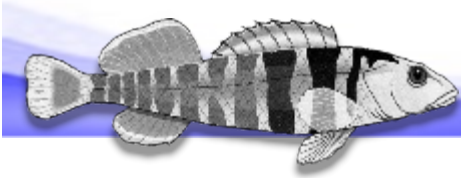
5/ Harry R. Burke, Odyssey of an Cowboy from New York whose hobby is aquarium keeping. St. Louis Globe-Democrat · 5 Jun 1927, Sun · Page 97

Editor's Note: Although S. Chichester Lloyd is mentioned in these newspaper articles as their source, for many St Louis aquarists he may not have been the most recognizable name involved in this early shipment of tropical fish.

At about the same time Otto Beldt, who had already emigrated to St Louis, was about to become active as a fish and lily breeder. The fish in this article were apparently sourced from Hamburg where Otto's father already owned his own import/export tropical fish business. Substantiation has not been found but Otto may have helped import of these fish and they may also have entered his own and eventually widely known fish breeding and tropical fish wholesale venture that lasted late into the 19th century.

[Otto Beldt is still recognized as having a significant impact on the hobby in the region.](#)





The DARTER

**Cnesterodon
decemmaculatus**

-

**The 10 spot
livebearer**

-

By Holly Paoni



© Roman Slaboch

CNESTERODON DECEMMACULATUS IS a sweet little nano livebearer with a name longer than the fish!

Seriously the majority average a tad over an inch. Mature females are between 1.25- 1.5 inches on average. The fry are tiny- just a smidge bigger than *Heterandria formosa*, aka: the least killiefish, another nano sized livebearer. They get this long name from the 10 black spots that lie horizontally down the lateral line. These spots come and go according to mood: Spook them and the spots disappear completely and if several fish are in a breeding frame of mind, those spots on the males get bolder.

The 10 Spots come from southern South America, which has a subtropical climate. They can be found in coastal ditches and drainage systems of major rivers in Southern Uruguay and Western Argentina. There the summer high temps reach the mid 70s, the winter lows drop to the mid 40s and the yearly average temp is mid 60s. They have been seen under a thin sheet of ice during rare freezes. I keep mine between low to mid 60s in winter

and low 70s in summer so average household temps, work perfectly .

Like the *Heterandria formosa*, and a couple other tiny livebearers, this species practices superfoetation. Instead of having all their fry at once, fry develop in intervals to be birthed a couple at a time, every few days through the month. There's a constant supply of new truly little fry to keep an eye out for. Looking for and finding newborn fry of these is always a joy.

4 Spots can be found in coastal ditches in brackish water and can slowly be converted over to a brackish environment. In fresh water they

prefer neutral to hard water, similar to the much more common guppy.

I keep returning to this fish species. I kept them quite awhile, then cleared tank space for something else- missed them, so got them back. ...did it yet again, Because I didn't learn. ...then even yet again.

I think I'm on my 4th time keeping these in over 20 yrs. Only twice while I've been involved with MASI and fish clubs in general- the other times they came from a small hole in the wall, old style independent fish store.

The owner had gotten them, loved them, and kept a 55 gal with hundreds of them, under the sales counter. I instantly had to have some but were told they were not for sale! Back then, the Internet was in its early infancy and I didn't even own a computer yet. Uncommon fish came from ads in the back of fish magazines. No photos, just a sales ad, unless you were in a club, but I knew nothing of clubs then either!

Eventually, the store owner gave in and sold me I scoop. When I moved, I took my new colony back to him. When I went back through the area later I had to stop in, so I got some more. At the time I only knew



them as a spotted dwarf livebearer that needed cooler temps.

My current colony is staying put! Their tanks are my li'l piece of zen, always has been. I love watching them!

They are very peaceful. They aren't chasing, nipping or even zipping around. They don't come up to the front glass expecting to be fed every time they see you, they just continue doing whatever they were doing. You can watch them without them reacting to you like a tiny slice of nature you are just observing. At times they play follow the leader. The biggest female starts going, then the rest follow her lead. They'll make a few laps around the tank and all will join no matter where they had been hiding. Then the laps stop and they scatter like it never happened. When this happens I can get a good head count.

They can be put with literally any species that won't eat them and is temperature compatible without issues. I've got neo shrimp bigger than adult 10 spots. My experience is they

don't bother each other at all. When they meet its more like "Oh, Hi, what are you... ok then, nice ta meet ya, see ya later" ... then everyone's back to slowly exploring the tank again.

10 spots also do not seem at all cannibalistic towards their fry but they will gobble up paramecium, small scuds, daphnia, the various microworms, as well as soft green algae, soft blanched veggies, and a wide variety of small dry foods.

I use a larger gravel or have lower level hiding spots in their tanks. The older juvies and adults go into the plant cover in the middle of the tank during routine maintance. The younger ones go down close to the substrate . I like to give species cover, where their instincts tell them to take shelter.

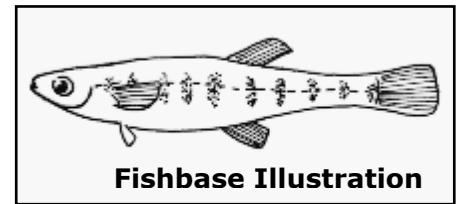
Currently I have 4 tanks of these going. Yes, 4! I told you I enjoy watching them!

I hve 2- 10 gallon tanks each with about 2 dozen fish, 1- 20 long that averages 3-4 dozen. And 1 tiny lil 1 gal next to the living room recliner with a

trio of 10 spots, and a few light green neo shrimp. This tank was a get well gift while I was recuperating from my burns.

It's hard for a fish geek to not be in their fishroom, but if they are, even harder when they can't get their hands wet! So a little piece of the fishroom came to me. Normally I do not like tanks this small, as they take a lot of maintance. This one is small enough I can just take a cup or so out to water a houseplant, then do a quick top off- its handy and not much time.

There are many species that I consider a long term favorite, each for its own reason. The 10 spot livebearer is just one of these.



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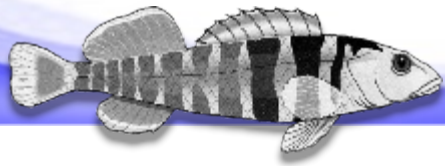


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The DARTER

Diverse Species From the Tanks of Steve Coxon



**This is not
a photo
contest,
it's a FISH
show!**





The Outdoor Pond

By Kevin Wise



THERE COMES A time in one's life where you have to decide, do I just want to tub, do I just want to keep doing the same old thing year after year? For me and my wife, the answer was no, there had to be more.

We both love our plants, we both love our goldfish, we both love the outdoors, and my wife always wanted her own pond. So, I decided to build us a pond, something that would go with the layout and look of our backyard, something that would flow, with what was already layed out and in place.

One night, yes night, due to my work most of the build would be done at night- with a few hours here and there during the day over the next 4 weeks, I laid out a rough plan on where the pond would go and started to dig. When I was done with the outline of

the pond, then came the decisions where would the shallow end be, ...and the deep end.

Of course when you're doing this the best plans never go as envisioned. A HUGE oak tree not even 10 feet from the end of the pond provided some of the fun part. Roots, and just not any roots, we are talking about tree branch size, but after a few long hours, and four and half feet deep later, the deep end of the pond had been dug out. On the shallow end the shelves on the banks of the pond dug out, the shape had also been set.

A few tweaks to the slope, and new larger longer shelf here, and the shape of the pond was done, 2 weeks of digging, shaping and packing and the full shape and form the pond was to have, was complete.

The pond liner was ordered as I now had the size of the pond and knew what to get to make sure I had enough but not so much extra as a waste. Before I placed the liner, I laid some sand and cardboard down to help protect the liner from and sharp rocks roots or anything else that may have been missed.



Now came the fun part that I wasn't expecting, but should have- getting the liner to lay as best I could. I set the liner over the pond and starting in the deep end let the water slowly fill. I made sure to pull the slack of the liner, placing the liner into the corners, placing rocks on the edges and slopes to help keep its shape as the water filled and rose. During this I made sure there was slack and extra liner for the areas that needed room as to not have it too tight. As the water filled, the water pressure and the weight would push it down and fill the corners, edges, shelf and banks of the pond.

The outcome from a long night in the pond paid off as the pond was now full. The deep end was about 4 feet deep with a shallow end of 2 foot deep. The main body of the pond has shelves 12 to 20 inches deep. In the middle of the pond I built a raised underwater island that would be 12



inches below normal water level where a planter could sit. On either side of that was a 12 inch wide channel for water flow and allowing fish to move more freely.



After the pond was filled with water it was time to start placing the rocks that would give the pond a more natural look and feel. There were many many trips to the local landscaping store and after a surprise find of a local rock collector getting out of his hobby, I had my rocks to shape the future look of the new pond. After



a few tries I placed the rocks around the pond in a manner that helped keep the liner down and also gave it a more natural look. Placing the rock is like a puzzle - one wants to make sure all the pieces fit and also hold each other together.

The filtration for the pond is two pumps, one runs the waterfall, the other runs a side shoot of current, which looks like a creek channel dumping into the pond from under the walkway. The waterfall has pore matten foam like a huge hang-on-back filter, the other pump is enclosed with foam all around, and a larger filtration system is being built, but for now the bio load on the pond has not been affected as the pond is stabilized and in normal parameters



I build an overflow at one end so the water level wouldn't spill over where I didn't want water to go. Don't let water get under your liners as that can cause a ton of future issues. To keep the pond in place and not all over the area, an overflow was built like a spillway at a local lake. I built a channel for the excess water to flow down a sand bed with some rock to give it the look of a dried-up creek bed when running water. This runs to a deep area that filled with a mint plant that loves water- a win win.

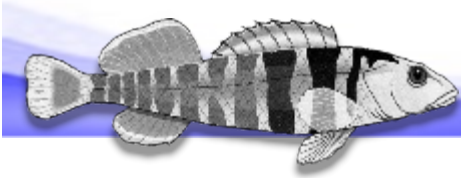
Now that the pond has been running for almost 3 months, there have been a few issues. Rocks fell in, the liner popped up at one end caused by water flowing over the edge causing me to build the spillway system the pond now has. The waterfall had a leak and it was moved so we could keep a

eye on it. A new waterfall will be build next season. This season is coming to a end shortly, so we decided to hold off and just let the pond be for the rest of this season without any major work done. We have let the plants and fish enjoy their first year in their new home.

This project was more of a challenge than I expected but the reward was well worth all the hard work that went into it. There are a few things I would have done differently, but with all that being said, walking out into our back yard, and seeing the pond I built, with my own hands, nothing makes me more happy than to see the smile on my wife's face as she gets to sit with her gold fish, play with her pond plants and enjoy her very own pond that she has wanted for a long time.

That feeling, makes all the work on the new pond, worth ever minute of it. Nothing compares to your very own back yard pond to add to the back yard beauty and expand your playground!





The DARTER

Minifins

The Sailfin Molly

Poecilia latipinna

By Mike Hellweg, CFN
(Certifiable Fish Nut)



YOU CAN WALK into almost any pet shop in the world and find at least one or two color or fin varieties of the sailfin molly, *Poecilia latipinna*. That’s amazing for a North American Native fish, most of which are relegated to specialists’ tanks.

In the wild, the sailfin molly is found from the Cape Fear River

system in North Carolina, all the way along the Atlantic and Gulf coast to the area around Veracruz in Mexico. They are found in pure freshwater, brackish water, and full strength sea water miles from shore. In most of their range, they are relegated to the role of “bait fish”, although a little over a century ago, early aquarists began to recognize their beauty and they quickly became a staple of the hobby, which they remain to this day.

Unfortunately, they are often sold as perfect fish for beginners,

which isn’t exactly true. What is true is that when given the right conditions they are hardy, easy to care for, and long lived, but they do need those “right conditions”. Without those they quickly become sickly and die. A fish that has clamped fins or that is shimmying in the corner rarely recovers and should be passed over.

A quick look at their varied habitat in the wild will shed some light on appropriate conditions, and also help to shatter a popular myth about them. I have personally collected beautiful wild fish from the Louisiana salt marshes, from the Florida Everglades, and from the Cape Fear River in North Carolina. This varied habitat shows how adaptable the species is, and I’ve only touched three of their thousands of miles of habitat!

The Cape Fear River, especially, is a varied habitat. Some of it is fairly hard and alkaline, but not salty at all, some is blackwater where the Black River joins it (which I’ve also collected in – while the water is contiguous with the Cape Fear River, no mollies there!), and some is estuarine. The mollies we collected were found primarily in the estuary. In and near the Everglades, we collected them in clear creeks and drainage ditches, all of which were fed from Florida’s famous aquifer, which is hard and alkaline, but





ALA Logo by Joanne Norton

purely fresh and crystal clear. Further west, in the Louisiana marshes outside of Houma, I collected them in minnow traps to use as bait for fishing for dinner. This water was so algae tinted that you couldn't see more than a foot down in the water column. It was mostly fresh for part of the day as the tide went out, and when the tide came in, it changed over to mostly marine.

By the way, the sailfins I collected were way too beautiful to use as bait, so I released them!

One diver I met back in the late 1970s talked about finding black spotted sailfins about 5 miles offshore from the Florida Keys, in crystal clear marine water about 20 feet deep, always around cover of rock and coral.

As you can see from the varied habitat in which sailfin mollies are found, they are very adaptable, but when you look closer, the range is still within certain parameters. Generally, the water is hard and alkaline – think Lake Malawi water. In parts of the habitat where the water becomes softer and more acidic, such as the Black River in North Carolina, they are absent or at least very few and far between.

In many places it is estuarine, with a mix of salt water that fluctuates throughout the day from almost pure fresh but hard and alkaline, to nearly full strength marine. And in some places, they dwell in full strength marine water.

So, what does this tell us for keeping them in our aquaria?

Well, first of all, if they are wild caught or wild descended fish, find out what their wild habitat was like and try to replicate that. For the fancy varieties, think Lake Malawi water – hard, alkaline and

clean with low dissolved organics – and you should be good to go.

Notice I didn't mention salt!

Sailfin mollies don't require salt to be happy. That's a myth. Give them hard and alkaline water and do large, regular water changes and they will be happy. Salt can be used as an emergency stop-gap measure if the fish are having trouble, but it doesn't take the place of a good, old fashioned water change!

Another myth is that they need to have warm water. I've been in North Carolina in February – it can snow! Of course, even a little snow brings everything human to a halt, but think of the fish. They have to survive in that cold water. And they do. Even as far south as Florida and Texas folks can have cold snaps. The fish survive there, too. As long as the change is gradual, sailfin mollies will do just fine in 60 degree water for a while. In fact, sailfin mollies do very well around here in small ponds and tubs outdoors well into September, and possibly even into October, but they do need to come indoors for the winter.

Outdoors you can see why most of the wild fish are covered with those bluish to greenish spots, especially the males. They use them to show off

when sparring with other males and courting females. You'll see a little of this in an aquarium, but nothing like you do outdoors in sunlight! I've sat along the shore of a clearwater stream in Florida and watched male sailfins cavort and display for one another and for the girls. It's something you have to see at least once in your life.

Two males will dance, flashing their huge dorsal to its fullest, and leaning at almost a 45 degree angle to the surface to catch and reflect the sunlight on their metallic spots. They literally twinkle and sparkle like jewels as they circle one another until one or the other finally gives up. The victor then swims over and starts to court the females, which have been watching from the sidelines. The males do a dance where they bend their body in an "S" curve and seem to almost stand on their tail while flashing their dorsal and reflecting the sunlight on their spots.

It is possible they also release pheromones in the water at this time slightly upstream of the courted female that stimulate ripe females to ovulate. If the female is ready, the male will copulate with her and then both swim off, with the male to repeat the dance again with other males and females. If not, the male may chase the female a bit and try to mate with her, but these thrusts are not always successful. This simple chase and thrust is more common in aquaria, but in larger tanks you can see more natural behavior.

Depending on the habitat, males are more or less colorful. Generally, I've found those in the murky waters of Louisiana to be much more colorful than those of the clear waters of Florida. That makes sense – in murky waters the males have to be more colorful for their rivals and potential mates to see them.

Wild males are varieties of green, olive, silver, yellow, orange, blue and metallic green, varying from habitat to habitat. Some have more or less black speckling. Some populations have red, orange or yellow outlines on the



© Oliver Lucanus



© Río Meta





dorsal and caudal fin, others do not. Wild females are generally green or olive with a whitish belly.

Domesticated fish can range from chocolate brown to coal black to gold to silver to pure white. There are bright red varieties, and those with creamy colored bodies and black fins. There are those that are marbled with black and silver, black and gold, red and white, and lemon yellow and black. There are several different types of albinos – pure white, white with yellow or gold, pure yellow, orange, deep red, or marbled with yellow and red, red and white and gold and red.

Even though the large dorsal is naturally occurring, I've seen males with extra-large dorsal fins. And all of the above colors also come in veiltail and lyretail varieties. If a pet shop were to try and carry all of the potential varieties, they might not have room for anything else!

Now that you're excited about the possibilities, let's look at a tank for the sailfin molly and how to care for them. They are big fish, males topping out at about 4 inches, and females can top 5 inches. That means for a group of them (and if they're happy and you have males and females, you'll soon have a group!), you shouldn't consider anything smaller than a 40 gallon breeder. Better a 55 or 75 gallon tank.

Use crushed coral, aragonite sand, dolomite or some sort of limestone gravel for substrate, and you can use limestone rocks for decorations. Artificial driftwood is fine, but avoid natural driftwood as it will release tannins into the water which will be counter to what you're trying to do. Plants are most welcome,

and various long, grassy plants will be similar to what you would find in the wild. The tank should be brightly lit and have an open area for swimming and displaying. This will provide the males with room for their natural



displaying and courting. It will also encourage algae to grow, which the fish will nibble on all day long, just like they do in the wild.

I should mention here that some sailfins turn into lawn mowers and no plants are safe, but for the most part if they're well fed, they will just graze on the surface of the plants.

Their diet should be largely vegetarian, with a spirulina based flake as a staple diet, supplemented with vegetables like romaine, zucchini, squash, pumpkin, green beans, bananas and similar fare. Once or twice a week give them something meaty like frozen brine shrimp or Mysis. Realize that they are pigs and will eat and hunt food all day long. Generally, when they aren't mating, they are eating. Young fish grow quickly and eat even more per gram of body weight than their parents! Adults tend to ignore their fry, but if they aren't well fed, they may snack on a few of the smallest fry. Even if they are well fed, their habit of grazing all day

long will compete with the fry for food. So, if you want to quickly raise some nice fry, it is best to give them their own tank set up just like the parent's tank.

Since I haven't mentioned it yet, they are livebearers. Females will drop more fry as they grow, and a really big female can easily drop 200 fry. It is best not to move the female when she is close to dropping – generally it is safe to move her up to a week before, but within seven days may cause her to drop early and these fry almost never survive. Never move a female that has squared off – that is to say she looks like she has swallowed a block of some kind. This generally indicates that she is about to drop, and usually will within 24 hours of squaring off.

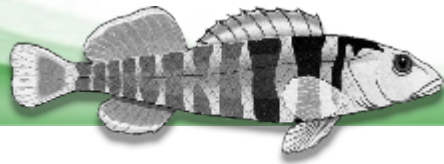
Females generally drop 5 or 6 broods in sequence and then stop carrying fry for several months. This is normal. Usually, there are about 28 days between broods, so after one brood you can calculate when they next one is due and when it would be safe to move the female.

The fry will feed continuously all day and should be given very hard, alkaline water with extra sources of calcium like chicken grit, oyster shell (used for chickens and small caged birds as "grit" to help them digest their food) or limestone pieces in the tank. This will be used by the young males to build their spectacular dorsal fins as they grow. With plenty of food, space and water changes, they can easily reach an inch in size in just 5 or 6 weeks, and two inches by the time they are three months old.

Sailfin mollies are always in demand and do very well at club auctions as well as when used as trade bait with local shops. Other folks will be looking for fish like these spectacular animals for their tanks, too.

Which reminds me - don't forget to sit in front of the tank and spend time just watching your fish!





Eichhornia crassipes

**Non-native
Invader in
Warmer
Climates**

By Micah Issitt



© Wouter Hagens

A FAMILIAR WATER GARDEN plant not native to Missouri is *Eichhornia crassipes*, better known as the “water hyacinth”. This plant acquired a misleading common name and is not related to its namesake hyacinth (*Hyacinthus* spp.), a group of flowering perennials native to the Eastern Mediterranean. *Eichhornia crassipes* is neither North American, nor European, but occurs naturally within parts of the Amazon river basin.

***E. crassipes* and our own native pond plant, *Pondetaria cordata*, are both members of the same family and subfamily, and have characteristics, including similarly hued purple or blue flowers and glossy green leaves that emerge from independent, meaty stalks. Unlike the pickerelweed, *E. crassipes* floats over the water’s surface on spongy inflated stems and its roots may dangle a meter or more below the surface.**

Pond and tub-lovers know this plant well, as it is basically the botanical equivalent of a spawning mop, providing a convenient, and mobile way to collect eggs. The plant is also quite “hungry,” and sucks up a tremendous amount of waste from the water as it rapidly grows and multiplies,

like some sort of floating botanical rabbit.

The widespread cultivation of *E. crassipes* has been an ecological nightmare. The plant is now feral in many of our subtropical states and other parts of the globe, wreaking havoc on ecosystems and clogging natural waterways. This is a prime example of one danger of utilizing exotic plants in landscaping.

Here in Missouri, *E. crassipes* doesn’t pose much of a threat because Missouri winters, even mild ones, are too severe for the tropical *E. crassipes*, which quickly withers and dies in the cooling fall, while it’s cousin

P. cordata shuts down to await the return of warmer weather.

We don’t need to worry about spreading the species to native waterways - for now, I remain wary of global warming, and Missouri gardeners are free to employ *E. crassipes* in our ponds and tubs.

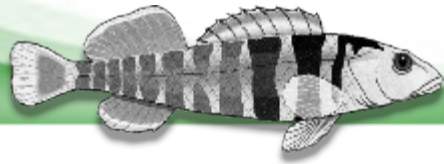
***E. crassipes* and *P. cordata* look great together.** The similarities in the texture and color creates a harmonious scene, and their different structures add to the visual interest of their collective display. Once the water gets to around 23c (~75 F), both species often flower at once, which can create a lovely flush of fresh-looking color across the pond.



Kenya, Kisumu Harbour Hyacinths

© Dr.A.Hugentobler





Jewels of Shaw's Gardens



Victoria Lily *Victoria amazonica*-

© GWL



Hardy Lily *Nymphaea* sp "White Hot"

© GWL



Hardy Lily *Nymphaea* sp "Tan-Khwan"

© GWL

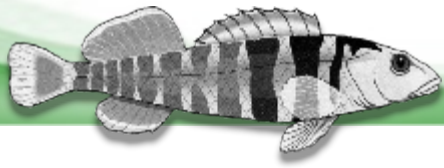


Hardy Lily *Nymphaea* sp. Selection

© GWL

Taken by Gary Lange





HAP Seed Article

Aquatic Forget Me Nots

Myosotis scorpioides

-

By Holly Paoni

AQUATIC FORGET ME Nots are a very easy pond, bog, or water garden plant. It grows about 8-10 inches tall then easily blooms, readily seeds, and also propagates readily by rhizome.

It is winter hardy and a great plant to submerge in the shallows near the edges. Just don't put it more than 4 inches below water. Mine is where the sunlight changes throughout the day. Indirect, partial, full, partial, full, indirect- it doesn't seem to mind.

My start was acquired at an area pond store this spring, in an overgrown nursery pot. I divided that pot into a few plants that were scattered throughout a long curved pond basket with sand, gravel and clay mix then plopped it into the pond in early May. By June it had tripled in size filling that planter and creeping down the side and across the pond it was in.

It started blooming constantly in June and hasn't stopped yet. It's now the end of July, and I have 4 planters filled from that first start, and have already sent 2 portions to the meeting mini auction.



Holly's HAP Bloom

Myosotis scorpioides does seed readily and frequently. For me it seemed that every time it got close to seed harvest we had thunderstorms. The next day the stems with maturing seeds, were battered, broken or submerged from the rain.

This plant self seeds, so these hidden seeds, buried in foliage with bright blue flowers, if they land in water, won't go to waste. To my surprise, luckily, I found seeds in one of the portions I had pulled to sell for HAP at the mini-auction!!!

This plant can eventually take things over and become invasive, so keep that in mind when choosing a good spot for planting. The only boggy conditions near me, are in my pond and tubs.

A pair of Hondurian Red Point cichlids spawned in the pot of Creeping Jenny next to the original pot of Forget-Me-Nots. They would take the fry into the Forget-Me-Nots during the day then back to the Creeping Jenny pot in the evening. The Creeping Jenny has taken a beating this year but being able to watch a pair care for their brood that close to the waters surface is worth it...and there are now pieces of the Creeping Jenny and the Forget-Me-Nots all over as well.

It's one thing to watch fish in a tank and seeing them in a tub from a different angle is a nice experience. There is no cave to block the view, just a pit in a pot, about 3 inches under the waters surface.

The Hondurian Red Point fry are feeding on whatever micro organisms, paramecium, etc that are living in and around the Forget-Me-Nots and are sheltered in its stems from the other 31 adults, and school of 10 Rosy Red Minnows, and the last of my *Fundulous olivacious* killie fish in this 300 gallon pond.

Aquatic Forget-Me-Nots are a great plant to try, just be ready to give some portions away- and quickly- as it does multiply rapidly. I'm enjoying it as a new addition to my collection.



Red Points





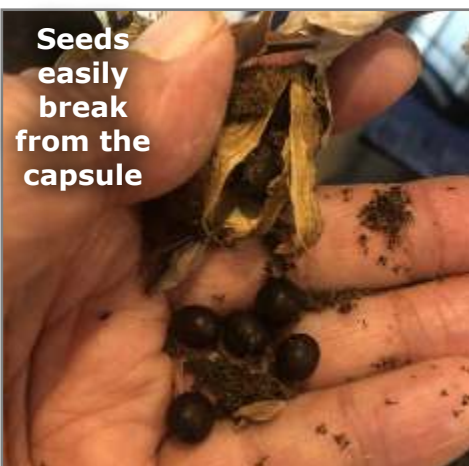
HAP Seed Article

Cannas from Seed

By Connie & Chuck Bremer



Fruit soon after blooming.



Seeds easily break from the capsule

WE USE A lot of Cannas in our home landscaping and water gardening. They grow well, create a good screen and are colorful around the outside of the house.

Usually we try to over winter the plants after drying the soil by placing the pots in a semi-protected place, such as our garage, and usually they over winter and can be redisplayed the following year. The winter of 2020-21 was severe enough, however, that all froze in the garage.

Cannas were also fairly expensive this spring at local garden centers and sometimes hard to find so Connie, who worked several years at a landscaping/nursery business, decided to sprout our own.

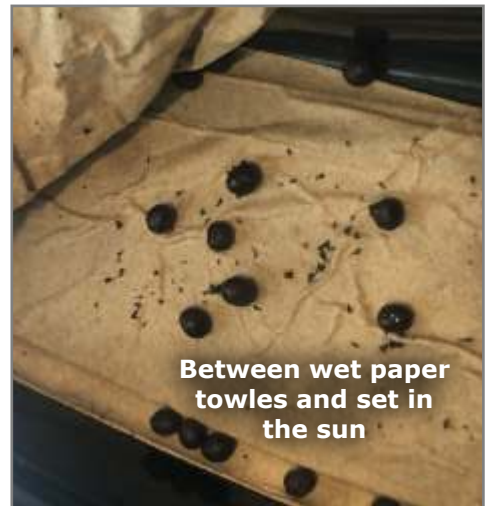
We had collected seeds from several varieties in previous years so had quite a selection of seeds- red and yellow, with both light and dark green and red leaves. Please note that some hybrids made between species will be sterile and flower but never create seed. The hybridization process creates unviable nuclei that are not viable.

Cannas seeds have a very hard outer cuticle that prevents the seed from imbibing water so she used a file to cut through that coat, or scarifyit, to assist the inner embryo to imbibe water and start to swell, placing the seeds between wet paper towels. Initially they refused to sprout inside at temperatures in mid-70's F, however, when moved outside into the warmer temperatures well above 80F they began to sprout within a week.

It would appear that a higher temperature is required to complete the vernalization process. One method recommended by some is to scarify, then pour nearly boiling water over the seed to get them to initiate sprouting. We have not tested this.

The young sprouts grow rapidly when maintained in a warm environment and were soon ready to transplant.

We now anxiously await blooms to affirm the



Between wet paper towles and set in the sun



About 4-6 wks growth

colors. We're hoping to have grown some red blooms with red leaves.



The **DARTER**



November/December 2021

INSIDE THIS ISSUE

KEY:

IMPORTANT

Fishy

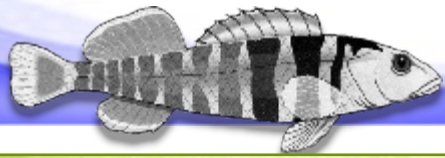
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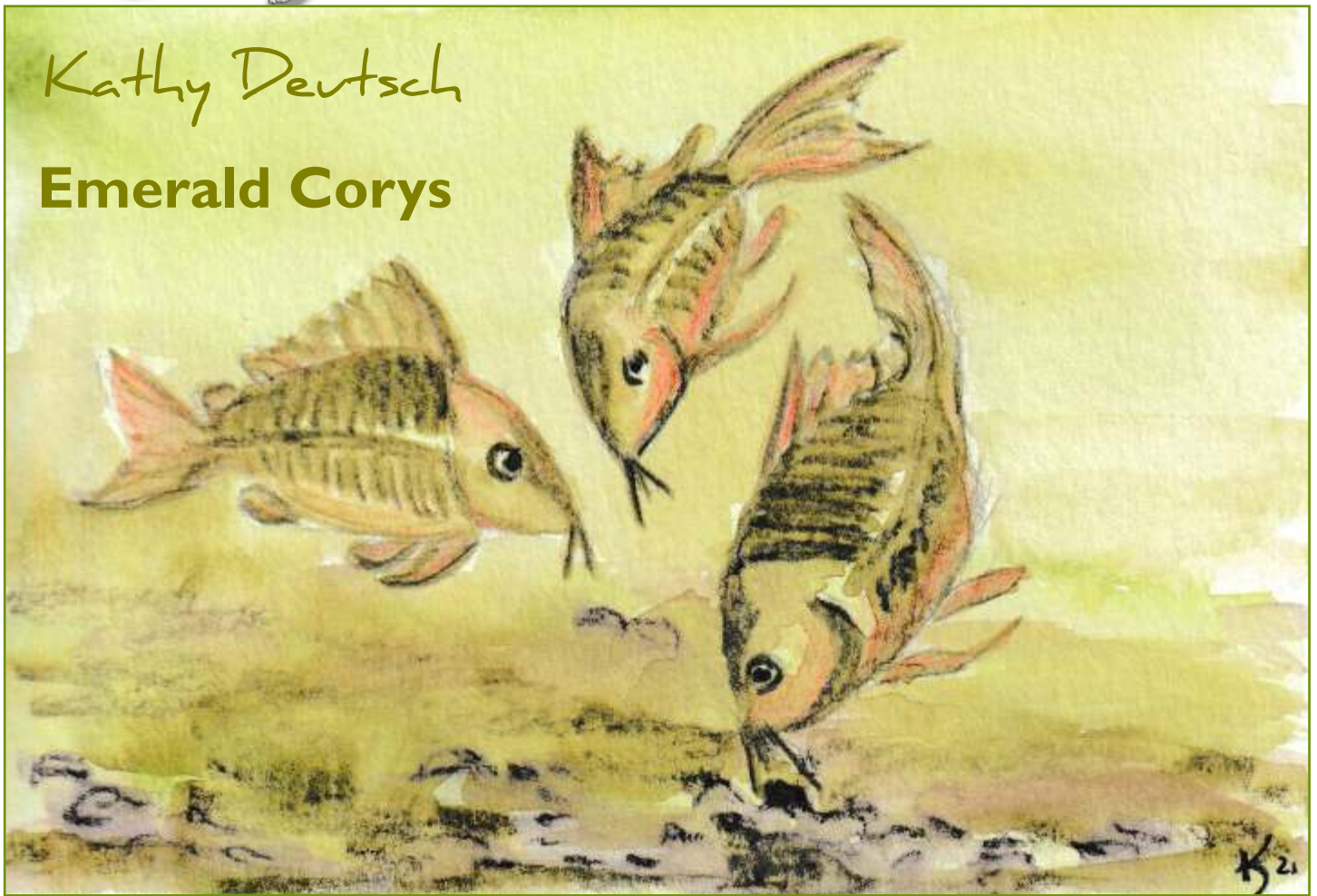




The DARTER

Kathy Deutsch

Emerald Corys



Hope you liked these Articles published for Dues paying members of the Missouri Aquarium Society in 2021!



MASI 
YouTube Channel 
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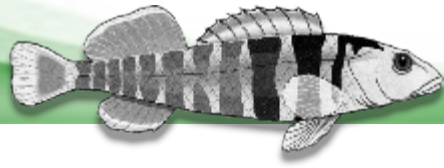
For a quick and free way to interact with the local St Louis Aquatic Community, Click or Scan to join MASI on one of our Social Media Sites:

 
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Wabi-Kusa Creation

MASI's October Aquatic Hands On

By Melanie Holmes



INSTRUCTION AND HANDS-ON experience developing their own miniature aquascape was provided Missouri Aquarium Society's members by Melanie Holmes. Melanie is a very active Aquatic Gardener and participates in many of the AGA's activities, aquascaping and contests.

The Demo/Hands-On was video taped and is available to view on the Missouri Aquarium Society's YouTube Channel: <https://TinyURL.com/MASI-video>.

Here is a brief guide to making your own Wabi Kusa at home with photos taken from the event.

Tools and equipment:

- **Container** to hold the final creation as it grow and develops.
- **Square of fine netting or tulle** used to encircle your dirt ball. Black or brown colors usually blend best with the soil.
- **Black cotton thread** to tie things together.
- **Tweezers to position** plants and to help tie the thread in close quarters.
- **Paper plate or newspaper** to work over.
- **Misting water bottle.**
- **Plastic Cling wrap** to seal the container.



Plants that work well include:

Many stem plants, such as Hygrophila, Ludwigia, Rotala, Pennywort, Pogostemons and others work well.

Some ferns such as Indian fern, Java fern and mosses, such as Java moss and similar species can also work.

Avoid always submerged plants such as Vallisneria, Myriophyllum and Hornwort.

Experiment and see what works for you, some plants are surprising!!



Now, Get Those Hands DIRTY!

Generally follow these steps:

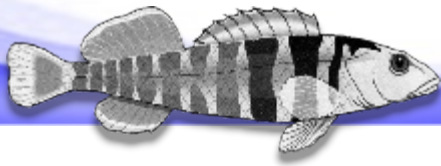
- **Soil mix:** Begin with about 2 cups of Aquasoil, ½ cup potting mix and, optionally, powdered clay to hold it together. This mix is a good place to begin, but experiment. Reducing the clay reduces water cloudiness.
- **Add water** to the the substrate mix to form a substrate ball. Continue adding water slowly until substrate retains a ball shape
- **Transfer the formed substrate ball** into a cradle of fine tulle netting and use thread to cinch it up and tie into a ball. Cut off excess netting and thread. Put the knot on the bottom.
- **Cover the substrate ball with a thin layer of moss and plants.** Wrap the plants and mosses with thread to hold in place and tie it off.
- **Put the Wabi Kusa in a container** with some water and cover with cling plastic wrap to hold in the moisture and humidity. Set the container under a light or in a window.
- **Gradually remove the cling wrap** over a period of a few weeks as the plants grow and acclimate to being emersed.

Enjoy your Wabi Kusa and try another!



After 2 ½ Wks Grow Out!





Pandemics, Business and Luck

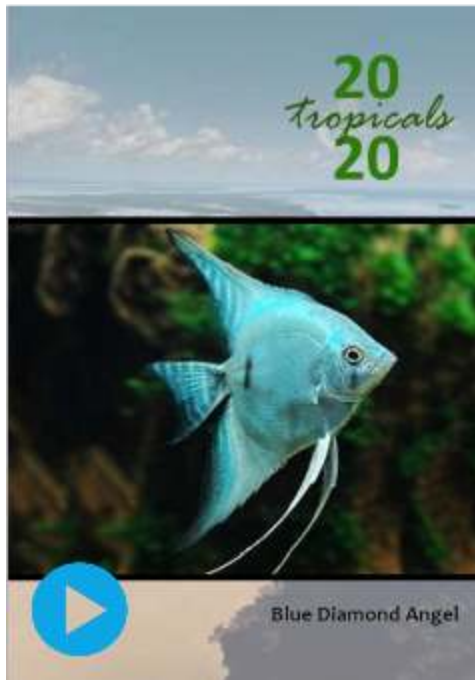
Surviving 2020, 2021 and Luckily emerging stronger!

By Kevin Plazak

IN CASE YOU are wondering where the heck I went, I dealt with a pandemic messing with me and my business.

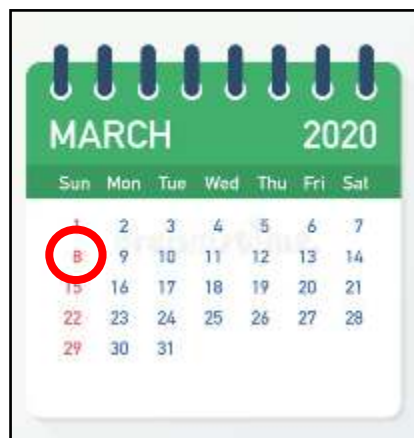
I learned that when I work over 40 hours a week, walk my dog 1 hour a day (almost every day), do basic home chores and anything that comes up, I barely have time for 8 hours of sleep every day. After talking to my wife, we figured I could take up hobbies again once I was working at or less than 40 hours a week.

September 20, 2021 is week #2 of about 40 hours -- writing was my first indulgence! (And as I sit here, my wife just got home and is giving me the side eye. The dog is just staring... RUDE!)



You know, when you boil everything down to its purest form, succeeding in business is a choice.

You will either stay open by any ethical means necessary or you will fold. Assuming ethics don't hamper your choices, staying open will be easier. Let's walk down my pandemic path and it should bring you up to speed. The year was 2020...



The pandemic was just starting to take hold in our region with the Kirkland, Washington nursing home, ground zero for the pandemic in this region, only three hours from our shop and ten minutes from a customer's front door. No one really knew what

was true, but our governor declared a state of emergency on March 8th due to the pandemic and issued a stay-at-home order on March 23rd of 2020. Essential employees and essential businesses only!

We had a lot of luck in March, most of it bad. Many customers closed or did minimal hours and almost no orders. This wasn't great for the bottom line, but it helped our business because all of the staff quit. No orders meant we didn't need the help – win win! One of my staff quit because she was pregnant. One quit because her boyfriend had a heart condition and she didn't want to expose him to anything lethal. One had put in notice a while before March and we had hired a replacement who didn't quit! But we didn't really need him since the world was burning. *15 years of institutional knowledge gone in two weeks.*

But we were an essential business and THAT alone was likely the cause of us not closing. That was the really good luck in March.

Rent was due every month, no reprieve was offered by my landlord. I have a tenant to comply with local ordinances regarding wholesale facilities. He kept paying his bills and I didn't have budget to cut him slack.

Kevin's PART 3 to A "Hobbyist's" Guide to Selling Fish, published in March 2020, coincided with the onset of the COVID pandemic.

Since then he has been "taking care of his own business". Here are experiences and adjustments made to survive.



So, we all sucked it up and paid our bills. Then April hit and I was pretty sure that the business was going to fold.



We did about 1/4 of our regular sales in April, almost entirely feeder items. Everything we sold was a low or no margin item with delivery charges to the customers going through the roof. The bank account was sucking wind, but thankfully our main supplier of fish closed in March so we couldn't buy anything. No money out and a little money coming in means that we might just survive until we run out of fish. We had about \$20K in fish and that would keep us open for a few months. Maybe the business wouldn't close?

Then our main competitor in town closed. This was a mixed bag because our main competitor made most of their money selling feeder items and, although they closed, to this day they are still delivering feeder items. We didn't make as many inroads as we would have liked from that closure, but we did pick up all the companies that bought fish from them.

April was a low point for everyone in Portland. The question was, is their closing a clue for us that we should quit too OR double down and really dig for every penny?

May was the turning point. After working for eight weeks alone and every day of the week, the orders started trickling back in. May was filling with sales, each week better than the last. We needed more help than one old man and one cranky dog, and we needed it quick. An ex-employee of ours posted the job on Facebook and multiple people suggested the same person. That seemed like a good sign.

We hired Maria and she is still working for us today. Single best hire ever.

May also brought us a couple of other bright spots. We had applied for the PPP loan and we were approved in late May. The application was filed in April before employees were a thing and we wanted to ensure there was money for rent until the end of the year. We applied for and got \$4,728. That tiny amount of money made sure we would stay open until January 2021. \$4,728 is essentially a check to a single fish vendor every week, but at the time my fish vendors had closed. Many vendors had also stopped shipping fish and that small loan along with the funds in our bank account should keep the rent paid, lights on and heat flowing. Win!



Another big moment happened while I was delivering feeder items to a customer. We talked for a bit, I told them my company could pay the bills until the end of the year, but we were in a bad spot. He had started feeling the up tick of money spent on pets during the lockdown and handed me a blank check. This store owner owns



three pet stores – he is an accomplished business owner - owning over 10 that I know of- pilot, family man, lover of beautiful machines and inventor. We should not have been on his radar so prominently – but he knew we made him a lot of money in his many fish rooms. The faith he had in us probably did more than any single event during the pandemic.

So the staff was set until we needed more: A driver who worked one day a week but wanting full time, an office worker gaining stamina and skills in a humid warehouse, an old guy who was too old for this sh*t... what could go wrong? The sales kept growing month after month until July blew every sales record we had ever had! We continued to break sales records every month from July until February of 2021. In May, our main vendor reopened and fish buying became much easier. It was far from perfect, but it was a LOT better than nothing.



People had disposable income and no place to dispose of it. Pet stores were considered essential businesses as dogs and cats need their brand of food. Reptiles need live food. As long as the pet store is open, people used their disposable income on fish and tanks like no time we have ever experienced. Stores that rarely cracked \$500 invoices from our company were blowing \$1,500 a week! Things continue to be really good to this day. But, for a moment there, things were a



bit more terrifying than you could call “comfortably terrifying”.

I would love to sum up how to continue to survive in a pandemic but I don't have an answer. I got lucky that pet stores are essential. **I got lucky** that just enough good luck fell my way. **I kept showing up to work and doing my job every day** – hell or high water. And, while I don't have the answers, I believe Teddy Roosevelt has the closest answer to how one stays open when times are tough:

"It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who



errs, who comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat."

If things are getting very bad, it is brave to consider a future for yourself that is different from the path you are currently walking. Changing

careers or fighting for your existing career can be “striving valiantly” if you do with your eyes open. Minimize your risks, maximize your options and always dare greatly!

Sorry for the bluntness, business is what I know, but I still am a hobbyist. Talking with others in various aquatic clubs once in a while has worked me up into a froth and I am renting a 2,500 square foot space to turn into a fish room, possibly a fish club, and looking for some hobby again.

Hopefully things will stay smooth at the shop and I will get to participate with the club more in the future.

I may have lost my mind...

Anyhoo -- it's good to chat again!

Continuing Recovery and Growth - Business Space considerations for the Future

By Kevin Plazak

We added a lot of tanks during the surge in sales. I tore out the marine section, as did many of my customers, and added 102 more tanks so far. We are about to get 36 more running some time this week. Every new tank allows me to pick up a little more business. Hopefully we'll have about 300 new tanks when all is said and done. That would be about double the number of cubes of water since 2019



before the pandemic.

I have always had fewer tanks than the other kids. Making a wholesaler work with 300ish tanks is a function of weekly inventories, running the stock levels always lean and sometimes stocking one tank with two

species. I keep gar-like characins with nerites for example -- it is a good pairing.

With three hundred tanks of fish (or snails), we make a catalog of 11 pages with 20 to 35 items per page that makes customers happy enough to order weekly.

Average tank size today works out to 24 gallons but when I am done with the installation of the new tanks, we will be at an average tank size of 19 gallons.

I found that if I want to carry interesting, rare or expensive fish I will need space for them to sit for months. Single specimens don't need a lot of space, so adding a host of 10 gallon tanks will allow me to order a single expensive fish, or a group of 3 expensive plecocs -placed one per tank if they are t*rds- or a pair of mid-sized cichlids, with a divider of course, or a single big fish per tank... the options are endless. Now they need to pay for their stay in a 20/30 gallon tank, and that is tough to make work when a common fish will sell out of a 20 gallon tank every week or two and net me at least \$100 a week with that turnover.

With 300 tanks now, I would say 100 tanks pay all the bills. And many of those 100 tanks are duplicate species in multiple tanks -- Rummynose, Otocinclus, Guppies... they all get at least three tanks when they arrive at the shop and one or two tanks when I am running

low. A Rummynose tank can often net me \$400 in a week, whereas a Blue Tetra tank can net me \$100 one week and \$0 for the next two weeks. Without both (or other less popular offerings), folks will look for other wholesalers. So -- I need about 100 to 150 items in stock to stay open and as many attractive items as I can pack the place with -- and the weird/expensive stuff needs to rotate all the time.



So, the really long answer is, you will do just fine as a wholesaler with 100 tanks and all the right items, but you need about 200 to 300 tanks to be a wholesaler that can pick up new customers regularly, in my opinion. My data supports that finding, but I am also the salesman, manager, accountant, buyer, etc... so I am obviously affecting my data and making subtle choices I wouldn't make without all the data of every facet of the shop. There obviously other things that matter, but the list of items for sale sells you to your new customers more than any other thing. A clean, full, interesting list that actively changes will garner the most return for the effort.





Consider Aging...

...of both the fish and its keeper -

By Kathy Deutsch



I F THE PANDEMIC has taught me anything, it is that if we are lucky, we get to grow old... So, too, our fish and our tanks age.

I know I never think about aging aquarium seals, sagging stands, or broken heaters until I see water on the floor. The zap when I touch a tank tells me something electrical has shot craps. It's a wacky idea, I know, to have a checklist of what ages out in an aquarium, But thanks to the pandemic, I had time to worry about fish tanks BEFORE something broke. Truth to tell, it was nice to have something different to worry about.

WHAT AGES UNDER NORMAL CONDITIONS

- 👁-the seals of the tank
- 👁-the corners, if the stand or the floor shifts
- 👁-the plastic frame of the tank
- 👁-the cover, hood, lights and the cord/plug
- 👁-the stand (depending on the material or if the floor shifts)
- 👁-tank decorations made from plastic (get brittle) or ceramic (glaze cracks)
- 👁-plastic plants
- 👁-the filtration and pump (even my 10 year go-to, the sponge filter, gets gummy)

- 👁-the heater (I put my hand on the front glass of every tank, every day when I feed. If the temp is off, that is an immediate unplug and pull the heater out. Hopefully, I have grabbed a bucket first to put the dripping heater in. Usually not)
- 👁-extra pumps and water movers in the tank
- 👁-FISH FOOD
- 👁-nets
- 👁-buckets
- 👁-THE INHABITANTS
- 👁-...and the fish keeper

The list above is a good starting point but it's MY aging that was a wake-up call.

As much as I wanted to recreate my "fish house" with my current abode, I had to face facts. I despise low-to-the ground tanks. Starting a siphon is bad enough, starting one and getting it to the bottom tanks is tiresome. And once my 50's were in the rear view mirror, I had to admit it held zero interest. I created a list, then, of what to consider in keeping fish as I aged.

FISH KEEPING AS THE KEEPER'S AGE CREEPS UP

- 👁-can I reach the whole interior of the tank easily, without a ladder?
- 👁-can I do a water change and clean or siphon?
- 👁-can I manage the filter(s)?

- 👁-can I continue to check everything every day, no matter how I feel?
- 👁-if I get sick, who can care for the fish?
- 👁-if my foot-long Oscar dies, can I wrangle it out of the tank? And where does the body go?
- 👁-if there is a problem, who can I ask for help?
- 👁-if water is leaking, what is my plan?

...actually, that is my going-in position with continuing to keep fish.

BUT WHAT IS MY PLAN?

Everyone has their personal "how to" in caring for their fish. But that evolves as we grow in the hobby, and also when we decide to do less. Aging creeps up. And cleaning the filter gets harder, or we just cannot lift one more bucket. Since we are responsible for these fish of ours, having a plan is a comfort. And one less thing to worry about.

I knew I wanted to keep fish until my last day on earth, if I could. Having had fish, in buckets, ponds, at the end of my fishing line, or in tanks since I was a baby, there was no way I was quitting. But keeping large or aggressive fish takes vigilance. Keeping big tanks takes a keen eye, a quick hand, strength, and again, vigilance.



What I enjoy, these days, is an underwater landscape. Rocks, plants, fish, all easy to care for. I want to avoid heaters and big filters.

Thanks to my time in the aquarium industry, I have developed sensitivities to aquarium bacteria. If I get filter muck on my arms, and don't immediately wash it off, I get a rash. And when handling big filter pads, that goo gets everywhere. Aging skin is thin, even without sensitivity, fish poop can cause a problem. Likewise, siphoning and glass cleaning poses a problem if the dirty water is soaking a shirt and jeans... and the floor... and the dogs.

Having swallowed enough tank water to fill a 10 gallon, I was not dealing with that any more.

I recently bought a new Fluval all-in-one tank. For over a decade I have kept a betta in my kitchen, using a small Fluval all-in-one, with a spider plant on top of the tank (roots in water), some rocks, and plants. The flow is too strong, so I unplug the filter during the day (when I feed) and turn it on at night. The LEDs are great.

This new, somewhat larger tank holds some guppies, some gravel, and some plants. It's a work in progress. I am finding new joy in spending a few minutes fiddling with the tank. It's easy to work on, and I can wash up quickly after.

My plan is to slowly quit the bigger tanks and add small ones. I still want to breed cories, and will keep a rack of 6 20 gallon tanks for that. Otherwise, I will keep small livebearers and the like. If I feel ambitious, I will get some *Apistogrammas*. I did a lot of work with *Panaque* (the blue-eye) and it took a lot out of me. I cannot imagine attempting THAT breeding colony again, especially since that fish comes from the wild. I think tank-raised species will be enough.

If I plan to keep on with fish, I know there will be times when I need help. My starting position is to do this alone. But if I get involved in cory breeding, things can get out of hand tank-wise.

I am blessed with 2 adult children and a son-in-law who keep fish. In a pinch, they can help. They will also be the voices of reason when the 256 gallon tank seems like a good

idea. Either that, or they will help me with it. My spouse already does a lot of work on the big tanks; I won't be adding to his workload.

If I plan to keep on with fish, I know there will be times when I need help. My starting position is to do this alone, but if I get heavily involved, things could get out of hand.

Ambition does not wane the way physical ability does. That, it seems, is the big "gotcha" of the hobby. I can see getting in over my head again. And that is where MASI comes in.

Fellow fish club members can advise, suggest, and bring me back down to earth when it comes to fishy schemes. If I do get in trouble with too much, I am confident I can ask the club members to rescue the fish and take the tanks/equipment.

My fall-back plan is a plea online to club members for HELP!

Finally, the water on the floor that spells trouble? No matter how I plan, that is still my problem.



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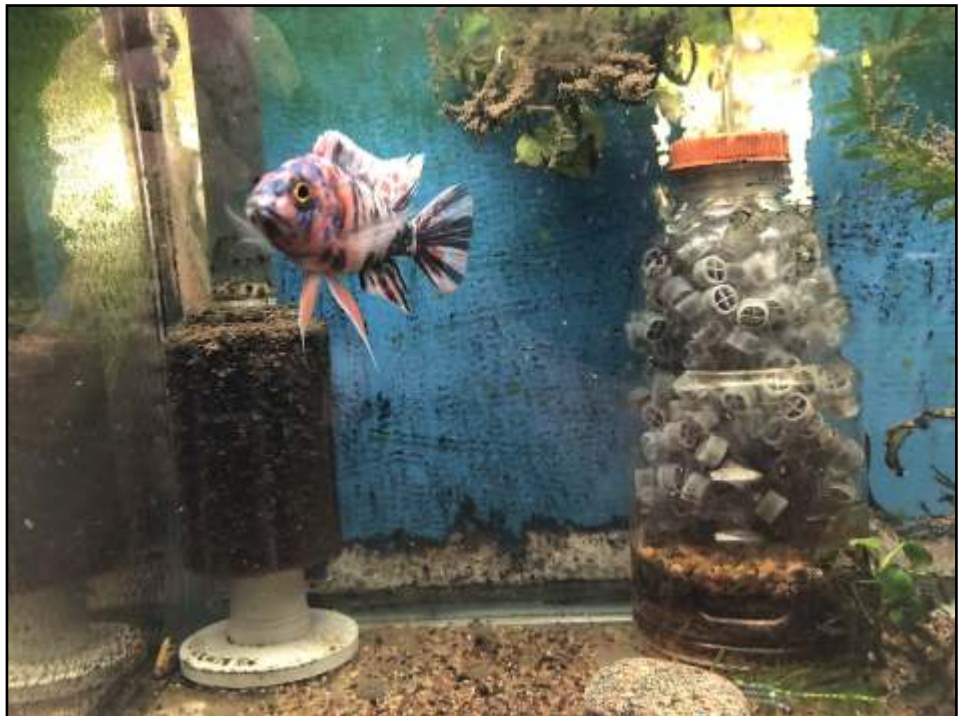


Plastic Bottle Nitrifying Aquarium Filter

By Art Pesch

Member both CAFE & MASI

1st printed in
CAFE's InSein
Menu, July 2021



My version uses these materials:

- 🐟 32 oz. sports drink bottles
- 🐟 1/8" or 3/16" clear rigid airline tubing
- 🐟 Fill bottle with 1 1/2" of Aquarium gravel
- 🐟 Add KI Micro Filter Material

of the bottle. The upper holes allow the air and circulating water to escape.

Drill another series of holes around the perimeter of the bottle about 1/2" above the layer of the gravel. Unfortunately these holes do not show up in the picture. These holes allow the water to enter the bottle. After all the holes are drilled use a small rat tail file to smooth the holes and then clean out the plastic bits from the bottle.

Next drill a hole in the center of the cap providing a snug fit for your rigid airline tubing. Cut the air

Hint: To drill the holes in the bottle a sharp drill is a must. Use a variable speed drill and vary the speed until you find the sweet spot. Practice on a scrap bottle first to get a feel for this.

ABOUT A YEAR and a half ago three CAFE members: Phil Nixon, Jerry Montgomery and I took a road trip to Indianapolis to visit Charley Grimes' fish room and some of Indy's aquarium stores.

While touring Charley's magnificent fish room, we were fascinated with his DIY nitrifying filters. His filters were all in very large tanks and were made of 64 oz. or larger sports drink bottles.

I made similar filters for the rack of 10 and 20 gallon breeding tanks in my heated garage & model airplane workshop.

To prepare each bottle I drank the sports drink and washed the bottle thoroughly.



Next I drilled a series of 1/4" holes around the bottle. The first ring of holes is about 1" from the top



KI Micro Filter Material (available from Amazon)





The lower holes towards the top of this bottle were a mistake and allowed too much air to accumulate, floating the filter with delivery tubing about an inch longer than the total height of the bottle.

Assemble the filters by thoroughly rinsing your gravel. Add

about 1-1/2" of the gravel to the bottom of the bottle.

Then add enough of the **K1 Micro Filter Material** to fill the bottle a third of the way to the top. Note: this is a trial and error process. Too much of the K1 material and it won't turn over no matter how much air you run through the filter.

Push the rigid tubing through the filter material and gravel to within an 1/8" of the bottom of the bottle.

Finish the filter by sliding the **cap down the rigid tube** and screw it tight. Adjust the tube so it's not touching the bottom of the bottle but is just above it.

Sink the filter in your aquarium and allow it to fill with water. Attach an air source to the tube and adjust the flow so there is a nice turnover of the filter material. If the material does not turn over, try a little more air flow. If that doesn't work, you may have to remove some filter material. Do NOT do this in the tank as the material will float out and go all over the aquarium.

The nine filters I made took an afternoon of work.



My nine filters before adding the filter material.

It will take 10 days to two weeks for the filter material to become coated with nitrifying bacteria. After a year, I did have to rinse the filter to remove some debris. These filters have given me an extra level of comfort for the stocking levels in my breeding tanks.

My thanks to Charley Grimes for the inspiration for this article.

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Jenynsia onca

Spawning the Uncommon One-Sided Livebearer

By Mike Huber



© Imperial Tropicals

JENYNSIA ONCA is a livebearer in the family Anablepidae from South America.

The Anablepidae is a family which lives in brackish and fresh water habitats from southern Mexico to southern South America. It consists of three genera, the *Anableps* or four-eyed fish, the *Jenynsia* or one sided livebearers, and the *Oxyzygonectes* or white eyes.

These species are distributed in the Rio de la Plata basin and Atlantic coastal drainage from Rio Negro Province, Argentina to the city of Rio de Janeiro, Brazil and in the Andean drainage of northwest Argentina and southern Bolivia.

Anableps species are often called one sided livebearers. Earlier it was thought that they only mated on one side, right-handed males with left-handed females and vice-versa. But more recently they have been observed

even turning upside down and backwards to mate with a female as well as other strange ways.

These fish do not have a gonopodium like the livebearers such as guppy, molly and swordtail but are more like the Goodeid family with just 3 rays that make up the sexual reproduction part of the fin. Unlike many livebearers the males and females are the same color but one can mostly tell the females when they become very pregnant.

There are about 16 other species in the Jenynsia genus. In MASI Breeder's Award Program a few people have also spawned *Jenynsia lineata*.

To spawn these fish I put them in a bare bottom tank with a sponge filter where they initially hid behind. I added a few floating plants so the fry would have a place to hide and feel safe and a lid so they would not jump out.

The tank was in a heated room that set to 74 degrees and normally ranged from 68 to 73 F at that place on the rack. They were in very hard well water.

They were observed jumping

when first received and I presumed it was a female who was not ready to spawn leaping from a male. They were fed live, frozen, and flake food everyday. A 30% water change at least once a week or sometimes twice a week depending on how much they may have been overfed with flake food.

The females began to get heavy in this tank setup and when the fry were born they were fairly large for new borns. The parents were not observed paying any attention to the fry and after a couple days the fry were schooling with the parents.

The fry were fed banana and micro worms, newly hatched shrimp and fry food for a couple days then they started eating chopped up black worms and live shrimp.

Other Linked References:

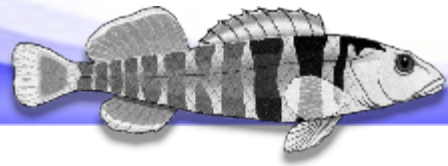
- <http://www.nanfa.org/ac/one-sided-livebearer-jenynsia-lineata.pdf>
- https://www.researchgate.net/publication/269928643_Jenynsia_onca_a_new_anablepid_fish_Teleostei_Cyprinodontiformes_from_southern_Brazil_and_its_phylogenetic_position

To work with new or rare fish like these, join the Missouri Aquarium Society's Breeder Award Program (BAP)



Jenynsia onca original description





The DARTER

A Roundup of Rainbows from Gary W. Lange





Spawning the Golden pencil fish, *Nannostomus beckfordi*

By Mike Huber

THE GOLDEN PENCIL fish, *Nannostomus beckfordi*, belong to the order Characiformes in the family Lebiasinidae. They are found normally in swamps and slow-moving waters and inhabit sluggish tributaries, small rivers and swampy areas particularly in areas with dense growth of aquatic vegetation or submerged woody structure and leaf litter.

Nannostomus beckfordi are found in Brazil, Guyana, French Guiana and Surinam and are also reported from the Rio Madeira, lower and middle Amazon as far upstream as the lower Rio Negro, and the Rio Orinoco in Venezuela.

Though wild fish are still exported most of the pencil fish sold are now commercially farm raised.

Adult males are more colorful and the females are noticeably more rounded. The anal fin of the male has a curved posterior edge which is straight in the females.

To spawn them I used a 20 long with a sponge filter and very fine gravel with large glacial rock on top. The fine gravel allowed plants to grow in the substrate and the larger rocks allowed the eggs to fall between where



© H-J Chen

the spawning group could not get to them.

I added some Anubias tied to driftwood and floating plants. Plants were so thick the fish would wriggle to get through them. A small opening was left in the front of about 4" with nothing but fine gravel where I could feed the fish and do small gravel vacuuming when changing water.

There were leaves placed throughout the tank that while decaying created a microbe colonies and added tannis to the water while creating a food source for the fry.

Several different methods to spawn and raise egg scattering fish can be used.

Another method I've used is to have four or five tanks set up with the same water conditions, round rocks or marbles in the bottom. Put the spawning group into a tank for 2 or 3 days then move them to the next till you use all the tanks, after which you can put the spawning group back in a holding or conditioning tank and let the fry hatch out and grow in the tanks. This method does keep a lot of tanks tied up.

Using the single tank set up similar to the first outside with a tub and they will usually have bigger spawns because of all the live food. Outside I don't use a filter as the plants create enough oxygen. I have also used a ten gallon tank that sits in my

windowsill with a false bottom, sponge filter and potted plants.

Condition the fish in another tank and when the females are full of eggs move the group to the tank in the window. I put them there in the evening before the lights get turned off. Through the false bottom the next morning you can see if there are eggs on the bottom.

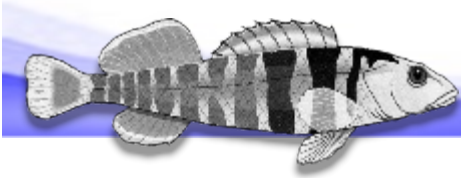
Most of the time I don't feed them because they are only going to be in the tank for 3 or 4 days. But if they are fed, with the false bottom, one can lift up a side to get a small hose in and either vacuum the bottom or suck out the eggs if needed. I normally leave the eggs in the tank and even if some fry hatch they usually won't go through the false bottom.

After spawning I put the parents back into their tank, remove the false bottom, and let the fry grow in that tank for a few weeks.

If there are several different species to spawn, sometimes the eggs can be sucked out every morning and put into a different container next to the tank. After 3 or 4 days remove the parents and eggs and introduce a new set of fish that evening.

Their are several ways to spawn egg scatters. Pick the one that works best for you.





Spawning *Apistogramma* sp. 'Abacaxis'

By Steve Coxon

HAVE ALWAYS LOVED *Apistogramma* dwarf cichlids. As a teenager working in a shop in East Tennessee, I found my first—an unlabeled single female, probably *cacatuoides*, while unpacking a shipment.

I worked in the shop for \$4 an hour not only for the financial support of my hobby, but also to get the first picks from each delivery. Information was more difficult to find then, and I never did identify the fish, but I fell in love watching that Apisto's behavior in my tank as she immediately took up residence under a piece of driftwood and seemed much more intelligent than the other fish I kept.

Over the past few years, with much greater access to information of MASI experts, old books I've accumulated, and the Internet, which also provides ready access to buy pairs



Male



Female w Fry

of Apistos, I've been breeding several species.

For me, nothing in fishkeeping beats watching a female Apisto look after her fry. I like them all, but a standout is *Apistogramma* sp. 'Abacaxis'. I first saw them in Jake Harris' fishroom and obtained a pair from him. Sp. 'Abacaxis' is a standout among Apistos in coloration, particularly their purple lips and throat. It is a very striking fish.

Discovered in 1999 at Lago Glemende in the Rio Abacaxis of Brazil by Horst Link and Mario Wilhelm, another name for the fish is sp. Wilhelmi. Many hobbyists discourage this name as using it as a common name may prevent it from becoming its species name when it is described in the future (Ref: Dwarfcichlid.com). The fish also has the A numbers A227 and A228.

Sp. 'Abacaxis' is found in very soft water with a pH below 4.0 and almost no hardness. Sp. 'Abacaxis' is smaller than other Apistos I've worked with including *cacatuoides*, D37, and *alacrina*. I've spawned each of those in treated St. Louis County tap water, but did not think that would work in this case as all spawning reports I found for 'Abacaxis' had a pH below 7 and a TDS below 100.

To spawn Sp. 'Abacaxis', I used a 10 gallon tank with a thin sand substrate, driftwood, lots of

java moss, alder cones and Indian almond leaves, a 3" clay pot drilled with a step bit, a double sponge filter, and a box filter filled with Fluval peat pellets. I used RO/DI water with just a cup of treated tap and heated and filtered it for several days with a box filter filled with Fluval peat pellets on Mike Hellweg's recommendation. I heat the tank to 79F.

I was never able to obtain a pH below 6.2 but do have a TDS around 60, and that (likely along with live foods including black and grindle worms) was enough. In early October, the male suddenly took to the back of the tank as the female brought her fry out on parade.

The approximately 40 fry, with their mother watching closely, now spend most of their time near the front of their tank where I feed them. I give them baby brine shrimp and microworms daily, but they also happily accept prepared foods such as Sera Micron Nature Fry Food and as they are getting a little larger, Brine Shrimp Direct's KilliFeast (300-500 micron). While the female generally keeps the male away, I observed him step right in to defend the fry when she was scared away by a feeding tube I used to give them microworms at first.

I have a 20 gallon grow out tank waiting for them to move into in a month or so- I wait until the female is done parenting them when possible.

I hope to help make Sp. 'Abacaxis' a more common sight in St. Louis area fish rooms!





Minifins

How to Tell the Boys from the Girls

By Mike Hellweg, CFN
(Certifiable Fish Nut)



IT MAY SEEM obvious, or even silly, but it bears reminding – if you want to breed fish both a male and a female are needed.

I don't know how many times I've heard folks complaining about having trouble getting a fish to spawn, only to find out that they only have fish of one sex! Folks in the business of selling fish don't always know, either, so a newer hobbyist can't be faulted.

If you want to be a successful breeder, it is a good idea to start learning how to determine sex in your fish. With many species it is pretty easy, but sometimes it can be a challenge even for folks who have been breeding fish for decades.

This has happened over and over again over the decades, even with some very popular fish. It may be surprising, but for many folks, even breeders, except for breeding season it is still difficult to sex common fish like angels, discus, and goldfish. In many other fish, where fry care is shared equally or is non-existent, sexes can be challenging or nearly impossible to distinguish. So do a bit of research, and don't be afraid to use a book.

A lot of information about keeping and breeding fish isn't on the Internet, and many things you find on the Internet are just regurgitated from other Internet sources – and all of it is limited by the original source. Book information is not only the author's opinion, but books are also edited, discussed and argued about by the author and sometimes as many as 7 editors (*I'm speaking from personal experience here!*) so there is a much better chance that the information found in a book is correct, even if some of the scientific names are out-of-date.

A classic mixup example occurred about 20-some years ago at a major convention- one of the vendors was selling an awesomely colored "new" bright red *Badis* species. He had a tank full of them, brightly colored males and some less colorful fish he believed were females. The fish were a bit too pricey for me at the time. Turns out that was a good thing as no one who bought them had any luck getting them to spawn. When females finally showed up in the trade a couple years later, it became obvious why. He was selling dominant fish as males and less dominant fish as females, but they were still males!

There was nothing nefarious here. Noone knew any better. Females actually are much smaller and look nothing like the males, so collectors were removing them from the fish they shipped to their wholesale customers. No one wanted to sell those "ugly" gray fish! Of course, I'm talking about the Scarlet Badis, *Dario dario*, and while males are bright, stunningly red striped fish, with bright red fins, females are plain silvery gray fish with clear fins. To this day, some dealers still try to sell less-dominant males, with very pale red colors and lightly tinted fins, as females. But get one of these "females" in a tank where they are the only fish, or the dominant fish, and suddenly they color up! Females are still plain silvery gray with clear fins. If there is red in the fins, it's a male!

So how do you tell the boys from the girls and avoid problems like this? First off, sit in front of the tank and watch your fish. Behavior is often your first clue as to the sex of your fish. Even when young, male fish are often more outgoing, sparring with one another, chasing each other, and generally spending more time out in the open. One sex or the other at a given age is generally larger than the other. Secondary sexual cha



racteristics often begin to appear when fish are only a couple months old. Usually, sex based fin development and coloration begins to appear at that time, too.

Don't be disappointed if it appears you have all fish of one sex. Often, fish don't start to reach sexual maturity until they are over a year old. For example, if you get a dozen young Montezuma swordtails, don't be surprised if they all look like females until they're nearly full grown and about 12 – 14 months old. Then, almost overnight, you'll suddenly see a male or two "pop". If you miss watching the tank for a few days, you might be forgiven for thinking someone added a couple males while you were away!

Livebearer males are generally smaller than females – often half the size or even less! Male livebearers are generally more colorful, and in some species, males may have enlarged fins or extended fin rays such as in sailfin mollies or swordtails. In male Poeciliid livebearers the anal fin is modified into a tube shaped intromittent organ called a gonopodium. The male inserts the gonopodium into the genital pore of the female and deposits sperm packets that will later fertilize her eggs when she ovulates. In some species, the male does a dance in front of the female and releases pheromones into

the water that cause her to ovulate, ensuring his sperm gets to ripe eggs.

Other livebearer families are a bit different. In Goodeids, the males are also smaller and more colorful than the females, but they don't have a gonopodium. Instead, their anal fin is called an andropodium and is used to clasp that of the female and the male inserts a soft pseudo-penis into her genital pore. To facilitate the insertion of the pseudo-penis while holding her anal fin with his, the first few rays of the male's anal fin are shorter, looking like it has a notch in it. Male halfbeaks also have an andropodium that they use in a similar way, but instead of a



Goodeid Andropodium

notch, the center rays of their anal fin are elongated, serving a similar purpose.

Most fish are egg layers. Some scatter their eggs randomly, expecting current to disperse them. Others scatter their eggs over cover like plants, piles of rocks, or similar debris and hope some will find their way into a safe nook until they hatch. Yet others carefully place their eggs on surfaces or in crevices. Some parents will carefully guard the eggs and fry in a nest, while others leave them to their fate.

In some species, the males take up the eggs in their mouth. In others, the female does this. And in yet others, the parents pass the eggs or fry back and forth from one's mouth to the others! Every species is just a bit different! That's one of the great things about working with fish. With over 14000 freshwater species and more than 35000 total species, there is always something new and different!

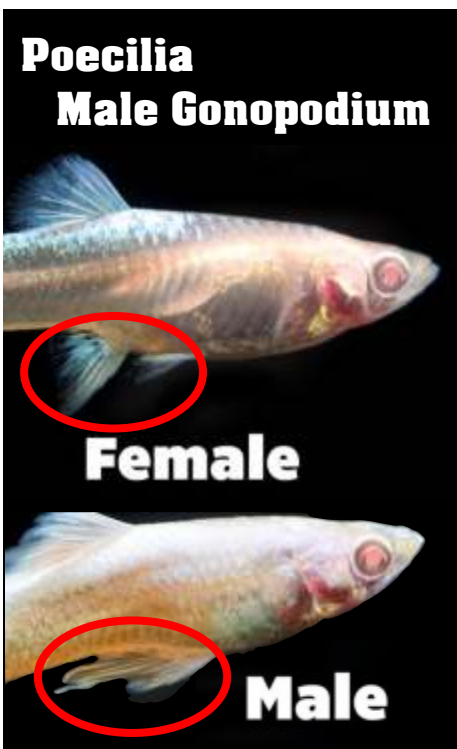
In the egg layers, males are generally smaller and more colorful

than the females. Males of many species will first chase one another, sometimes doing a frenzied dance, sparring with one another, flashing colors that aren't normally seen, and flexing their bodies to form pressure waves against each other's lateral lines to see who is the most fit.

Young males, even though they have no hope of spawning, may start to participate in this frenzy even when they are too young to mate and this may be the first cue that they are, in fact, males. This frenzy is similar to seeing two male deer locking antlers during the rut, and it may help to get the male's "blood up", getting mating hormones going in the male's body that he will need for spawning after the frenzy. It may involve just a couple males, or an entire group. Most of us have seen a huge group of male cories all chasing each other in this manner at the beginning of spawning.

It may be a surprise to know that like birds, not only do male fish dance to challenge rivals and impress potential mates, but many male fish will also "sing" to threaten rivals, claim territories, or to attract or impress potential mates by making sounds during this mating frenzy or actual courting. Chirps, grunts, squeaks, and clicking sounds are all common. These sounds are made with teeth, jaws, mouths, throat teeth, and even specialized fin joint or bone structures that may be tied to the swim bladder to amplify this sound. Some sounds are so loud, they can be heard from long distances, even out of the water! In our aquaria, fish like croaking gouramis and talking catfish can easily be heard across the room.

In species where the males are larger than the females, the males



Male Neolamprologus Shelly guarding territory, smaller females below



generally defend a territory and sometimes a harem from other males. Some males will build and defend nests or similar structures like leks or arenas. This may last only through spawning, after which the males may leave the eggs/fry to their fate, or they might guard the eggs/fry until they've hatched and the fry are fairly large.

Many male cichlids defend territories and males tend to be more colorful, larger, and sometimes have ray extensions on their unpaired fins. They sometimes have more impressive mouths or jaws that they use for fighting. Sometimes the male guards a territory and individual smaller females guard individual caves within the male's territory. These males can be easily two to three times the female's size, or more.



In some species one or the other parent will hold the eggs or even the fry in their mouth after they hatch. Generally, the holding sex in these species (females in many cichlids, males in many Bettas, females or males in some gouramis) will have an enlarged head or throat. Sometimes this is a more colorful area, especially when the parent is holding. In many other Anabantoids the males are more colorful and more aggressively defend their territories at or near the surface where they will build a nest of mucus-covered bubbles. In addition to brighter colors, these males may also have fin ray extensions.

Mouthbrooding male Bettas develop a larger mouth that appears more "U" shaped from above, whereas the females from the same angle have a more "V" shaped profile. This can be seen when the fish are only a month to six weeks old, and is the first secondary sex characteristic to



develops in these fish.

There's always one oddity...

A fish with only one apparent sex is *Kryptolebias marmoratus*, a species of killifish native to Florida, some of the Caribbean islands and coastal areas of Central America. In most populations of this species all

individuals appear as females but are actually self-fertile hermaphrodites so only one fish is needed to have a breeding group!

Each individual fish has BOTH male and female sex organs and can fertilize their own eggs internally, allowing them to lay fertile eggs without another fish present. Occasionally, and especially with populations in the southern end of their range, fully functioning colorful males will appear. This can allow the population to remix genetic diversity occasionally. Otherwise, there would be no mixing of genes as a single individual fish would be both mother and father!

As a further example of the strangeness of this species, for many years they were considered to be very rare and endangered. Now they are known to be fairly common. Scientists realized that they spend a lot of time OUT of the water and had been looking for them in the wrong places. They are actually more commonly found hiding in crab or crayfish burrows, hollow logs or damp grassy fields - often some distance or many yards from the water, and even sticking to leaves in TREES! Who would have thought to look for fish in TREES?

Aren't fish amazing?

Which reminds me - don't forget to sit in front of the



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Missouri Native Plants
for Aquaculture

Ludwigia alternifolia

Marsh seedbox,
rattlebox, bushy
seed box

By Micah Issitt &
Adrienne Legault



Wikipedia Commons



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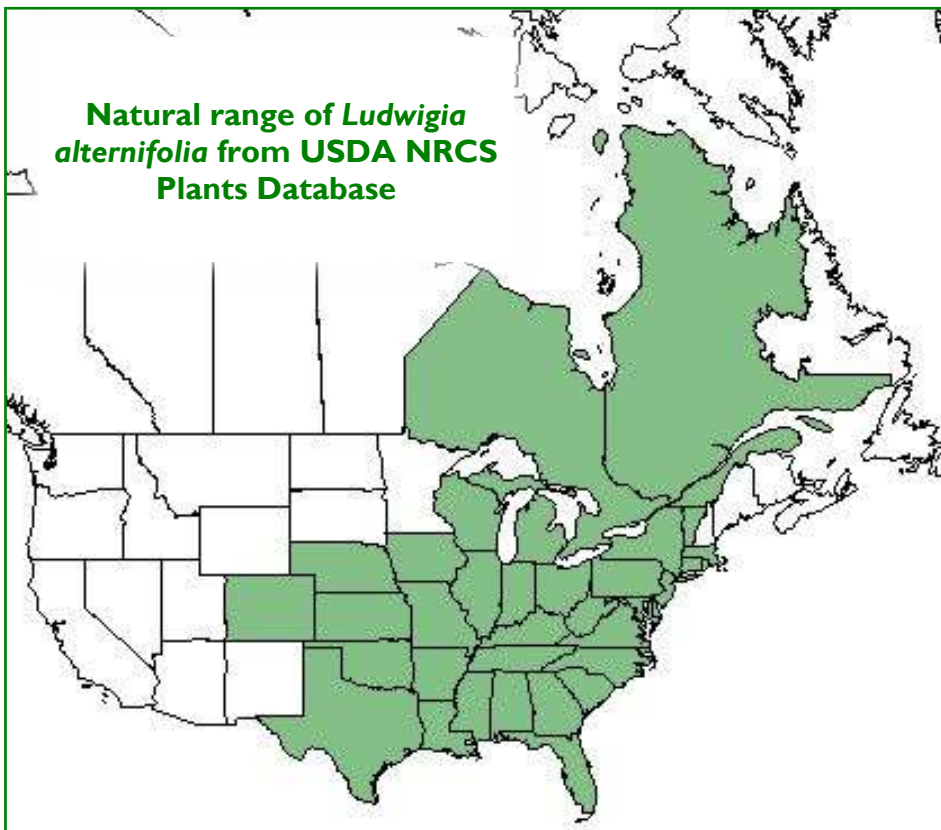
LUDWIGIA ALTERNIFOLIA, ALSO known locally as “seedbox,” is a very unusual member of the

familiar semi-aquatic genus *Ludwigia*. The species blooms typically blooms in the mid- to late-summer and, in the fall,

produces one of the most unusual seed-bearing structures, providing visual and auditory interest in a winter garden left wild.

The genus *Ludwigia* is but one branch of the massive plant family **Onagraceae**, commonly known as the “willowherbs” or the “primroses.” This large group of flowering herbaceous plants, shrubs, and trees (650 species in total), is found on every continent and is one of the most important plant families for North American insects. For gardeners of the aquatic or terrestrial bent, the Onagraceae is an essential group of plants to get to know.

Onagraceae has two subfamilies, the first of which is Onagroideae, typically called the “evening primroses” or “sundrops.” While there are many types of native Missouri plants in this group, one of the best to know about is *Oenothera macrocarpa*, the Missouri evening primrose. The large yellow flowers of this sprawling dry soil plant open in the evening and keep blooming into the night and the plant therefore



attracts a whole fauna that might not otherwise visit the garden. This includes the absolutely wonderful sphinx and hawk moths (family Sphingidae), which are large nectar-guzzling creatures famous because some of the diurnal ones mimic hummingbirds.



White Lined Hawkmoth

The other subfamily of the Onagraceae is the Ludwigioideae, which contains only a single genus, *Ludwigia*. These plants, commonly known as “water primroses” or “water purslanes,” are widespread through North, Central, and South America.

If there is one group of people who don't need to be convinced about the value of Ludwigias it is the aquatic gardeners. Pretty much every aquarist who has ever experimented with planted tanks will be familiar with the genus. *Ludwigia repens*, sometimes called the “purple” or “red-leaved *Ludwigia*,” is an extremely popular aquarium plant and, as many area aquarists might not know, a Missouri native as well. The species' presence in the state was actually first documented by Peter Raven, a legend in the botanical field who discovered his first new species at age 14 and went on to become the Director of the Missouri Botanical Garden.

Missouri is actually a pretty great place for aficionados of the Ludwigias to hang out because the state boasts eleven native species. Cultivars and tropical varieties tend to be more common in the general aquarium trade, but the wild varieties that appear in the state are every bit as interesting and useful in both water gardens and aquaria.

One of the most common native members of the group is *Ludwigia peploides*, otherwise known as the “water primrose.” This wonderful plant should be in every water gardener's repertoire, providing

beautiful yellow flowers, in abundance, and forming a network of submerged and emergent growth that creates rich and varied environments for aquatic creatures.

The species in focus here, *Ludwigia alternifolia*, is quite different than the more familiar *L. repens* or *L. Palustris*. *Ludwigia alternifolia* tends to struggle when fully submerged and prefers to grow either in the margins of an aquatic environment, or in moist, boggy soil.

We grow *L. alternifolia* on shallow shelves so that the growing tips remain outside the water, but the roots are submerged. We tend to use a very rich organic soil with plenty of ground up fresh plant matter and banana added to garden clay or loam. We top our pots with a sand cap to prevent loss of the soil. We start *L. alternifolia* on a shallow shelf, but once the plant gets going, the pot can sit as low as 6-8 inches under the surface. Just make sure that there are growing tips extending above the surface.

By late summer, *L. alternifolia* will typically have become quite bushy, growing up to 3 ft tall. The leaves, which appear on short stalks from the main stem, are dark green and lanceolate (lance shaped).

I have found that when used as an emergent plant, *L. alternifolia* will also put out stems that float along the water's surface and provide excellent cover for fry. On the surface of the pot, *L. alternifolia* tends to throw up a bunch of air roots, which look like the heads of little red worms poking out of the soil.

Most of our ponds are dedicated to Medaka ricefish (*Oryzias latipes*) and the fry produced by this species tend to gather around air roots, darting through them like a miniature version of a mangrove forest.

One way I've used *L. alternifolia* is to situate the plant at the edge of the pond or tub, and then to use *L. repens* a little deeper in the same tub. I find that this more aquatic *Ludwigia* creates the necessary underwater cover for fry of species that like to gather at the bottom during their first few

What's in a Name?

There is an interesting story about how the genus *Ludwigia* got its name. Swedish botanist Carl Linnaeus, who is known as the father of botanical taxonomy, introduced a system of classifying organisms that he called the “sexual system” in his 1735 masterwork “**Systema naturae**”.

The Linnaean system is now treated as the standard for classifying organisms but at the time he created it, many prominent botanists were opposed to the system. Some objected because they felt it was immoral to use plant sexual bit for classification and feared that this might become a practice among zoologists as well. Even, heaven forfend, in classifying humanity. Oh, the immorality!!

Others objected, like Leipzig botanist and physician Christian Gottlieb Ludwig (1709-1773), because the Linnaean system upended the traditional botanical system that Ludwig and his mates had spent so

long developing. Linnaeus was what is often now called a “disruptor,” a progressive willing to throw out the old to come up with an entirely different system. As always happens when a progressive professional comes along, traditionalist conservatives are resistant and rally around the status quo. Ludwig and those of a similar ilk felt that Linnaeus was stepping on their toes.

Linnaeus also had a habit of naming new genera and species after his rivals and when he reclassified the Onagraceae according to his new system, he named the genus *Ludwigia* after Christian Ludwig. There is some evidence to suggest that Ludwig was not entirely impressed with having the genus, a group of marsh-loving, mud weeds, named after him. That being said, Ludwig is pretty much only remembered because of the genus *Ludwigia* and there is certainly no shame in having one's name associated with such a lovely, successful, and ecologically important group of plants.

By Micah Issitt



weeks, like many fish in the genus *Xiphophorus*.

It is possible, though difficult, to get the growing conditions just right for *L. repens* to emerge and flower at the same time that *L. alternifolia* is flowering and this cascade of small yellow flowers is a lovely sight.

Another interesting thing about the entire Onagraceae family is that many species are oligolectic, meaning that only a single species or a couple closely related species of pollinators can service the flowers. This makes growing and spreading native Onagracids all the more important for native gardeners, helping to provide oases for some of our rarer insect species. This is not true of *L. alternifolia*, which attracts a much larger group of pollinators to its flowers, but it is one of the reasons that my wife and I have focused on species from this family and grow over 20 different varieties in our gardens.

L. alternifolia has small, yellow flowers and these tend to attract bees in the family Halictidae, often called the “sweat bees,” and bees in the genus Megachile, sometimes called “leaf-cutter” bees. The Halictidae, a family with hundreds of species, come in great numbers to our urban yards and there are many different types, including the stunningly beautiful Agapostemon, descriptively known as the “metallic green” sweat bees. Halictid bees sometimes land on sweaty humans to lap up the salty excretions from the skin. They can sting if swatted, but are otherwise harmless. If possible, the bees should be left alone as they provide innumerable benefits to our



ecosystems and are food for many birds in addition to pollinating a large number of small flowers.

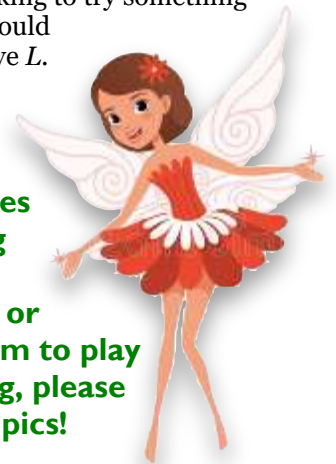
Flowering occurs in the summer, usually around June, but may occur as late as mid-July, depending on the weather. Like all Onagraceae, the plant’s flowers have four petals and four sepals. The yellow petals fall off quickly, typically within a day or two of opening. The less colorful sepals are all that is left behind and so the flowers quickly take on a faded, underwhelming appearance.

By far the best thing about keeping *L. alternifolia* is what happens after flowering. From each flower site, a cube-shaped fruit develops. These little capsules are a little over half a centimeter long and they turn rusty brown as they harden. Each capsule has a small hole at the top (called an apical pore) and holds a number of tiny seeds within. The seeds aren’t released for some time after the capsules form and for weeks the dried capsules and seeds remain affixed to the plant.

When the wind blows, the seeds contained within these little cubes rattle around against the dried husk of the capsule. It is a very unusual but pleasing sound that adds a little magic to a windy fall day around the rapidly aestivating water garden. This sound, and the strange look of the dried cubes on the plant, are why this is one of my favorite plants for the fall and winter water garden, adding a little bit of strange interest to an otherwise bleak landscape. In addition, the seed heads are a big hit with seed-hunting birds and deer mice and we’ve seen both being what can only rationally be described as “extremely cute” as they land on, or ascend the stalks to get at the seeds.

Over the years, these strange seed pods have helped *L. alternifolia* to find a place in local legend and lore as it is said that gnomes and faeries use the little square capsules as instruments. I have never seen this occur, though it may simply be the case that most of the faeries in our gardens are not musically inclined. In any case, Missouri gardeners and outdoor fish keepers looking to try something different should certainly give *L. alternifolia* a look.

If you do see faeries clipping the capsules or using them to play a little jig, please send pics!



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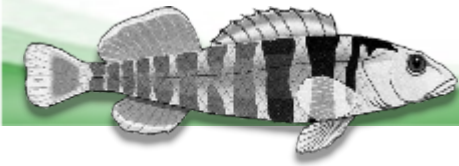
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What's in a Name?

By Micah Issitt

THE NATIVE MISSOURI water plant *Pontederia cordata*, reviewed last Darter issue, provides a prime example of species naming and how poorly chosen “common names” can cause repeated confusion, sometimes lasting for centuries.

Pontederia cordata is often sold as “Purple Pickerel RUSH,” even though the plant is not closely related to the large group of primarily wetland, grass-like perennials from the family *Juncaceae*, which are more correctly called “rushes.” The problem of confusing or misleading common names is one that is familiar to fishkeepers, as many fish were named in ways that seem to associate them with groups to which they do not belong.

An ancient Chinese expression attributed to Kong Fu-zi, or Confucious, who was not a single person but an amalgamation of many noted philosophers, holds that wisdom begins with the ability to call things by their right names. The early naturalists agreed and felt that it was important to assign each organism a clear and unambiguous name that indicated the species’ relationship to other species.

Lacking experience and detailed anatomical knowledge, naturalists often assumed relationships that later proved incorrect. Someone in the distant past associated *P. cordata* with rushes that grew in the same environment and in the same basic conditions. They began to call this plant a rush, even though it was not the

same kind of plant and it is still often known by this mistaken description.

The modern science of taxonomy is typically said to have begun with the publication of Swedish scientist Carl Linnaeus’s famous treatise on plant biology, *Systema Naturae*, which was first published in 1735. While this might seem a long time ago, it was quite recent in the broad span of human history. By this time, humans had already been naming plants and animals for thousands of years.

Linnaeus’s new system for organizing plants and animals into orders, families, genera, and species, etc., changed the language used to describe organisms and established a new and far more accurate way to reflect the relationships between species.

Many species are known often by dozens of different common names, some specific to the various little towns or regions in which the species appears. So, a species of fish, for instance, like the North American species *Esox niger*, might be known as a “grass pike” in one area, while fisherpeople in another town might call it a “jack fish.” Linnaeus’s scientific naming method was meant to cut through this confusion and to assign each species a single, scientifically determined name.

Of course, the taxonomic system isn’t perfect. Many plants and animals were mistakenly assigned to the wrong groups in the years that followed. However, because taxonomy is a science, it is self-correcting. New research supplants older thinking and the network of taxonomic relationships is gradually refined.

It is a great benefit to aquaculture AND horticulture that the scientific names of fish and plants are now more commonly used. I am especially pleased when strains of fish or cultivars of plants are tagged with even deeper levels of specificity, such as subspecies, varietals, or location data. This can be a great benefit on the practical level and also adds an extra layer of nerdy goodness to both of these hobbies.

The point of this taxonomic rant is that *Pontederia cordata* is not a rush, despite being called one. Fortunately, *Pontederia cordata* also has the more accurate common name, “pickerelweed,” which is derived from the fact that this plant both grows “like a weed” and often occurs in habitat utilized by the freshwater fish known as *Esox niger* (chain pickerel) and *Esox americanus* (American pickerel). The word “pickerel” emerged in the 13th century and is a diminutive of “pike,” the common name for a widespread group of freshwater fish in the *Esocidae* family. Pickerel essentially means “little pike” or “baby pike” and this is fitting when discussing “pickerelweed,” because the plant creates excellent cover and a prime “nursery habitat” for the fry of these and many other species.

***Pontederia* is one of many genera of plants and animals what was actually named by Carl Linnaeus himself.** He named the genus in honor of a then-prominent Italian botanist named Giulio Pontedera (1688-1757). Actually Pontedera was one of Linnaeus’s most passionate critics and spent years arguing against Linnaeus’ approach to plant classification, known as the “sexual system”, which classifies a plant by sorting key sexual characters, such as the number and arrangement of stamens and pistils in the flowers.

Pontedera, then a professor of Botany at Padua University and one of the most influential scientists in Italy, said, “This new system is crappy.” But, as it turned out, Pontedera and his allies didn’t have any better ideas and Linnaeus eventually won out over his critics. There is a long correspondence between Linnaeus and Pontedera, filled with passive-aggressive verbiage, in which the two discussed Linnaeus’ system while Pontedera demonstrated the depth of his jealousy at not having been the one to come up with it.

In what is either a gracious gesture or a bit of a barb, Linnaeus named the genus *Pontederia* in honor of his “frenemy”.



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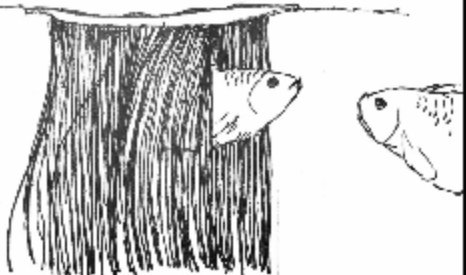
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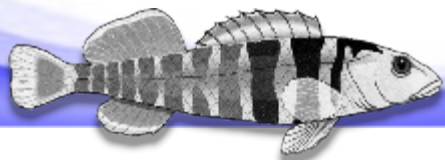
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