

In Depth April 2024

Tropical Fish Club of Burlington



TFCB's 35th Anniversary Celebration

Culturing Live Foods

Setting up a 150-gallon Planted Aquarium

Breeding American Flagfish Outdoors

Planning the All-American Catfish Convention

Tons of tank tips & so much more!



Royal Farlowella (*Sturisoma panamense*) pair. Photo by Ann Whitman

In Depth

published by The Tropical Fish Club of Burlington

Established February 1989



We meet on the second Thursday of each month, September through June, at 6:30 PM at the VFW Hall, 73 Pearl St, Essex Junction, VT.

Our membership consists of adults, children and teens. Many members are very experienced and have been keeping fish for years, and others are just getting started. People of all ages and experience levels are always welcome. Meet and learn from those who share your interests!

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Contents

April 2024

From the President by Ira Gardner	3
Editorial by Ann Whitman	4
Celebrating Our 35th Anniversary by David Banks, Jr.	5
Feast and Famine with <i>Tropheus</i> sp. 'Bemba' by Ira Gardner	7
Remembrance by Brian Candib	10
Polar Parents by Matilda Kauffman	13
My Favorite Fish—Butterfly Splitfins by Brian Candib	14
Breeding American Flagfish Outdoors by Keith Kalinowski	16
Setting up a 150-gallon Planted Aquarium by David Goodman	18
Growing <i>Aponogeton boivinianus</i> from Seed by Ann Whitman	19
Dave's Top Ten No-Nos by David Banks, Jr.	21
Keeping Track of Maintenance & More by Ann Whitman	23
Raising Our Fry by David Banks, Jr.	25
Finding Mosquito Larvae Indoors by Laura Isham	30
Culturing Live Foods Primer by David Banks, Jr., Laura Isham, Ann Whitman	31
Moina	31
Vinegar Eels	32
Microworms	33
Grindal Worms	34
Whiteworms	35
Blackworms	36
A Shell Dweller Story by Jason Da Silva	37

From the President

It's been a few years since our last *In Depth* was published, and what a wild few years they were! Our club, like so many others, faced unprecedented challenges during the COVID-19 era. However, rather than floundering in uncertainty, we adapted, evolving our methods to stay connected and engaged. Our transition to online auctions not only sustained us but also connected us with fellow hobbyists from clubs outside Vermont. Our shift to virtual meetings brought in new faces eager to explore the wonders of tropical fishkeeping—and some of them have joined us at in-person monthly meetings at the VFW in Essex Junction.

Our online presence has never been better. Our auction site (<https://auction.fish>) has hundreds of users and over a dozen clubs use it. Our social platform on Discord has active daily discussions and a lively marketplace, and our Facebook page and website (<https://tfcb.org>) have been recently revamped!

I'm looking forward to a lineup of exciting speakers and events this year that promise to inspire and delight. From experts in aquascaping, conservationists, top cichlid breeders and more, our roster is brimming with talent and expertise. These speakers and club events will not only educate, but also ignite our passion for the aquatic world, reminding us why we fell in love with this hobby in the first place. Bring your friends!

And of course, I'm especially looking forward to our All-American Catfish Convention (CatCon) coming up in November 2024. This event promises to be one of our largest-ever events, and has already attracted speakers and participants from all over the world! It will include a rare fish raffle, fish and product vendors, expert speakers, an auction, and more.

As we embark on this 35th year anniversary together, our club remains true to its founding principles. We are committed to fostering a welcoming and inclusive environment where all are encouraged to learn from each other and share our passion for the aquatic hobby. After the past few years of change, we have navigated the currents of uncertainty and emerged stronger, more vibrant, and more connected than ever before.

—Ira Gardner



Corydoras habrosus. Photo by Ira Gardner

Editorial

Creating a Tropical Paradise in a Vermont Cellar

by Ann Whitman

Winters in the Northeast are long, the weather is usually cold and miserable, and I don't get out much. I've always dreamed of having a dedicated fish room where the temperature is 78°F, the air is moist, and the sound of bubbling water is comforting on a snowy day. I imagined a comfortable chair where I could sit and watch the fish and enjoy a tropical beverage, ignoring the inclement world outside.

The COVID lockdown during the winter of 2020-2021 brought the perfect opportunity make my dream a reality. Traveling was out of the question, as was nearly all away-from-home entertainment. Like so many others, we tackled home improvement projects with new enthusiasm and focus. After some negotiation, building a fish room finally made it to the top of the list. In return, my husband, Don, would be able to enclose his workshop. After a few weeks of cleaning, organizing, and donating boxes of stored treasures in the cellar, construction began.

When my husband tackles a project, he wants to do it well and do it right. He researched insulation and ventilation solutions, electrical and plumbing needs, and even mold- and fire-retardant paint. He planned for the inevitable over-flowed tanks by raising the bottom of the wall a couple of inches off the floor. He scoured Craig's List for materials and hit the jackpot for rigid insulation and a sink base.

I measured and re-measured the space. I drew up plans and cut out scale models of the tank stands and racking footprints on rectangles of graph paper. I moved them around on the floorplan map and then marked the plans on the cellar floor with painters tape. I calculated the numbers and needed locations of electrical outlets and air valves.

By spring 2021, the construction was finished and more than 30 aquariums, many of them once scattered around the house, had moved into the space. Now, tank maintenance is simply done with a hose (no buckets!), water spilled on the concrete floor is no problem, and all the lights are plugged into dedicated switches connected to a central, automated timer. Air flows into all the sponge filters from a single, powerful air pump via a PVC pipe system. A rack of plant lights illuminates trays of orchids and houseplants. Winters aren't so challenging now—I can pull up a chair, pour a glass of wine, and watch the fish instead of the latest snow flurry outside. It's warm and cozy in here.



Don cutting insulation board for the fish room in 2021. Note the electrical outlets high on the wall and ceiling.



The same corner of the fish room today.

TFCB Celebrates Our 35th Anniversary

By David L Banks Jr

The Tropical Fish Club of Burlington held their very first meeting February 16, 1989, 35 years ago. Over 50 hobbyists responded to posters that were placed in the various pet stores in the Burlington area saying, "Meet and learn from others who share your interests". Some of those original hobbyists still come to TFCB meetings today! I want to touch on some highlights from our 35-year history.

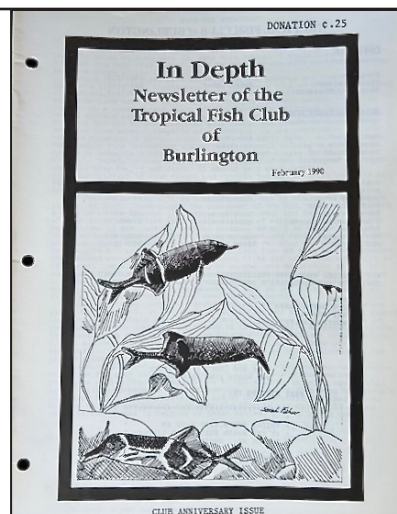
We held our first auction at our May meeting in 1989. It was small and held during our regular meeting time, but proceeds from it allowed us to start building a treasury so we could expand our activities. The following year we held a large all-day auction that was a huge success with many other clubs from throughout New England sending support, including many bidders and sellers as well as auctioneers! We still had no real treasury to pay for a rental space in which to hold the auction, so one of our members offered his store's showroom floor as the location. We had to move a lot of stuff out and back again, but it was a great event! A year later, in 1991, we held our second full-day auction and our first tropical fish show, which attracted over 100 entries. These events were a great start to the club. We still hold mini auctions at our monthly meetings and a big annual fall auction to this day.

Special Anniversaries *In Depth*

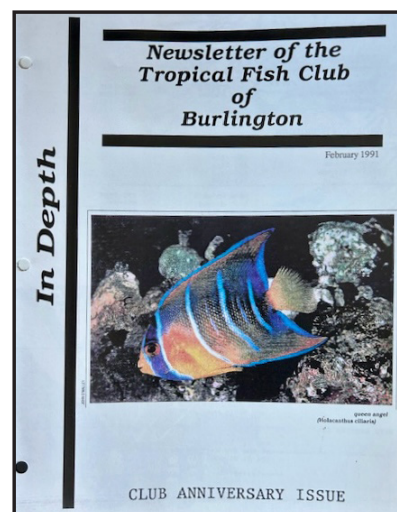
TFCB started publishing a monthly newsletter in April 1989. Our February 1990 issue of *In Depth* had a small mention that it was our club's first anniversary. We published a second-year anniversary issue of *In Depth* in 1991 with a full-color cover! In 1994, we published our 5th anniversary edition, again with a full-color cover. For our 10th anniversary in 1999, we celebrated with a potluck dinner at our meeting at the Burlington Science Center and, of course, published a special edition of *In Depth*. At the 15th anniversary, we had our party at the new ECHO facility with five original board members in attendance!

For TFCB's 25th anniversary, Janine Banks served as guest editor and produced another special anniversary edition of *In Depth*. The club held a mini convention that started with a barbeque at our house Friday night, and continued with guest speakers at a local hotel during the day on Saturday, a dinner cruise on the Spirit of Ethan Allen on Lake Champlain, and a huge all-day auction on Sunday. The club's goal was to give back to and support our present and past members, so attendee costs were kept to a minimum for TFCB members. We had a great response from other clubs, too, and ended up making a profit for the club, instead of spending a few thousand dollars, as we had expected. We had many attendees ask if we were going to do this again the following year; my response was NO ... but maybe in five years.

Five years later in 2019, Ann Whitman was our *In Depth* editor and she put out a great issue for our 30th anniversary when we held another mini convention to celebrate. This time we added a microbrewery



TFCB's first anniversary edition with artwork by Sarah Fisher.



TFCB's 2nd anniversary cover printed in color.

tour on Friday ending with pizza party at one of the breweries. The rest of the weekend we kept to our previously successful plan with speakers throughout the day Saturday and a dinner cruise that evening, and an auction on Sunday. And again, we had a great turnout and ended up with a profit! Many asked if we were going to do this again, and they got a similar response, NO ... but maybe in 5 years.

Growing Through COVID

In 2020, as the COVID pandemic was ramping up and putting everything in disarray, TFCB decided early on that we would move to online meetings. We found that we were able to host many long-distance speakers that we would not normally be able to have each month. Our Facebook page suddenly became extremely active as people stayed at home and looked for new ways to interact with the hobby.

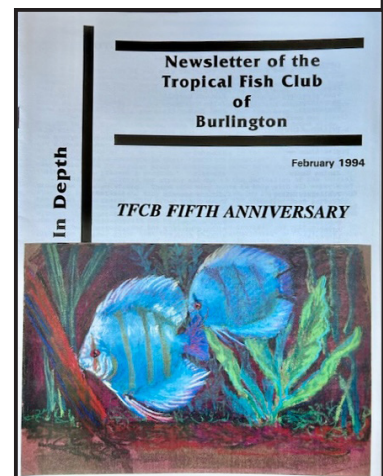
As we got close to the time when we normally held our annual fall auction, our newly elected president Ira Gardner saw a need to try something different that would allow us to hold the event safely. He suggested building a website to host online fish auctions and tackled it himself. The auction.fish website was born! What started as a simple idea turned into a very diverse and useful tool for our club and others, as well.

TFCB has continued to use the auction website beyond the lockdown years for several reasons. First, our former auction site at the Holiday Inn is no longer available and has been torn down. Second, online auctions allow a wider audience of both buyers and sellers by having multiple lot exchange locations. Third, it offers the chance to review the auction items, ask questions of the seller, and bid right from your home or anywhere with your phone. During the pandemic, the ability to conduct direct sales among hobbyists was very critical since pet stores were having a hard time getting stock due to disruptions in the supply chain. At the end of each online auction, buyers and sellers met in open-air parking lots to make their exchanges during the pandemic to limit the risk of COVID. And once things did start to open up again, Ira added the option to use the website for in-person events as well!

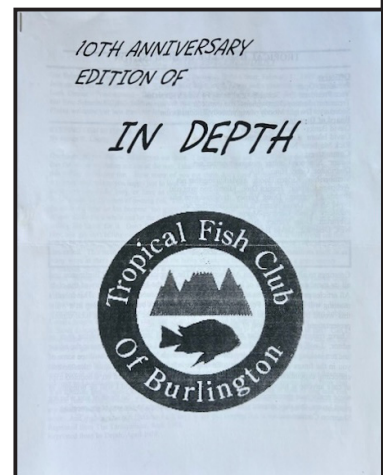
Looking Ahead

This year the club celebrates its 35th anniversary! The festivities started with our February meeting, with Luiz Tencatt's live stream presentation of "The science behind naming Corydoradinae catfishes". Luiz was remote at his home in Brazil while club members and others watched from across the U.S. and around the world on YouTube. Those who met in person at our usual place at the VFW in Essex Junction enjoyed cake, great door prizes, and an auction after the presentation. More great speakers are lined up all year long.

On March 23rd at the Delta Hotel in So. Burlington, TFCB hosted the 2024 Burlington Aquarium Fish, Frag and Reptile Expo with more



In Depth celebrated the 5th anniversary with a full-color cover.



The 10th anniversary cover featured the club logo.



TFCB celebrated its 25th anniversary in February 2014.

than 15 vendors. Previously, we held several Expos or swap meets at the Holiday Inn that were well attended and enjoyed by both sellers and buyers! Since that hotel was torn down, in 2023 we held the Expo event at the VFW in Essex Junction. We were not sure what to expect coming out of the pandemic, and the VFW was a good place to start. It was packed with standing room only before the event even opened until almost 2:00 PM. The new venue at the Delta is a larger and more centrally located venue with room for more vendors and shoppers.

The centerpiece of our 35th anniversary celebration will be TFCB's hosting of the All-Aquarium Catfish Convention, aka CatCon, here in South Burlington, November 1-3 at the Delta Hotel! We have an international slate of speakers, a rare fish raffle, full-day auction, full vendor room and much more. Don't miss what is billed as "Fun on One!" on Friday evening, an event in which hobbyists can sell fish, plants and equipment from their hotel rooms. We are hoping that every TFCB member and many more local hobbyists take advantage of this unique opportunity to attend, even if you can only come for a part of the weekend. Check out the website at <https://tfc.org/catcon-2024/> for all the details!

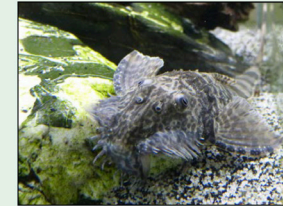
What a way to celebrate 35 years! We are looking forward to many more years, and many more celebrations!

InDepth April 2019

Tropical Fish Club of Burlington



Our Club's 30th Anniversary Convention, June 7-9th
 On the Road with Rob: Recap of Fall 2018 Fish Conventions
 Setting Up a Dry-Start Aquarium
 Nile Perch Invasion of Lake Victoria
 Endangered Mission—Keeping CARES Species
 More Than a Hobby—Making a Lifetime of Fish Friends
 Calendar of Coming Events ...and so much more!



Spilodon ocellatus, made with premagical whippers, called cobaltides. Photo by Ann Whitman

The 30th anniversary issue was published as a full-color PDF online.

ALL-AQUARIUM CATFISH CONVENTION

November 1st-3rd, 2024

Register : www.TFCB.org/Catcon-2024

Book Your Room Now!

Delta Hotel by Marriott, So. Burlington, VT

Speakers:

Eric Bodrock~Hans Evers~Haakon Haagenen
 Daniel Konn-Vetterlein~Regina Spotti
 Oliver Lucanus

AMAZONAS

COBALT
AQUATICS



PRESTIGE
AQUATICS



Feast and Famine with *Tropheus* sp. ‘Bemba’

By Ira Gardner

The Lake Tanganyika genus *Tropheus* carries a reputation for being difficult to maintain and breed. I am a sucker for anything expensive and easy to kill, so of course I had to have some.

In 2018, a batch of 20+ 1-inch *Tropheus* sp. ‘Bemba’ fry found their way into my care. Over the next few months, I dedicated myself to meticulously monitoring the growth and development of these specimens, immersing myself in studying the intricate details of their behavioral patterns. Each day, I invested countless hours diligently observing their movements, interactions and subtle cues, striving to gain a profound understanding of their needs and preferences and forging a deep connection with, and a profound appreciation for, these fascinating creatures.

I’m kidding, of course. In reality, I threw them into a 90-gallon tank and ignored them, only tossing in food and doing water changes.

Prolific Population

And they bred. And bred. And bred. I didn’t lose a single fish—not to aggression, nor to the dreaded “bloat”, nor to my water chemistry (which is on the soft side). I couldn’t believe that people consider these fish difficult. Sure, they’re not a fish you can literally keep in damp sawdust (looking at you, rivulus killifish), but unlike Discus (*Symphysodon*), which die when you look at them sideways, these *Tropheus* seemed to be easy as long as you follow the recipe for success: provide a big tank, start with a large colony of small fish, add lots of green food, and you’re good to go.



Ira’s prolific *Tropheus* sp. ‘Bemba’ colony.

Fast forward to 2020 and I had over 100 three-inch+ fish in a 90-gallon tank. That's when I should have been removing the fry and selling them, but of course to catch the fry I'd need to take the whole tank apart and that's a bit more effort (and water on the floor) than I want. So, I got rid of approximately 65 individuals, and was dismayed to see an immediate and complete stop in any kind of spawning behavior.

Finally, a reason to pay attention to them! I varied their diet from wafers to flake to a different brand of wafers, changed up the rock work in the tank, increased water changes, checked for females holding fry every day, and took hundreds of pictures. I even meticulously vented each fish and removed as many males as I could. Watching their behavior to try to sex them, I believe I had and still have about 3 males and 15 females. And, of course, nothing worked.

Finding a Solution

In early 2024, almost four years since they stopped spawning, our club invited renowned *Tropheus* expert Pam Chin as our speaker, so I asked her what I should do. Chin suggested incorporating freeze-dried, high-protein food alongside “the cheapest green flake you can find, whatever is on sale”, saying that the role of protein in bloat was generally exaggerated. Additionally, she recommended against removing excess males (oops, too late on that), suggesting that with only a few males in the tank, they would spend all their time defending territories and wouldn't spawn. She thought they were “bored” (I disagree—can fish even get bored?) and should be moved to a different tank, which is something I—kind of—had already done by rearranging the rock work.

After a bit of thought about Chin's suggestions, I did the easiest thing first: I introduced freeze-dried food into their diet. And sure enough, within days several females began to display signs of holding fry. So, I guess the recipe for success with *Tropheus* should really be “provide a big tank, start with a large colony of small fish, add lots of green food, some high-protein, low-fat food a couple times a week, and you're good to go”. Oh, and the clutches used to be just a couple fry, but the latest clutch is at least 4 or 5. I'm not sure if this is just the age of the females, or if the protein is really having that much impact.

These experiences highlight once again the role of “ask an expert” as a critical alternative to my traditional “brute force and ignorance” approach to fish keeping. *Tropheus* are fun, give them a try some time if you've got a spare 90-gallon tank and a bunch of extra money just lying around.



Remembrance

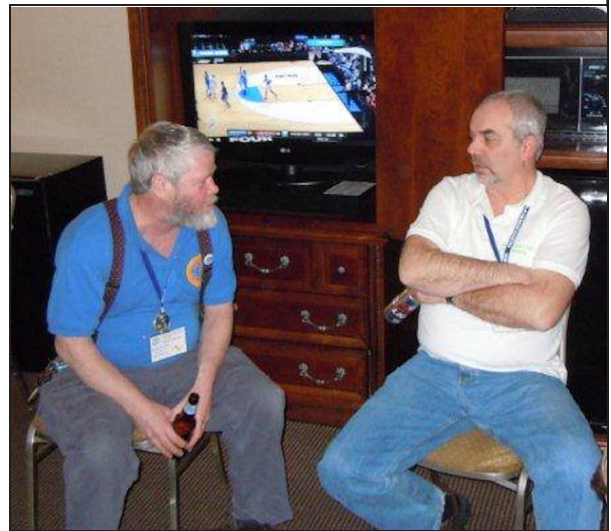
By Brian Candib

As someone who has spent about 20 years in the fishkeeping hobby and as a member of the Tropical Fish Club of Burlington (TFCB), I want to recall a few of the members that our club has lost in that time. These folks really brought a wealth of knowledge and support to myself and others when I was starting out and through the years until they left us. Twenty years ago, mentors with a personal touch helped newcomers cope with the hobby. The internet was not anything like it is today with Google Search, Wikipedia, and dare I say, the introduction of Artificial Intelligence (AI) to the trade. Here are some of the folks to whom I and many others owe gratitude and a moment of reflection.

David Isham was one club member I met early on. He was the TFCB *In Depth* editor and, at the time, we were just moving to the digital issue of the newsletter. I remember Dave always trying to get articles for the monthly issue and requesting us to write anything about everything. Dave would paste his hand-written observations from the fish room into the newsletter and include his *Discus Tank Notes* column. I always liked how he interjected some humor into those notes saying things like, “don’t ever answer the phone while filling a fish tank with hose”, or “my fish had a cold ride home from the auction due to my WRX [Subaru] heater failure”.

I was able to learn a lot from Dave in our monthly meetings, his articles, and his presentations (making your own fish food comes to mind). Dave proved to be a very approachable and generous person. He participated in discussions and provided worthy advice that helped me learn from my mistakes.

He was always on the lookout for books and aquarium supplies for the schools in the Grand Isle School District where he worked. I remember more than a few times at auctions where I contemplated bidding against him and thinking no, it’s for the kids.



Dave Isham and Brian Candib enjoying the NEC hospitality suite.



Dave Isham, Janine Banks, and Dave Schumacher of Dave’s Rare Aquarium Fish at an American Cichlid Assoc. event.



Bryan Goodkowsky and Dave Isham at an NEC banquet.

Dwight Moody was a man I would consider a true aquarist in every sense of the word. He was adept at citing rules and regulations for collecting, shipping, and keeping fish (although I recall he did a long stint with the Airport TSA so that probably helped). He would give talks on Vermont fish to collect, endangered fish to keep, and shipping fish. He loved the croaking gouramis, pencilfish, killifishes, and goodeids. He kept many CARES fish and at one time ran our club's breeding program. He was also an active member of NANFA (North American Native Fishes Assoc.).



Dwight Moody and Dave Isham

One time I received a plea for help from Dwight. He asked me to house his fish until he could find another place to live. I ended up housing at least a half dozen species of his fish that brought my fish room to capacity for some time. Dwight could tell you everything about the fish he kept, right down to their required temperature and pH levels. He left me with some Redtail Splitfin Goodeid (*Xenotoca eiseni*) that I still have.

I remember during his final days at the Respite house, I would bring him my *AMAZONAS* magazines and he would talk fish and the types he wanted to keep, which regretfully I cannot remember now. He kept his passion for fishkeeping right up until his last moments amongst us.

Brian Scott was memorable from the first time I saw him at a TFCB fish meeting just after I joined the club. I saw him come in and thought to myself, "He must be lost. He doesn't look like a tropical fish keeper. Maybe he's a motorcycle biker coming into the Burlington VFW for a cold one and decided to rest a spell".



Lee and Brian Scott

New to the club scene, I did not know anyone, but I remember somebody at that meeting asking about some affliction with her fish. It seemed they developed bubbles in their gut, some had died and others were developing the ailment, and she was looking for a remedy. Then Brian spoke up about it and I was aghast! How could this long-bearded, gruffy, tattooed biker know anything about tropical fish, much less what ails them? Boy, was I wrong! This fellow was identifying the problem and how best to treat it.

I remember asking David Banks at some point who was that guy and if he was for real. I think Dave did introduce me to him and his wife Lee at the next meeting we were together. He turned out to be one of the nicest and most knowledgeable persons around to converse with.

Brian was always helping at the club and encouraging me to learn more about the hobby. He was a certified Fish Show judge and would give folks tips on what he looked for and how best to present a fish. I recall losing at a People's Choice Bowl Show only to have him come up to me afterward and say that

had it been a judged event, my fish would have won by far. It was a moment of kindness one does not forget.

My wife and I very much appreciated Brian and Lee for how helpful and supportive they always were to both the Otter Valley Aquarium Society (OVAS) and TFCB clubs and events.

Club outings and events were special times to enjoy being in the company of these generous and knowledgeable men. I appreciated Dave's famous blueberry pies and boiler makers, Dwight's sometime awkwardness of just talking about subjects other than fish, and Brian's ability to communicate and present himself as a kind and welcoming soul.

A person's heart should always be open to remember those with their passion, mark of graciousness, and contribution to the success of others.



Brian Scott won the holiday party trivia contest and took home the trophy in December 2019.



Polar Parents

By Matilda Kauffman

A little over a month ago I adopted two Polar Parrot cichlids, one a striking blue, the other a glossy white. Polar Parrot cichlids are man-made hybrids, created from the Blood Parrot (*Amphilophus citrinellus* x *Paraneetroplus synspilus*) and Convict cichlid (*Amatitlania nigrofasciata*) species. I put the two adolescent Parrots in a quarantine tank, as I had learned my lesson about forgoing this necessary acclimation step. The two, despite being nameless, seemed content in their temporary home, exploring all the nooks and crannies. My plan, originally, was for the new fish to be quarantined for two to three weeks before moving them to my 55-gallon tropical tank.

Surprise!

A mere two weeks later, though, a fish as small as a pencil tip appeared, as though out of thin ...water. It's amazing how something so insignificantly small can put such a wrench in a well-formulated plan. It was a Polar Parrot fry, an adventurous one at that, who had wandered from its group nestled in the middle of a decorative flower. I didn't have any intention of breeding Polars when I got the fish, but I did get them together because they seemed to have a bond. I knew it was likely that they could pair up, but I was completely blindsided to the fact that they could breed at such a young age. Plus, I wasn't sure if they were the same sex or not. I had seen the breed of fish in pet stores a few times, always admiring their charms and colors, but as I mentioned, these two seemed to have a friendship. They were always together, fighting off the other fish so they could enjoy their private section of the tank. The thought of them getting separated was enough to push me over the edge, and so I wound up with both.

The plastic flower where the Polars laid their eggs is approximately an inch in diameter, for context. I had noticed some yellow in the center of the decorative flower and assumed that it was the normal coloration that I had just overlooked previously. My assumption was wrong though, because a few days later that yellow color was gone and replaced with squirming hatchlings. It seemed as if there were hundreds of babies, so tightly woven together you could barely see the center anymore. The parents stood close guard, warding off any intruders and tending to their young.

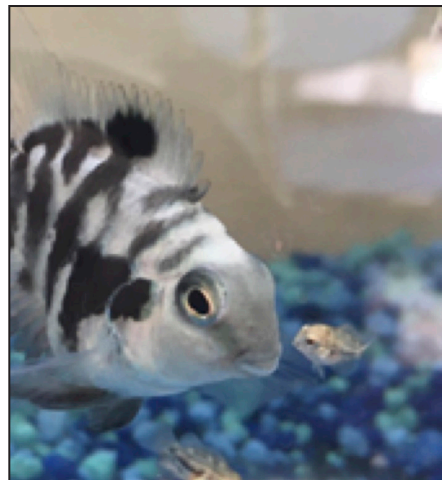
Exemplary Parents

The parental instincts the Polars exhibited was a breath of fresh air compared to the cannibalistic parenting methods of livebearers and other species. Instead of gobbling up their offspring, I watched as the Polars picked them up in their mouths, and spit them out, helping to redirect the fry. The babies, for the first week or so, stayed clustered together and traveled around the tank like a unit. Their parents acted as guides. My guess is that the male is the blue one, but I'm not 100% sure because it's incredibly difficult to determine the sex of young Polar Parrots.

I wasn't convinced that their mouths were big enough, but I fed the



Polar Parrot pair with fry.



Polar Parrots are excellent parents.

Polar fry baby brine shrimp, the least microscopic of the unseeable live foods. The parents, especially the blue cichlid, were incredibly aggressive toward alien objects, specifically the pipette that delivered meals. They were quite ferocious, headbutting it with such vigor it made me less than thrilled that I would one day have to stick my hand in to clean.

As the babies got older, the parents loosened up, becoming less attentive to their needs. This freed my Polar Parrots to use their time for other matters, for example, redecorating the tank. Over the entire process of caring for Polar Parrot cichlids, their tendency to move around substrate has been the most hypnotizing to watch. They cleared out huge sections of gravel, picking it up in their mouths, for no apparent reason. And they continued to do this, clearing out sections until only the bare bottom of the tank remained. Perhaps they need a mirror to prepare themselves in the morning? The Polar Parrots have been an absolute blast, and a terrific addition to this addictive hobby.

My Favorite Fish—Butterfly Splitfins

By Brian Candib

As many TFCB members know, I have a small fish room in my basement. I keep about 12 tanks with a couple 10s, a few 20s and the rest 40 to 50 gallons in size. These tanks are filled with a variety of tropical fish. I have guppies, killifish, cichlids, goodeids, catfish, and frankly some other species, but I have been too lazy to identify them.

All in all, my setup seems just about right for my lifestyle: a little (well, quite) unkept, some unsightly algae on the glass and an occasional odor from not emptying the wastebasket regularly. This fish room has a small office-like setup so I can find myself working on my laptop or just relaxing in my self-made, yet comfortable mancave of fish.

At times, my solitude is interrupted by family, friends, and neighbors. Sometimes it is a home inspector or service guy that pops in and, by happenstance, sees my fish hideaway. I will digress here, but I recall one time when a couple guys were delivering a new freezer and had to transgress the fish room to do so. They stopped and started looking at the tanks and pointing out all the cool fish swimming around. Then one of the guys said to me, “Gosh, this is the second house I have been to in the past few months that has a fish room in the basement”. He went on to ask if I knew the other house, as it was somewhere nearby. Of course, living “in the neighborhood” of the TFCB

president, Ira Gardner, I knew exactly who he was referring to and said yes, we travel in the same circles.

Anyway, despite all my visitors, I do not ever recall anyone standing in my fish room and asking me what my favorite fish was. Sure, folks would say what they liked or point out a colorful one, but just like



Aquarium setup for Brian's *Ameca splendens*.

asking a parent which kid is their favorite, asking about a favorite fish just didn't seem to come to mind. When fish friends get together, they will often discuss favored species, something akin to a group of teachers discussing their favorite kids amongst themselves. But, perhaps non-fish people fear getting an earful on a subject they really don't care or know much about.

Which brings me to my favorite fish, one that I had successfully bred and given away to others over the years—*Ameca splendens*, a CARES* fish. But thru an accident of my own making, not adding water conditioner to neutralize the chloramines in the water, I lost my remaining stock.

I always liked my Butterfly Splitfin Goodeids with their silvery and flashy bodies, the males' yellow vertical stripe across the caudal fin, their ability to bear live babies that required little to no special foods, like their parents. Keeping a CARES fish species also felt just like owning a "rescue dog", a badge of honor.

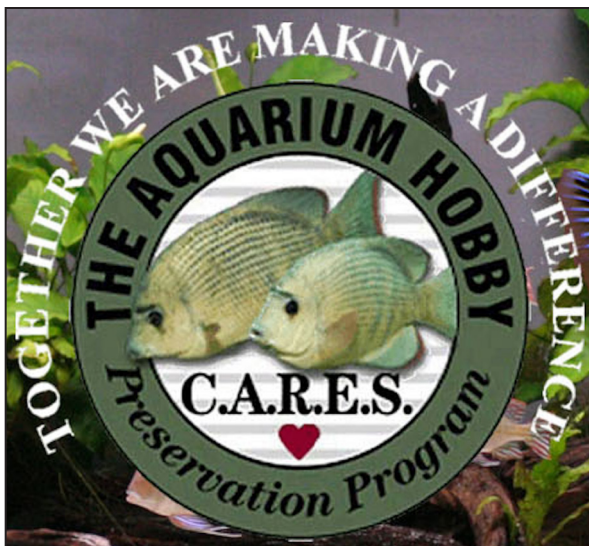
I kept mine in a species-only tank and would recommend being careful about placing them in a tank with other fish. They can be feisty and are said to be fin nippers. They can also be preyed upon by other more aggressive fish and, of course, their fry would be quickly eaten by other tankmates.

I had kept a dozen *Ameca splendens* with a couple of 3-inch plecos in a well-planted 40-gallon bow tank. At first, I had been heating the tank to 76°F, but when the heater went berserk, I removed it. My fish room had been staying at about 72°F year-round (because of the other tanks and heaters), and they were a hardy bunch of fish. But sadly, I have been without a tank of them for at least a few years now.

At this point I have about a dozen or so community fish in this tank filling the void. I have been checking around the fish stores for Butterfly Splitfins, but it seems to be a fish that is diminishing somewhat in the trade. When Goliad Farms in Texas, who used to carry them, had their ice storm and catastrophic loss, I lost that lifeline. But to my surprise, in January this year, I saw the online retailer Wet Spot offering some unsexed fry in stock. I intend to place an order in late March or April to avoid a cold-weather shipment, and hope to rekindle that same fondness again.

In some small way, I will attempt to raise a small quantity that I can spread to others who appreciate this critically endangered Mexican species. It will be a way to help maintain them in the trade and to pay my respects to such a wonderful fish!

*CARES (Conservation, Awareness, Recognition and Responsibility, Encouragement and Education, and Support and Sharing). Online at Facebook C.A.R.E.S. Preservation.



Blue *Neocaridina* shrimp. Photo Ira Gardner

Breeding American Flagfish (*Jordanella floridae*) Outdoors

By Keith Kalinowski

KJE Aquatics

American Flagfish (*Jordanella floridae*) are beautiful, often underrated, fish native to Florida in the United States. Contrary to some online information, they are not overly aggressive and do thrive in community tanks. They also consume certain types of algae, making them beneficial additions to indoor aquariums. Breeding American Flagfish in an outdoor tub can be a rewarding and enjoyable endeavor. Here's a basic guide to help you set up your outdoor tub for breeding these beautiful fish.

Selecting the Tub: Choose a tub that is large enough to accommodate your breeding colony of American Flagfish. A tub with a capacity of at least 50-100 gallons would be suitable for 3 to 5 trios (one male and two females) or 15 to 24 fish. Make sure it's made of sturdy, fish-safe material. I like to use the Rubbermaid 100-gallon tubs available at local Tractor Supply stores.



Male American Flagfish

Live Plants: Live plants are essential; they help filter and oxygenate the water, and are crucial for breeding. I recommend using a variety of plants, such as Water Hyacinth (*Eichhornia crassipes*), Water Lettuce (*Pistia stratiotes*), American Sponge-plant or Frogbit (*Limnobium spongia*), Ludwigia species, Vallisneria species, Rotala species, Hornwort (*Ceratophyllum demersum*), Guppy Grass (*Egeria najas*), Java Moss, Pickerel weed, Hardy Water Lilies, and more. Discussing plants for tubs could be a topic in itself!

Location: Place the tub in a spot that receives partial sunlight, especially for the plants. American Flagfish prefer habitats with some shade, so avoid direct sunlight for extended periods to prevent overheating and algae growth. Ensure the location is safe from predators and environmental hazards.

Filtration and Aeration: In my experience, a simple airstone and live plants provide adequate oxygenation and filtration. Previously, I used an air-powered sponge filter, but the current setup has been effective for the past few years.

Substrate and Decor: Substrate is optional, especially since the tubs are emptied annually. I don't use substrate and just allow the mulm to buildup. Decor options include large seed pod botanicals like Monkey, Sterculia, and Bael pods, as well as driftwood. To aid potential trapped critters, I recommend adding a long piece of wood protruding from the tub to offer an escape route.



Water Parameters: American Flagfish are adaptable but prefer stable conditions. Our tap water is hard with a high pH. If the tub is located where it receives rainfall, however, the parameters will naturally be tempered by rainwater over the season. While I don't regularly test the tubs, the fish appear to be healthy.

Introducing the Fish: Acclimate your American Flagfish gradually to prevent shock. Float the bag containing the fish in the tub for 15-20 minutes to equalize the temperature before releasing them gently into their new environment.

Feeding: Offer a varied diet of high-quality foods such as Dr. Bassleer medium-sized pellets or Northfin *Nano-Bits*. Additionally, these fish naturally consume algae and live foods like daphnia and scuds, which are abundant outdoors. Regular commercial feeding can be reduced due to the presence of bugs in their natural environment. Also, do not worry about mosquitos—the fish will love their larvae.

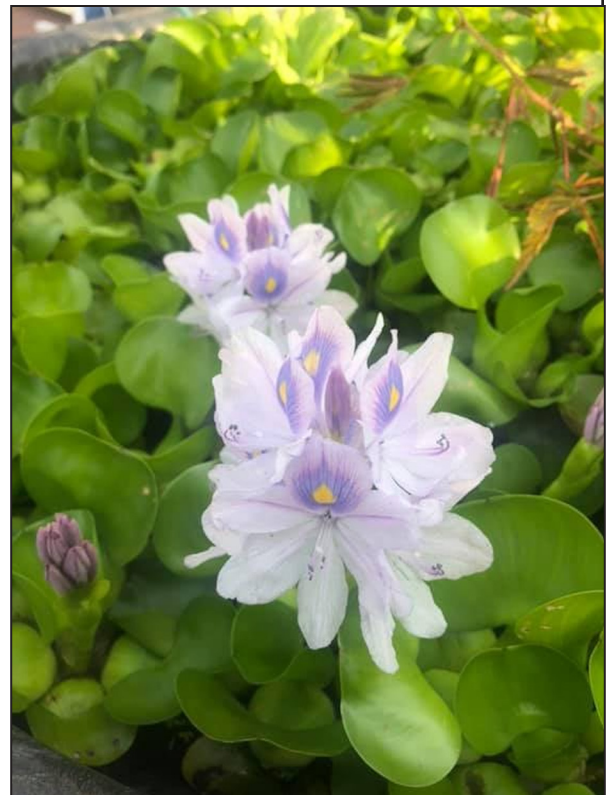
Breeding: American Flagfish are relatively easy to sex and to breed. Males are slightly larger with a reddish hue and lack a black dot in the dorsal fin. A ratio of 1 male to 3-5 females is recommended. Females typically lay eggs in the roots of floating plants like Water Hyacinth, Water Lettuce, and American Sponge plants.

Fry Care: After hatching, fry can feed on natural foods like bugs, infusoria, algae, and biofilm found within the tub. Occasional feeding of fry-specific foods like Dr. Bassleer *Baby/Nano* or Agcore *Fry Powder* is beneficial. Plants provide cover for the fry, increasing their chances of survival. Whether to remove fry is up to personal preference; some opt to let nature take its course. Remove all fish at the end of the tub season and relocate them indoors.

For any questions, feel free to reach out to me at:
www.kjeaquatics.com
or through Facebook @ [Facebook.com/kjeaquatics](https://www.facebook.com/kjeaquatics)



Floating plants provide shade and protection for adults and fry.



Water Hyacinth in bloom.

Setting Up a 150-Gallon Planted Aquarium

By David Goodman

During COVID lockdown, like everyone else, I kept busy by working around the house, painting rooms, cleaning out the garage, and the basement, and expanding my goldfish pond from 4 feet in diameter by 2 feet deep to 12 feet in diameter by 4 feet deep. Now my Comets and Shubunkins could overwinter outside instead of going into my 150-gallon tank indoors every fall. So, what to do with the 150? Well, I've always been a gardener and also interested in aquatic plants over the years, so that's what I did—I turned the 150 into a planted tank.

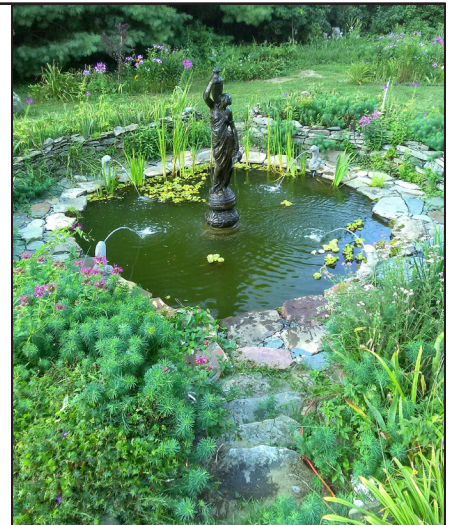
I haven't been very successful with plants in my smaller tanks, so I began to read up on everything I could concerning planted tanks. This has been my experience. I used about 100 pounds of SeaChem *Flourite* on the bottom of the tank, which is porous clay. On top of it, I put 100 pounds of gravel, 2.6 to 4mm in size, which gave me 4 inches of substrate for roomy root development.

For lighting I chose the Fluval *Plant Spectrum LED 3.0*. It offered me the opportunity to play with different light spectrums, which I experimented with for several months. For now, I have it set at 70% pink, 20% blue, 70% cold white, 70% pure white, and 70% warm white. I haven't used the other features on it. I was concerned that, with the 31-inch depth of the tank, the light was not going to get to the substrate, but it hasn't been a real problem. I just don't grow carpet plants.

The filter I have is the Fluval *FX6* canister, which I pretty much use as a sponge filter. The feature I really like is the valve at the bottom of the canister, which can be used to drain the tank. I have a hose through the floor to my basement sump pump that drains the water to the outside. To refill the tank, I fill and preheat a 55-gallon plastic drum in the basement with a sump pump in it and pump the new water through the floor to the tank. It's really easy to do water changes this way. I do water changes twice a month and clean the filter every 4 months.



Planted 150-gallon tank is home to a thriving population of swordtails.



Building a 4-foot-deep pond allowed my goldfish to overwinter outdoors.

The heater is a hygger, 800-watt LCD display heater. It does the job and actually has been working well after several other brands that have been awful. The temperature is set to 78°F.

The hardscape I gathered from the Lamoille River. There's lots of driftwood down there, which I cleaned up a bit with hydrogen peroxide and an abrasive sponge. After cleaning, I let it sit for a few days before adding it to the tank.

I needed plants that would survive higher pH, 7.6 to 7.8

and hard wellwater. That guided my choices as I didn't want to add buffers. The plants have done very well so far and, after 15 months, they include *Cryptocoryne* species, *Staurogyne repens*, Süßwassertang, Swordplants (*Echinodorus* sp.), Anubias, Guppy Grass (*Najas guadalupensis*), Jungle Vallisneria, Tiger Lotus (*Nymphaea lotus*), Christmas Moss (*Vesicularia*), Bolbitis, and Octopus Plants (*Pogostemon stellatus*). Other than the fish providing fertilizer, I use Aquarium Co-Op *Easy Root Tabs* once a month, and their *Easy Green All-in-One* liquid fertilizer every 5 days and *Easy Iron* every 7 days. I trim the plants as needed, usually once a month. There's no algae. I obtained some swordtails for free and they have done a great job of fertilizing the plants and spawning like crazy.

After some trial and error, I've found what works within the parameters of my tank and it's been a lot of fun. Because this tank is so completely planted, to further experiment I might have to set up my 90-gallon tank.

Happy Planting!

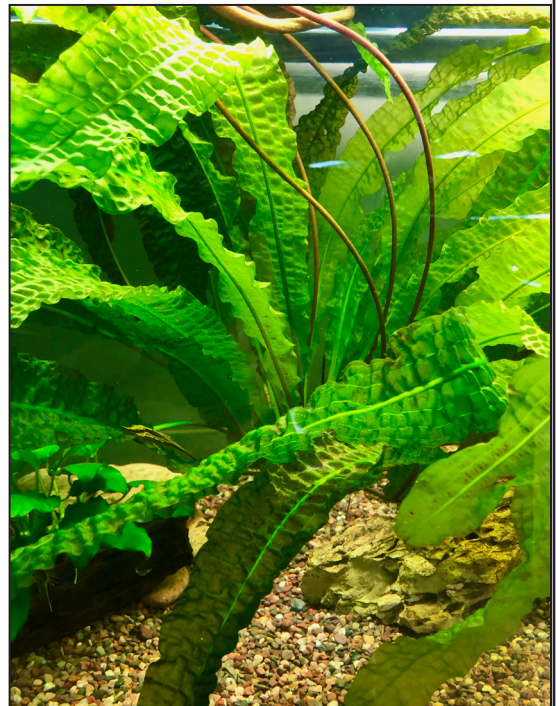
Growing *Aponogeton boivinianus* from Seed

by Ann Whitman

The centerpiece plant in one end of my six-foot-long, 100-gallon tank is a magnificent *Aponogeton boivinianus*. This species is native to Madagascar and grows from a bulb. I've had the plant for at least six years and probably got it in a club auction from a Florida Aquatic Nursery donation. It started out as a little one-inch bulb in a 20H aquarium, got moved up to a 40B, and eventually outgrew that space, too. The last time I moved it, the solid root and substrate mass surrounding the bulb was about 10 inches in diameter.

Our water is hard and alkaline with a pH of 7.6 right out of the tap, and all the *Aponogeton* and *Cryptocoryne* species I keep seem to thrive in it. I don't fertilize regularly at all, but do push Seachem *Flourish Tabs* into the substrate every few months and dose with other various Seachem fertilizers or Nilocg Aquatics *Thrive* when I think of it. It's currently growing in AquaNatural *Midnight Pearl* gravel and previously grew in coarse black sand. I've had it under various aquarium plant lights where it grows vigorously with no CO₂ added.

Aponogeton species grow from bulbs and in several different types of natural habitats; some water bodies dry out periodically and some contain water year round, some are stagnant and some are flowing. As a result, the different species have adapted to various dormancy strategies. *Aponogeton boivinianus* occurs in flowing waters that rarely, if ever, dry out, making it very suitable for aquarium maintenance. My plant does go through periods of semi-dormancy when most of its leaves turn brown and die, but it always has at least a dozen or more strong green leaves. This period usually lasts for a couple of months before it resumes lush growth.



Aponogeton boivinianus with four flower stems in a 100-gallon tank.

My plant blooms pretty regularly, at least four or five times a year, and always sends up two to four flower stalks. Usually, the flowers just disintegrate after blooming and I pinch off the stalk when it's done. In the fall of 2023, however, the plant bloomed, the flowers self-pollinated and began to develop seeds. This had occurred once in the past but I wasn't able to keep the seedlings growing. The plant is uncommon and hard to find, so this time, I was determined to harvest and grow as many little *A. boivinianus* seedlings as possible.

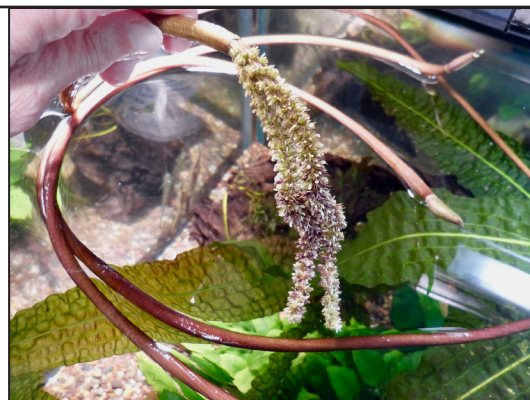
Seed Development

The aquarium is well-covered by a glass lid that holds humidity at the surface, and this may have contributed to the flower fertilization and high germination rate. As soon as I saw the seeds developing, I slipped a mesh filter bag over the inflorescence to prevent the seeds from escaping into the tank. About three weeks later, the seeds had sprouted and begun rooting into the mesh.

I cut the bag open, but did not try to remove the little seedlings from the mesh because their roots were small and fragile. Instead, I cut up the fabric and planted the sections in a 15-gallon tank containing sand substrate and a high-quality aquarium plant light. I kept the water level to about 8 inches deep for the first few weeks and added just an airstone for gentle surface agitation and a few squirts of *Thrive*.

I kept the seedling tank fish-free so as not to disturb the roots or risk having the leaves eaten. I have only fertilized them a couple of times. Now, just four months after setting seeds, many of the plant's offspring are a couple of inches in diameter and well on their way to becoming centerpieces in aquariums of their own.

Reference: Kasselmann C. 2020. *Aquarium Plants*. English Edition. Aquarium Plants Publisher, Teltow, Germany.



Flower stalks end in two flower spikes, each containing many pink flowers. This inflorescence is just past full bloom and flowers closest to the stem have already been fertilized. Photo Oct. 29th



Fertilized flowers sink under the water where the developing seeds mature. Photo Nov. 5th



Seeds germinated quickly and clung to the decaying inflorescence as they developed roots and first leaves. Photo Nov. 29th



Three months after planting, the seedlings have grown into small plants. Leaves are beginning to show corrugation. Photo Feb 29th

Dave's Top Ten No-Nos

By David L Banks Jr

If we stay in this hobby long enough, all of us will likely fall victim to many of these mistakes, but hopefully this list will save one of us from doing at least one of these things once in their life. It is easy to just go about life without giving these much thought, which may have negative consequences for our fish. Take the time to give these ten things a quick thought and you should be able to avoid these simple mistakes.

1. Using household chemicals/cleaners
2. Skipping water changes
3. Buying fish without knowing about them
4. Ignoring your tanks
5. Letting a neighbor feed fish while away
6. Buying cheap heaters
7. Forgetting you are filling a tank
8. Over cleaning your tanks
9. Putting little fish in tanks with fish with big mouths
10. Believing everything you read on the internet!!!



Remember to turn off the hose!

1. Beware of using any household cleaners or chemicals around the aquarium, or especially in it. Don't spray Windex or other glass cleaners directly onto the aquarium glass as it many contain ammonia or other chemicals dangerous to the fish. It is best to spray the cloth away from the tank and then clean the aquarium glass, or even better, just use water. Room deodorizers and rug cleaners are other potential problems; avoid using these near aquariums. Sponges are not obvious sources of trouble, but new sponges are often treated with chemicals to stop bacteria and mold. Used sponges may contain soap, even if rinsed many times. If you need a sponge, read the package label for chemical additives, dedicate one sponge for your tanks, don't use any soap or other chemicals with it, and make sure it is very well rinsed. Other options would be paper towels, or even the plastic scrunge pads, again making sure they are clean and chemical free. Lots of other chemicals could also be dangerous, just think about using anything near your aquarium.

2. This may seem obvious, but how often have you thought to yourself, "when was the last time I did a water change on that tank"? It is a good idea to mark on the calendar when you do them, or set a schedule so you do them the same day each week. Regular partial water changes on a weekly basis are one of the best tools we have to keep our fish healthy.

3. We will all do this at some time. You see a new or unusual fish that you just must have! But what do you really know about it? How big does it get is the first question, and will it outgrow my tanks? Does it require special feeding or have other special requirements? Will it live with my other fish or does it

need its own space? It's never a good idea to buy any animal on impulse, but I know it is hard to resist sometimes. Just give it a thought, and try to find out as much as possible before taking something new home. Almost everyone now has a smart phone, so Google it and learn what you can before buying.

4. While this may seem like it is covered in item two, it really goes beyond just water changes. Observing fish and checking filters, heaters and other equipment also needs to be done on a regular basis. You can avoid all kinds of larger issues by discovering a potential problem early on. I know I have a couple of power filters that I tend to ignore for too long and eventually they start to overflow and drip onto the floor! By observing your tanks more closely and regularly, you will also see interesting behaviors of your fish and maybe even that they have spawned. I always say that the key to fishkeeping success is observation!

5. Another tempting thing to do is to ask an inexperienced neighbor or friend to take care of your fish when you go away. While it is a good idea to have someone check on your fish and aquariums while you are away for an extended time, adult fish can go without being fed for a long weekend without any issue. In fact, they can go for a week in many instances without food. Even having an experienced fishkeeper feed your fish can introduce problems as they are not familiar with your setup, how many fish you have in each tank and how much they typically eat.

I was once gone for over three weeks and had a very experienced hobbyist care for my fish for the second week. I left very explicit instructions to feed very little and only every other day. Well, he was very helpful and made sure all the fish were well fed. However, what he may not have considered is that I had not planned for any maintenance in those three weeks, so some of the tanks were in immediate need of water changes when I got home! If they had been fed sparingly, the fish would have been in much better shape. Always leave clear instructions whenever someone is taking care of your fish in your absence. Leave only small amounts of food available or try pre-measuring food into Dixie cups for each tank for each scheduled feeding.

6. Have you ever been tempted to buy something because it was really cheap? A heater is one piece of equipment for which you are much better off spending the extra money and getting a reliable one. Used heaters are a hobbyist's worst investment; stay away from them! Faulty heaters can cause major problems. They can get stuck on and "boil" the fish, or not come on and "freeze" the fish, or even just fluctuate wildly. All heaters, even the expensive ones, can fail so check your tank temperature often. But, in general, the more reliable heaters are the more expensive ones, and they are well worth the extra money.

7. A little bit of water goes a long way when it ends up where it was not meant to go! For those who fill their tanks with a hose, over filling a tank is something that you will probably experience in your lifetime. It is so easy to get distracted: the phone rings, you're cleaning a filter, and the list goes on. I had a sign on my old fish room door asking the question, "Are you filling a tank?", and that sign stopped me many times from leaving the room while the hose was still running!

8. One thing that I see many new aquarium owners doing is spending a lot of time keeping their tank "clean". They take out all of the tank decorations and scrub them, but cleaning all the surfaces removes the beneficial biofilm that helps stabilize the tank. Simply keeping the water clean through routine partial water changes will avoid excessive nutrient buildup and help keep the algae growth in check. My philosophy has always been to make sure the front glass is clean so you can clearly see into the tank and see the fish. The rest I keep "reasonably" clean, so there is not a lot of unsightly algae growing on everything, by doing regular water changes and having an Ancistrus or other algae-eating fish.

9. Ever wonder what larger fish eat in their natural habitat? Many will eat anything that fits in

their mouths, including smaller fish. My rule is that if a fish can fit in another fish's mouth, it may be considered a meal, and some fish will surprise you at how large their mouth really is! Many catfish with wide mouths can open them very big. Black Ghost Knifefish (*Apteronotus albifrons*) is a great example of a fish you would not normally expect to be able to eat small fish since its mouth typically looks very small, but they can open their jaws to 90 degrees and swallow fish much larger than you might think. So be careful not to put fish that might be considered a meal in with larger fish. Of course, even those that know this rule may fall victim every now and again.

10. We have more information easily available to us than ever before in history, however, we also have a lot more false information available too! Whenever researching anything, always refer to multiple sources and make your own determinations from all the information you found. Consider the source!. Forums and blogs are places where anyone can write anything, but magazines and books usually have well-known and experienced writers whose information you can count on as being more accurate, at least most of the time. We all want to believe what we read is fact, but don't do it! What works for one hobbyist may not work for others as it all depends on your unique circumstances. Always gather the information, think critically about it, and then make up your own mind.

I hope I have helped to keep you from making at least one mistake. Happy fishkeeping!

Keeping Track of Maintenance & More

By Ann Whitman

My aquatic hobby has expanded over the years and I often have more than 30 tanks going. With so many aquariums, fish and plant species and various breeding activities, I wasn't able to keep track of the maintenance in my head anymore. I also like to travel and that always requires having someone else care for my fish in the days and weeks I'm away. The situation called for better organization, and spreadsheets were the answer!

Tank Maintenance Chaos

When I had just a few tanks, I did my water changes every Sunday and that routine worked well enough. With far more tanks to maintain, though, I couldn't get them all done in one day and it was easy to forget where I left off. Some setups also needed more- or less-frequent water changes, depending on what was in them. Fry and grow-out tanks usually require at least two water changes a week, for example, while a heavily planted tank with just a few fish can skip a week or two.

Other routine maintenance chores, like filter and glass lid cleaning also started to get out of hand. I simply couldn't remember the last time I cleaned that canister, rinsed the sponge filters, or scrubbed the crud off the lids. I tried making notes on a calendar, but wasn't consistent enough and the little calendar squares simply weren't big enough for all my notes.

Finally, I found a system that worked. I used a Sharpie to write a letter on the upper corner of each aquarium and entered them

Tank	Size	Water change & Filter Maintenance Dates				
sink	10	2/18	3/4			
A	29	2/14	2/29	3/2		
B	20H	2/18	2/29	3/1		
C	29	2/18	3/1	3/12		
D	20H	2/18	3/1	3/12		
E	15	2/18	3/1			
F	15	2/18	3/1			
G	15	2/18	3/4			
H	15	2/18	3/4			
I	15	moins/ worms				
J	15	2/18	3/10			
K1	40B	2/18 reset	3/4			
K3	20XH	2/15	2/29			
K4	20H	2/15	2/29			
L	20B	2/15	3/14			

Keeping a Tank Maintenance Chart tames the fish room chaos.

on a chart. Microsoft *Excel* is my go-to for making charts and keeping track of other things, and it works perfectly for the fish room, too. I created a chart/spreadsheets that lists each tank letter down the left side and has empty boxes in each row. I put this sheet on a clip board and hung it in the fish room.

When I do water changes, I simply write in the date after each tank. I usually clean filters and lids on the same day that I do a water change on a tank, but not every week. To keep track of the filter-cleaning schedule, I designate those activities with +F and lid cleaning with a +L after the dates they were done. Problem solved!

For the Fish Sitter

When I travel for more than a couple of days, someone else has to feed the fish because I usually have a bunch of fry or youngsters. (Most adult fish can go for a week without food.) I have tried different systems to relay information about how much and what kind of food and how often each tank got fed, but each system had problems.

When I had five or six tanks and was away for just a few days, I premeasured food portions for most of the aquariums in little Solo shot cups. That system no longer worked at all in the larger fish room, plus it didn't allow for live, frozen, or refrigerated foods. Post-it notes worked pretty well, but they fell off the tanks after a while and had to be redone by hand for every trip.

They also didn't have enough room to write some of the more detailed and nuanced instructions. Another strategy involved walking around the fish room with our house sitter while she took notes on a notepad. That was too time consuming and required that she make an extra (paid) trip out to our house.

I already kept spreadsheet records of all my tanks and the fish they contained, so I repurposed that list and made a new Feeding Chart. This spreadsheet shows the tank letters and the species and quantities of each fish down the left side. The next column has the specific feeding instructions for each tank with room for hand-written notes. Finally, a system that consolidates all the information in one place and is easy to keep updated and use! Our house sitter also writes observations and notes on the sheets that I can review when I return.

One benefit of my feeding spreadsheet that I hadn't really anticipated is its use as a valuable communication backup system. I make a digital copy of the sheet and keep it on my phone. I also send a copy to my sister, who is another highly experienced aquarist. If our house sitter needs help, she can text either of us, refer to the tank in question, and we will all be on the same page.

TANK C: WATCH. TREATS SUN NIGHT/MON MON W / 3 SCOOPS POLYGRANED IF BLACK MOL
SU + WUE + SA RAPASHI IS ALWAYS ONLY

Current Fish Room In-Use Tank Inventory, Feb 1, 2024			Feeding.
Tank ID	Tank gallon size	Current contents	NOTE: I feed Repashy in the morning. Repashy is 1/8" thick slice x size indicated. Baby fish get fed morning and evening. All other tanks get fed just in evening.
sink counter	10	ricefish and P. luminatus fry, 2 BN pleco fry, royal farlowella fry	half dropper of BBS or fine food, dime R. 2X
A	25	EMPTY	
B	20H	SR Ancistrus, Schleromystax barbatulus, juvenile Kali Tawa rainbows, many juvenile plecos	pinch flakes, quarter R. 1X
C	25	9 Panaqolus macrus (clown pleco), 1 Peckoltia L494, 5 black mollies, juvenile M. Lengguru rainbow	Nickel R. pellets FLAKES
D	20H	orange medaka, lemon BN, Corydoras similis, 1 Bolivian ram	flakes, nickel R
E	15	Pseudomugil luminatus blue-eyes, 8+ rosy loaches, Somphong rasboras	pinch flakes, dime R
F	15	6 loaches, swordtails, and 5-6 dwarf ananias cichlids	big pinch flakes
G	15	guppies & gold laser corys, pygmy Corys	pinch flakes, dime R, extra bbs. 2X
H	15	Daisy rice fish, green laser corys, 5 honeycomb woodcats	flakes, nickel R
I	15	EMPTY	
J	15	3 Rhinogobius davidi 'white'	SU/TU/TH/SA/NO white worms or frozen brine shrimp every other day WATCH FILTER! STARS RUNNING

Feeding notes for the fish sitter are easy to update and keep all the information in one place. The sheet is also a place to record anything that happens while I'm away.

Raising Our Fry

by David L Banks Jr, TFCB

photos by Ann Whitman unless noted

(Reprint from In Depth Feb 1990 with edits)

As our breeder program was being formed, I thought about all the information I've accumulated over the years that I could sort through to help the program. I came up with many things: other clubs' breeding programs, the program from the NEC, and many articles and the books on breeding I have.

One important thing I found in short supply, however, was information on the raising of the fry after the adults had spawned. There was usually some reference to raising them in many of the articles and books, but it was often limited to a single species and not very detailed. The main emphasis was on the act of spawning and what proceeded the event, with topics such as water conditions, tank setup, and feeding of the adults discussed in detail. Knowing that most of my experience is with cichlids, I thought I could at least use my general experience to help give others a better idea of how to raise their new arrivals to be as big and healthy as their parents!

Planning the Space

The first trick, obviously, is to get the adults to spawn, but there is much that can be done in preparation for the young before they arrive. First, it is important to be sure you have enough tank space in which to raise the fry. For proper growth, most species will need several different sized tanks for different growth stages. If the adults keep spawning, you may need additional tanks because the frequency of spawns may be greater than the growth rate of the fry, and you may be raising many different broods at the same time.

For many species, it is best to remove the fry at an early stage, sometimes as soon as the eggs are laid, but for others you can let the adults "raise" them. If the young are to remain with the adults, you should start with a tank capable of handling both the adults and the fry as far as size and filtration are concerned. Remember that as the fry grow, they will require more and more "space". Imagine a tank full of one-inch fish plus the adults. Will they all fit and still have room enough to grow?

If you separate the fry from the parents, an appropriate size tank needs to be setup in advance. I use a 2.5- or 5-gallon tank with no substrate. I keep an extra sponge filter going in an established tank and move it to the small tank for filtration just before the fry are added. I prefer sponge filters for several reasons. First, it will not trap the fry like mechanical filters, and they also provide an ever-present source of food for the grazing fry. Not using gravel in the tank makes it easier to clean the bottom plus it makes it easier to see the fry.

Other things can be added to the tank to make them feel more comfortable. For example, floating plants are enjoyed by livebearers and fish that stay at the top, or rocks could be added for your rock



Dwarf Petricola (*Synodontis lucipinnis*) fry. Photo David Banks, Jr

dwellers, but remember not to put in too much or it will make it harder to clean the tank and to see the fish. One thing I like to use for rock dwellers, from fry to adults, are Penn Plax Lok Rocks (editor's note: Lok Rocks have now been discontinued, but used ones do show up at club auctions, and even eBay as vintage items). These are plastic and look like rocks, but they are very light and can easily be arranged in many different ways. They are also simple to remove for cleaning the tank or netting out the fry. This will be only the first home for the fry, and they will be moved to larger quarters as they outgrow this tank, so keep it simple and easy to maintain.

Feeding Options

After you have a tank ready for the fry, it is time to start thinking about what to feed them. This is one thing that should be done as far in advance as possible so as soon as the fry are ready to eat, you have something to give them. Newly hatched brine shrimp is the first food for most of the cichlids we have spawned, but for many other fish species, baby brine shrimp may be too large. Size is probably the most important factor when trying to determine what food to first feed your fry because if it is too big, they will not be able to eat it.

The quality of the food is the next thing to consider. Powdered flake foods are probably OK, but I'm sure our fish would prefer live foods, if they're available. Many cultures can be started ahead of time to provide these live foods; brine shrimp, infusoria, micro worms, and others. You can obtain starter cultures from many sources such as other club members, mail order, or even some local pet stores. One advantage to live foods is that uneaten food will "live" in the tank until it is eaten instead of simply falling to the bottom and polluting the tank.

Some prepared foods especially marketed for fry are available, such as powdered freeze-dried foods, liquid foods (Interpet *Liquifry*), and frozen baby brine shrimp, cyclops and other microorganisms. These are good to keep on hand if you are expecting some fry but will not be able to get a live culture going in time. But, remember that live foods are always best. This is not to say we cannot raise our fry on prepared foods, we could, but the fish will grow faster and be much healthier if we can at least offer them some live foods as part of their diet.

Of course, it would be nice to know when we are going to have fry to raise. Observation is the only way to know if something is in the works or if eggs have already been laid. Most fish do some kind of pre-spawning preparation and/or perform a spawning ritual. Even if you don't know what these are, an observed change in behavior could be an indication of spawning. Remember, observation is the key! You may not know about the first or first few breeding attempts, but as you observe the adults you will get a feel for it, and it may become very obvious. The earlier you know your fish are about to spawn, the better your preparations can be. This may not seem very important at this point, but when you have several pairs of fish spawning regularly and have a limited number of extra tanks, it could be very important for you to know when the next batch is coming. Observing your fish will also help in many other areas, like detecting diseases and other health problems, over aggression, and poor water quality. Keeping an aquarist's notebook is a good way to keep track of your observations.



T-bar Cichlid (*Amatitlania sajica*) protecting her newly free-swimming fry.

Raising with Parents or Not

Enough of the preparations, what do you do after the fry arrive! As I mentioned earlier, a decision must be made whether to leave the fry or eggs with the adults or not. This question really must be answered by each individual, but here are some guidelines to consider. First, are the eggs or fry safe in the tank they are in? Most fishes will eat their own or another species eggs or fry if they have a chance, while others may do so only if they are not fed adequately. Another thing to consider is the care fry may require from the parents. While most species give no post-spawning care, others, such as most cichlids, do provide varying degrees of care.



Male *Laetacara dorsigera* with fry

If the adults will raise their fry, you must decide if you want to take on that responsibility yourself or leave it up to the parents. If you have never allowed the parents and fry to remain together, and the species you are breeding do provide parental care, try at least once leaving the fry with their parents and observe the parental behavior; it can be very interesting. We have raised many different broods of cichlids in a community tank and watched as the parents defended both their territory and their young.

Moving Eggs and Fry

The next question is how to move the fry if you are taking them away from the parents. The best way, if it is possible and practical, is not to move them at all but instead move all the other fish in the tank somewhere else. Usually this is not practical, however, so the fry or eggs will need to be moved. If you need to move eggs, larvae that have not yet become free swimming, or very young fish, don't take them out of the water. It is best to transfer them first to a container that is submerged in the tank and then move that container to the new tank.

This serves two purposes, first it doesn't expose the eggs or fry to the air and it also allows us to acclimate them to their new tank. Allow the container to reach the same temperature as the new tank by floating it. After they are at the correct temperature, start to acclimate them to the new tank by slowly adding water from the tank to the container. An alternative to this approach is doing a 75% water change on the new tank and fill it with water from the breeding tank. This is advised if the water from the two tanks are very different, but still do acclimate the eggs or fry somewhat as they are very fragile at this stage and even a small sudden change in conditions may injure the eggs or fry.

The size of the first tank to start raising the fry in should be small so that the fry won't have far to go to be able to get all the food they will need. However, this strategy will change drastically as the fry grow and they need more room. So, start with a small tank, but remember the smaller the volume of water, the faster it will become polluted. This means if you go for a very small volume, more frequent partial water changes will be needed.

I like to put eggs and newly hatched fry in a fine mesh net hanging in a 2.5- or 5-gallon tank and they will stay there until the fry become free swimming. This keeps them all together and I can put an air stone near the net so fresh water is constantly going through it. An anti-fungus additive can also be added to the tank if the eggs have not yet hatched. I would not recommend adding it if the eggs have hatched and the fry are starting to wiggle. If you have used an anti-fungus agent, do partial water changes daily to eliminate it as the eggs start to hatch.

First Days

After the fry become free swimming, it is time to start feeding them. Here, the fine mesh net is useful again. Because the fry are contained in the net, the food will not be dispersed throughout the tank. The fry should be fed as often is possible, at least three times a day. It is better to feed smaller amounts often than it is to feed them a large amount only twice a day because they won't go through a long period of not having anything to eat. During the week, I feed them once in the morning before work, after I get home from work, and before I go to bed at night. On days off, I try to feed them as often as I think of it, sometimes six or seven times a day, but only small amounts each time (no more than they will eat while I'm watching). This way they will end up eating more throughout the day even though it is only a small amount each time.

I leave the fry in the net for several days while feeding them, then they are released to the whole tank as they require more space to swim and grow. By using this method, the fry don't have far to go for their food and the tank will not become polluted as quickly as a smaller container would because we are using all the water in the tank to flow through the net. It also allows them to stay in the same tank without moving them, while giving them more space simply by letting them out of the net.

By this point we are well on the way to raising up our fry, but if we want them to grow properly, we still need to pay extra attention to them. As the fry grow and become able to swim around the tank to get food, you will need to move them again. Depending on how fast they grow, I will move fry to a larger tank about two to three weeks after they have been let out of the net. The fry have now reached the stage of grow out.



Young *Farlowella vittata* foraging in a cloud of baby brine shrimp.

Grow Out Stage

Grow out simply means the stage where the fry are basically off to a good start and just need to grow bigger for us to be able to sell, trade, or give them away. Since no one wants fry that are only 1/2" long, we need to grow them up to a size that most people would be willing to take them. There are three main factors involved here. They must be fed well, kept in good water conditions, and not be overcrowded. Note: in general these are the keys to keeping all healthy fish.

Let's start with the last one, overcrowding. When the fry have grown to the grow-out stage, it is very important to keep the number of fish per gallon of tank space at a minimum. There are two ways to do this, either have a large number of very big tanks available or thin out the fry. Since most of us don't have all that empty tank space, it is better to only try to raise what will fit into the available space.

Many fish lay hundreds of eggs and in the wild only a handful will ever make it much past this stage, and even fewer to adulthood. Don't try to raise 300 or more fry! In our home aquariums, we probably could raise at least 90% of all the eggs that hatched, but the quality of care we could give that many fry would obviously be less than optimal, and lack of care would show in the final product. It is important for us to raise quality fish, as these will hopefully be used for further breeding in the future, and we don't want our breeding stock to deteriorate. It's also very difficult to find homes for so many fish!

Try to pick the healthiest fry to keep by thinning out those that don't eat well and those with any type

of deformities. Be careful not to thin them based on size alone, as one sex may grow faster than the other in a particular species and you wouldn't want to end up with all males or all females. This can be a stepwise thinning as the fry require more space that you no longer have. As the fry get big enough, you could give some of the fry to someone else who might have extra space to raise them. Just remember the more space the fry have, the faster and bigger they will grow.

I will briefly touch on feeding and water conditions as you probably have been doing a good job at this already to get your adults to spawn in the first place. Never be afraid to do too many water changes! For most species, frequently changing even 50% of their water won't hurt them, and may be necessary in crowded fry tanks. As for feeding, just try to feed them often and vary the diet somewhat. As I said earlier, feeding live foods as part of the diet is a very good idea.

You may be tempted to mix different broods of fry as space starts to get limited, but I think this should be avoided. It is always good to know how old the fry are in a tank, if broods have been mixed, you might not know which fry are from which brood. If one sex grows larger, it is impossible to be able to make an intelligent guess at the sex of a particular fish if several broods are mixed. This could be important if you want to separate the sexes to prohibit them from spawning too early or to be able to match pairs.

Now that you all know my opinions, you can start to form your own if you haven't already as you read this article. Just remember, even I don't always follow my own rules, these are just what I try to accomplish. Of all the broods we have raised, only a handful really had what I would consider top care, but others had adequate care and turned out pretty well. Lots of people breed fish, but not all of them are producing quality fish, they are simply producing. I would recommend trying to give the fry the best care you can, and raising them well so you can be proud of your accomplishment.

GOOD LUCK



Neolamprologus ocellatus. Photo Ira Gardner

AMAZONAS

Finding Mosquito Larvae Indoors

By Laura Isham

Can you get mosquito larvae in your fish room in February? YES!

Most hobbyists are used to thinking of mosquito larvae as something that comes from egg rafts a friendly mosquito deposits to feed the fish in your tub ponds in the summer or something to watch out for before you put the fish in. But, especially for those of us who are interested in culturing less-common live foods beyond the standard brine shrimp or feeder guppies, mosquito larvae could pay us a visit in the off-season.

A lot of the discussion around mosquito eggs talks exclusively about egg rafts—a cluster of eggs that looks like a little scrap of wood ash floating on the water. But, most species in the *Aedes* genus (one of the commonly found types in this region) lay eggs singly above the water line, which helps them time their hatching to take advantage of higher water levels. If one laid some eggs right around the water line in a freshwater live food culture container or hitchhiked on something you brought into the house, you may find a few mosquito larvae later. For me, it has usually been about one to three larvae at a time—either the female has decided not to put all her eggs in one basket, so to speak, or there wasn't enough food for much of the brood to get to noticeable size.

I recently found two mosquito larvae in my blackworm culture. The container has an airline and a tiny sponge filter, but often the water level gets just below the level of the filter tube, and when that happens, most of the water surface is not moving. The vegetable bits and brown leaves in the container make just as good a food source for mosquito larva as for blackworms.

Recently, I had an atypical experience with mosquito larvae, though. Last summer, I put some sand in the bottom of a couple of my outdoor tubs as a plant-growing experiment—I was picturing sort of a grassland of *Vallisneria*. I collected most of the sand out of the tubs in October to use again later and I put it into an uncovered jar, after removing most of the snails, dead vegetation, etc. Later, I decided to use the sand to start a second blackworm culture, but held off adding the worms for a bit just in case some *Daphnia* or something else desirable hatched out from the sand. I ended up with a couple dozen mosquito larvae hatching out (as well as a couple medium-sized ramshorn snails that had managed to go dormant and survive). Since it was a fairly small jar, I just put the entire container inside an aquarium to let my fish eat them at their leisure.

As far as I know, I've never had mosquito adults hatch out in my house. Regularly checking any fishless containers will allow you to detect the mosquitoes while they are still larvae.



Mosquito larva found indoors in a blackworm culture.

Culturing Live Foods Primer

by David Banks, Laura Isham, and Ann Whitman
photos by Ann Whitman

At a club meeting in Spring 2023, several TFCB members gave presentations on various live foods and how to culture them. Everyone who attended that meeting went home with a variety of starter cultures and instructions for keeping them healthy. Those updated instructions are included here, starting with a new article by Laura Isham on keeping Moina (water fleas).

Note: all water used in these cultures must be chlorine-free. Use bottled spring water instead of dechlor chemicals if possible. Some organisms may be sensitive.



Freshwater Moina aka water fleas are ideal food for fry of nearly all sizes.

Moina Benefits

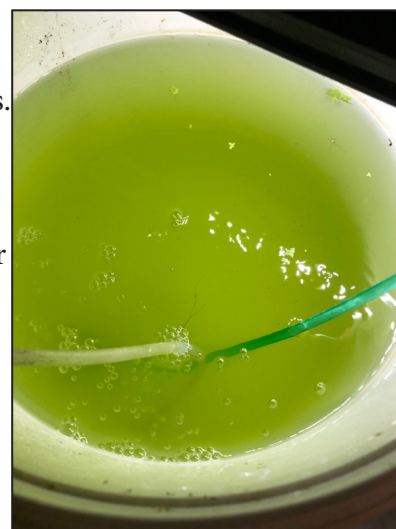
By Laura Isham

Moina species are closely related to Daphnia and both genera of crustaceans, collectively called water fleas, naturally live in fresh water. Moina are relatively small—the adults are slightly larger than newly hatched brine shrimp, and the newly hatched Moina are roughly the size of adult rotifers. They are about half the size of Daphnia and can also tolerate higher population densities. They make ideal food for freshwater fish, especially fry, because they can survive a lot longer than brine shrimp or the various terrestrial worms in the aquarium.

Feeding and Maintenance

To feed the Moina culture, I use a mix of 2/3 dry yeast and 1/3 spirulina powder. The spirulina “gut loads” the Moina to make them extra nutritious. Give them enough of the powdered food mix to make the water slightly cloudy. It’s smart to use a small spoon to scoop out the food mix rather than trying to pour it out because it’s easy to overfeed and foul the culture. You can put the food directly in the culture right before adding more water during a water change, and the process of adding water will mix the food into the water. Alternatively, you can make a solution of food and water and then add it to the culture. Water fleas are filter feeders, so they need the food to be mixed into the water.

In summertime, you can do Moina on easy mode! Take the green water (suspended algae) from your outdoor tubs and use it to replace the water after you harvest the Moina! This carries the risk, however, of bringing in unwanted invertebrates, such as snails, seed shrimp, cyclops, and insect larvae that may have been introduced by animals and insects. You may want to keep a separate culture going that doesn’t have any exposure to outdoor water. If you have a source of green water, you can culture it in an aquarium or bucket year-round to feed your Moina. Moina also feed on fungus, bacteria, and decaying organic matter.



Moina can be cultured in a bucket of green water or suspended algae.

Some people like to keep a few large containers of Moina going and others do a lot of smaller containers; even gallon-size jars work pretty well if you're harvesting and doing water changes regularly. It is prudent to keep multiple cultures going at once because they are prone to crashing, especially in smaller containers. You can gently aerate the cultures (a bubble every few seconds), as this helps to keep the food suspended, but it isn't essential. Don't use air stones because fine bubbles can become trapped inside the Moina's carapace.

If you are keeping Moina in gallon-size jars or if you are feeding the yeast mixture, change at least half the water in the culture, at least every other day. Some people think that Moina and Daphnia are sensitive to dechlorinator, so you can use aged tap water in jugs instead. Some use tank water to fill their Moina culture, but I don't recommend this unless you're confident that your tanks aren't harboring any remnant populations of other crustaceans, such as cyclops, seed shrimp or hydra. You would think that these critters wouldn't survive in a populated fish tank, but I've taken all the fish out of an aquarium and watched the sudden explosion of seed shrimp.

To harvest, strain the Moina from the water using a fine brine shrimp net or reusable coffee filter. You can also pour the Moina and culture water directly into the fish tank or tub if it's less than about a tenth of the tank's or tub's water volume, and if it doesn't contain suspended algae.

Reference

Rottmann, R. W., et al. 2017. Document CIR1054, Fisheries and Aquatic Sciences Program, School of Forest Resources and Conservation Department, UF/IFAS Extension.
<https://edis.ifas.ufl.edu/publication/FA024>

Vinegar Eels, Great Food for Very Small Fry

By David L Banks Jr, TFCB

Vinegar eels (*Turbatrix aceti*) are tiny nematodes with many properties that make them a great food for very small fry. They are small enough for many fry that are too small to take newly hatched brine shrimp and their active wiggling will attract the attention of hungry fish. They can live for quite some time in typical aquarium water parameters, so fry have time to hunt them down and have a constant supply until they have eaten them all. So, nothing goes to waste or adds to the waste load of the aquarium. They also will hang out near the surface, which is where many fry also congregate. But, one of the best things about vinegar eels is that they are very easy to culture and maintain.

Set 'em and Forget 'em

I have long said you can just leave a culture for years and it will still be active. I have kept a vinegar eel culture going for almost 20 years with long periods when I didn't need them or was too lazy to bother with them. Usually, even when I don't have fry to feed, I will take starter cultures to several auctions a year. They do get some attention then, but sometimes I have left a culture idle for well over a year, not touching it at all. Of course, this treatment is not ideal.

The standard maintenance for vinegar eels is to remove part of the culture and replace it with a mix of 50% new cider vinegar and 50% water from a healthy aquarium. Adding a small slice of apple is also recommended. I have been using large gallon-sized jars filled about half to two-thirds full. I have also used a one-quart, or maybe little larger, plastic peanut jar that seems to work quite nicely. Since it has a plastic top too, you don't need to worry about the metal top corroding, like it will on the glass jar.

I have had two cultures in the 20 or so years “fail”. The first time I had not touched the culture for more than a year, then removed a starter culture for an auction. I had not added a slice of apple for several years either. Several months later, it didn’t look right and there was a thick scum on the surface. It didn’t smell too good and was beyond hope. It had turned almost black and nothing moved in it.

Recently, after telling people how easy vinegar eels are to keep, I thought I should check on mine. Again, I had not used them for more than a year, and had only taken one or two small cultures in that time. I think I caught this one just in time. It did smell kind of funky when I opened it. There was no vinegar smell at all, just an almost sweet musty smell. Some scum was starting to form on the surface, but plenty of eels were still moving around in the jar. I removed a small sample and started a new culture. Saved! So I guess it is possible to kill off a vinegar eel culture, but you have to work hard at it.

Harvesting Vinegar Eels

The main drawback is figuring out how to separate the eels from the vinegar, since you really don’t want to be adding vinegar to your aquariums. I have tried filtering them using everything from paper coffee filters to expensive laboratory grade micron filters. The paper filters are cheap, the vinegar runs thru them fairly quickly, but you lose a bunch of eels. The smaller micron lab filters keep most eels on the filter, but it takes forever for the vinegar to flow thru using just gravity since the thousands of eels quickly clog the filter.

One of the simplest ways I have found to separate them came from Mike Hellweg, and is included in his live foods book. Take a long-neck clear bottle, like an Arizona Ice tea or Corona beer bottle, and fill up to the bottom of the neck with the vinegar eel culture. Then, put in a wad of cotton or polyester filter floss and push it down to the level of the liquid. Slowly and carefully top off the bottle with fresh clean water. The cotton will keep the vinegar from mixing with the fresh water; the eels will swim through it and come to the surface. You can then siphon off the eels in the fresh water.

This really works, try it. Test the water for pH, it does not smell like vinegar either. If it does smell vinegary, take out the cotton and some of the culture and try again. Add the water slowly so it does not mix when you are adding it. Then simply feed to your fry. You can also add new fresh water and repeat this using the same bottle and culture for a couple of days until most of the eels have been removed.

I would highly recommend that anyone interested in breeding fish with very small fry to consider keeping a vinegar eel culture just sitting on the shelf somewhere. They mostly do really last forever, just remember, forever is a really long time and you should give them a little attention every so often.

Reference

Hellweg, M. 2008. *Culturing Live Foods*. TFH Publications, Neptune City, NJ.

Microworms

By Ann Whitman

The term “microworms” refers to several species of *Panagrellus* nematodes of various sizes. The microworm species most often cultured is about 2 mm in length. Banana and Walter worms are a bit smaller at up to 1.5 mm. Culture is the same for all of them. Here’s my method.

1. Use finely ground instant oatmeal or oatmeal baby cereal (Gerber is a good one) as the culture medium. Some people use multigrain cereal. I have tried instant rice cereal and was not happy with the results. The worms failed to thrive in it. Mix with enough warm water to make a slightly soupy paste. It

should almost self-level, but not be runny. If using finely ground instant oatmeal, let this sit for 5 to 10 minutes and add more water if needed so that it's not too stiff.

2. Carefully add about a half- to three-quarter-inch depth of the medium to your culturing container. Clear pint-sized food storage containers work well; I use Talenti gelato jars. Try not to get the medium on the sides of the container because it will make harvesting the worms messier.

3. The starter culture you add to the new container can either be clean worm-filled medium from an established culture or worms wiped from the sides of a mature culture jar. Tip: If you are restarting a fouled culture, do not transfer any of the spoiled medium to the new container. Wipe the microworms off the sides, rinse them into a small amount of water, and use those instead. Add a dropper full of worms in water or a teaspoon of the established culture to the new medium.

4. If covering with shrink wrap, perforate it with several dozen pin holes to allow gas exchange. (Smaller holes will prevent fruit flies from getting into the culture.) If using a jar lid, place the on the container, but do not tighten it. Lift the lid periodically for air exchange.

5. Store the container between at room temperature or roughly 70° and 78°F. Within a week or so the culture will mature and the worms will start to climb the sides of the container and be ready to harvest.

6. Harvest the worms by wiping a clean finger or soft artist's brush around the inside of the container without touching the medium. I rinse the worms into a small amount of cool water in a cup and use a plastic pipette to feed the microworms to my fish.

7. Important: restart new cultures at least every two to three weeks, preferably before they “go bad.” Once the culture has started to turn dark and stink, you may be able to save it by harvesting the remaining living worms from the sides (see #3 above).

Comparative food sizes:

Baby brine shrimp	< 0.4 mm
Moina	0.4 to 1.7 mm
Microworms	1.0 to 1.5 mm length
Vinegar eels	1.0 to 2.0 mm length
Grindal worms	up to 10 mm length
Whiteworms	up to 30 mm length
Blackworms	up to 40 mm length



To show their relative sizes, this dish contains white worms (largest), grindal worms (medium), and microworms (very small). Q-tip for scale.

Grindal Worms

By Ann Whitman and David Banks, Jr

Grindal worms (*Enchytraeus buchholzi*) are the next step up from microworms and newly hatched baby brine shrimp for feeding fry. Small-mouthed adult fishes and those that require live foods also relish grindal worms. They are a little more challenging to culture, but they can be kept at room temperature and are easy to feed and harvest for those who want a nutritious in-between-size live food.

1. Culture grindal worms on moist potting soil set up in a shallow plastic or glass food container. Black or white plastic takeout trays with clear snap-on lids work well. Do not use potting soil with added fertilizers or other additives.

2. Inoculate the soil with a new worm culture. Then, gently spritz the worms into the soil with a bit of water, but don't waterlog the soil. It should be moist but not wet.

3. Stack 2 or 3 sections of plastic grid (found at craft stores) over the soil. The worms will crawl above the grids to feed and be easier to harvest.

4. Feed the worm culture with 1 to 3 pieces of dog or cat kibble, depending on the worm population. I rinse the kibble briefly in water to moisten it before setting it on top of the plastic grid.

5. Cover the kibble and grid with a sheet of stiff, clear plastic or sheet of glass to hold in the moisture and give the worms a surface on which to gather. Cover the entire container with cling wrap or a snap-on lid, but leave a small air gap at one corner for a bit of air exchange. It's important to prevent the medium from drying out.

6. It may take some time for the culture to grow and produce enough worms to harvest, but be patient. Check the kibble to see how many worms are gathered on it and on the sheet of glass or plastic. Replace the kibble as it is consumed or if it becomes moldy. Sprinkle with a little water as needed.

7. Harvest the worms by rinsing them off the glass or plastic sheet into a small bowl of water.

Tip: maintain a couple of cultures so that you have a backup in case one crashes.



Grindal worm culture on plastic grid, feeding on dog kibble and covered with a clear plastic sheet.

Whiteworms

By David Banks, Jr and Ann Whitman

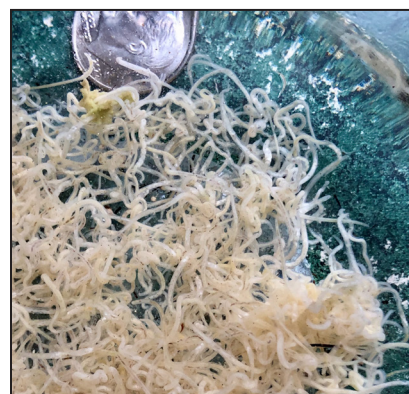
Whiteworms (*Enchytraeus albidus*) are larger worms, growing to about an inch long, that are great for feeding almost any fish as a special treat or for conditioning to spawn. Established cultures contain all sizes of the worms, from microworm size to adults, making them useful even for fry. Avoid overfeeding them to your fish, however, as they are fatty.

The greatest disadvantage for whiteworms is that they must be kept cool with temperatures between 55°F and 65°F being ideal. At warmer temperatures, the worms will die. I keep mine in the basement, others use wine coolers in warmer climates. Regular refrigerator temperatures are too cold.

The worms are cultured in moist soil or commercial worm bedding in plastic or styrofoam boxes. The soil can be fairly wet but not muddy or waterlogged. Place two or three layers of plastic grid (craft stores) over the soil. Keep the culture well-covered to maintain moisture and prevent fruit fly and mite contamination.

Feed the culture slices of bread dampened with water and place the food on top of the plastic grid. Remove and replace it if it gets moldy. I also feed my cultures cantaloupe rinds, avocado, fresh corn cobs in season, and similar moist foods.

Harvest the worms by scooping them up with a spoon or collecting them on piece of plastic or glass placed over the food.



A mass of wiggling whiteworms ready to feed to the fish. Dime for scale comparison.

Culturing Blackworms

By David Banks, Jr and Ann Whitman

photos by Greg Jones

Blackworms (*Lumbriculus variegatus*) are harder to culture than the other live foods mentioned, but they can be well worth the trouble. They are highly nutritious and valuable for conditioning fish to breed, as well as enticing picky eaters and wild-caught fish to eat. Unfortunately, they have become quite expensive and harder to find in shops.

Unlike the other cultured worms used as fish food, blackworms are aquatic and can become established in aquariums, living in the substrate. Loaches and Corydoras that forage through the sand are particularly fond of them and prevent their establishment, however.

To maximize your culture, set it up in a tank without fish. No heater is necessary, but add an airstone to keep the water well oxygenated and moving. Feed with sinking fish food pellets. Collect the worms in the bottom of a bucket when siphoning gravel during water changes.

Dedicated Blackworm Culture Setup

Aquarist Greg Jones, South Coast Tropical Fish Society in Massachusetts, takes blackworm culture to a higher level. Here's how he does it:



Greg's blackworm culture uses a 48 x 24 x 3-inch-deep hydroponics flood and drain table. It's tied into a sump system with a half-inch return line and 2-inch x 1-inch overflows with prefilter sponges and a small fountain pump to power it.



The gravel substrate is shallow for easy harvesting and to keep the oxygen level high.



He feeds the blackworms pleco wafers, spirulina flake, canned green beans, day-old zukes that his plecos didn't finish, and any dead fish.



Blackworms gather around the food on the surface, making it easy to harvest them with a turkey baster or scoop out with a net.

A Shell Dweller Story

By Jason Da Silva

Our story starts with the oldest of the rift lakes, and the second deepest lake in the world, Lake Tanganyika in eastern Africa. The lake is over 9 million years old. This has allowed for isolated evolution and led to a unique speciation of its inhabitants. One of these inhabitants is the smallest cichlid in the world, with an oversized personality. *Neolamprologus multifasciatus*, a tongue twister of a name that has led to most hobbyists calling them ‘multies,’ ‘shell dwellers,’ or as my husband likes to call them ‘little shellions’.

Halfway around the world, in a 55-gallon tank, lives my little colony of multies. This humble community has grown from a handful of males and one female to a thriving colony of 20 strong. They started in a small 20-gallon tank where they established a pecking order over the course of two months. The move to the 55-gallon gave room to fit two shells per fish, allowing their behavior to shine.

First, the males in my tank started terraforming, digging out the openings to their shells, staging homes for the future. The lone female would settle for nothing less than perfection. She spots the perfect shell. The opening is dug into the water flow, so food will drift in for the young fry. The hatchlings spend their first six months living here before moving out on their own. Hence, the name—shell dwellers.

The fish in my tank are now into their second generation and living with a school of *Cyprichromis microlepidotus*, also native to Lake Tanganyika. When chasing off fish more than twice their size, the multies’ little chihuahua personality really shows. The colony has become one of my favorite tanks for watching. Between the open-water cichlids in the upper column, and the social dynamics of the multies amongst themselves; this tiny cichlid has a big place in my heart. I hope more people get the chance to explore them in the hobby.

