

Are Temperate Fishes More Difficult to Spawn Than Tropicals?

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In the early years of the aquarium hobby, many attractive fishes from the United States were regularly available in the trade. But natives fell out of favor and pretty much disappeared from the hobby as fishes from other countries became increasingly available. Today, the vast majority of fishkeepers keep tropical fishes. This may simply be due to the old saying that the grass is always greener on the other side of the fence.

When I was a boy, I too favored tropicals over natives. It excited me to know that a fish I kept came from the Amazon, Borneo, or Africa. North American natives were just bait. I did, however, from time to time bring home “minnows” from trips to the lake. Eventually, native fishes began to interest me far more than the imports. Although tropicals were from exotic places, there was a greater sense of the unknown when it came to natives. Back in the 1960s, there was very little in print on local fishes. Even identification was difficult. I remember once trying to key out a fish I had put in my aquarium. All was going well until I ran into this diagnostic character: “Intestine spirally wound about the air bladder.” I either had to kill the fish to identify it, or keep it alive but never know what it was.

The Key to Temperate is Temperature

Many aquarists believe that native (temperate) fishes are harder to keep than tropicals. In one respect they are easier—temperature. The temperature range of tropical fishes is very narrow compared to most temperate fishes. The temperature in my native tanks have ranged from 35-95° F. Yes, my rainbow darters (*Etheostoma caeruleum*) start to die at 95° F, but they can survive at 85° F for short periods of time if necessary.

Exceptionally cold water is not a problem. I once returned from a weekend trip to discover that my furnace had broken down. The tropicals had all died, but the temperate fishes were enjoying the 40° F water. As long as you avoid prolonged high temperatures and change the water regularly, maintaining temperate fishes is not difficult.

Breeding and raising temperate fishes, however, is more complicated. Most tropical fishes that are common in the hobby tend not to have a fixed spawning season and, if well conditioned, breed continuously. Temperate fishes are harder to breed for three reasons. One, so few people have worked with these fishes and published information on them is so sparse, you may be working with a difficult species without knowing it. Two, you often have to guess as to what the breeding requirements of the fish are. (Do they need plants, gravel, caves, etc.?) And three, most temperate fishes, especially those from the north, need to have a change of season to trigger spawning behavior.

Being from Michigan, the local fishes I work with need a low temperature and short daylength during the winter to reset their spawning clocks. I am lucky in that I have a room in my home where the temperature in winter can easily be maintained in the 40-50° F range. I know several other native fish breeders in my area who keep tanks in unheated garages and get the same results. When maintaining aquaria in unheated rooms exposed to outside temperatures, make sure the aquariums do not freeze.

I also vary the lighting hours to match natural conditions. In Michigan, daylight hours vary from 12 hours in September to nine hours in December, back to 12 hours by March. I can either leave the fishes in the cold room until spring, or speed up the change of season by increasing the

temperature and light, which gets my fish to spawn between February and April. Interestingly, the only Michigan fishes for which a change of season is not necessary are killifishes, blackstripe topminnow (*Fundulus notatus*), starhead topminnow (*F. dispar*), and banded killifish (*F. diaphanus*). These fishes start breeding at 60° F even when kept at 15 hours of light per day.

Southern temperate fishes also sometimes do not require an extreme change of seasons. For example, flagfin shiner (*Pteronotropis signipinnis*) from Louisiana and lowland shiner (*P. stonei*) from South Carolina, even with long light periods, will spawn at 72° F as long as the temperature dips down into the 60s. I would think that other southern fishes react this way too, but I still put them through a cold-temperature, low-light cycle just to be safe.

It is always a waiting game with fishes you have not worked with before. Last winter I had rainbow shiner (*Notropis chrosomus*) set up to spawn for two months and nothing happened. I had a board meeting of Greater Detroit Aquarium Society at my home and commented that maybe I only had one sex. The next morning when I turned on the lights to feed the fish they were showing their brilliant spawning colors. A lot of spawning then occurred over the next month. Why? Presumably, the unheated aquarium temperatures in my basement had just reached a key temperature for triggering spawning in my rainbow shiner specimens—70° F. I will closely watch the related yellowfin shiner (*N. lutipinnis*) and saffron shiner (*N. rubricroceus*) to see if a 70° F spawning temperature works for them as well.

For darters, my experience indicates that spawning is completed by the time the temperature reaches the 70° F mark. I therefore start getting my darters into breeding condition when the room temperature is about 60° F.

Finding the Right Spawning Media

How should you set up a breeding tank for a minnow you've just collected and brought home? If you had purchased a tiger barb at your local aquarium shop, you could look in books dating back to the 1930s and find explanations of several breeding set-ups. There are few such resources for native fish aquarists, but one place to start is with the "Fishes of ..." books that are available for many states. Combing through these books can provide clues regarding the fish's wild breeding habits. Maybe it's known that your minnow spawns on the nests of other minnows, or spawns on plants, or merely scatters its eggs. If you can't find information on the species you have, read the sections on close relatives. Closely-

related species often have similar if not identical spawning requirements.

Of course, fish do not read fish books and sometimes spawn in ways contrary to what's reported in the literature. For example, many books report that northern redbelly dace (*Phoxinus eos*) spawn in plants. Mine only spawned over gravel. Sometimes captive fish spawn in media that's not found in their natural habitat. Blacknose shiner (*Notropis heterolepis*) I collected from a mud-bottomed weedy lake ignored plants and used the gravel.

The important lesson I learned is: Be prepared to offer alternate spawning media if nothing seems to be happening. For example, the first spawning medium I presented to Kentucky darters (*Etheostoma rafinesquei*) was rejected. It was a 4" x 6" ceramic tile mounted with silicone sealer vertically on a piece of plate glass. The female was heavy with eggs and the male was paying her lots of attention, but spawning did not occur. I added a stream-rounded stone etched with dozens of pockmarks approximately 2.0 mm x 1.0 mm deep. I leaned it against the tile and within hours eggs appeared in the pockmarks. Spawning occurred for over a month.

If I don't know the preferred spawning medium of a particular fish, I set up a tank that includes a choice of spawning media: a pile of one-inch diameter stream-rounded stones, and some plants (usually java moss or hornwort). Then I look for eggs. If I find them in the stones, I remove the plants. If I find them in the plants, I remove the stones.

Foods, Feeding, Raising the Fry

After the eggs hatch, what do you feed them? This is a little easier. I do nothing in this area that's different from what I do with tropicals. I keep green water, live microworms, newly-hatched brine shrimp, and powdered commercial fry foods on hand. I also feed the fry one of the oldest homemade foods in the hobby, powdered hard-boiled egg yoke. Before I started keeping green water (heavy *Euglena* culture), small darter and minnow fry often had very high mortality rates. The green water has corrected most of that. The size of the fry may give you an indication as to first food, but make sure to watch closely. Know that the fry have full bellies and are eating. Feed good quality foods and feed them often.

I condition temperate breeders just as I do tropicals, with daily feedings of frozen bloodworms, frozen brine shrimp, live blackworms, and, for fishes that will eat it, flake food. Many temperate fishes I have worked with take two years to reach full adult size. A few can breed at one year, but many are



Fig. 1.

The author in his fish room. At far left (author's far right) are a 50-gallon tank of tropical Peru fishes, a 10-gallon breeding set-up for Arkansas fishes, and a 15-gallon tank for Sipsy darter. On the cabinet at the author's immediate right are (top) a 20-gallon high with Peruvian fishes and a 5-gallon pirate perch tank, (middle) a 15-gallon breeding set-up for yellowfin shiner and a 5-gallon least killifish tank, and (bottom) a 15-gallon breeding set-up for gilt darter. To the author's immediate left are a 60-gallon native community tank featuring flagfin shiner, lowland shiner, rainbow shiner, burrhead shiner, longnose shiner, ironcolor shiner, silverjaw minnow, greenside darter, blackspotted topminnow, and a group of miscellaneous darters; a 10-gallon tank of striptail darter (possibly all males), and a 15-gallon tank containing last year's young Tuskaloosa and Kentucky daters. On the table at far right is a 5-gallon breeding set-up for snubnose darter. Not shown is a breeding set-up for saffron shiner. Photo by Tim Turner.

still too small. Two years worth of feeding fishes frozen foods is expensive. This is one reason why I believe captive-raised natives for the aquarium trade is not a realistic enterprise.

The Adventure of Collecting, and the Importance of Sharing What You Learn

Of course, why would you buy native fishes when you could jump in a creek and catch your own? Collecting lets you experience first hand the natural habitat of the fish and see what else lives with it. All you can learn about fish from a fish store is that they come from glass boxes. I recently had the opportunity to collect in Peru, where I saw the natural habitat of angelfish and what lives with wild neon tetras—something I've never learned from reading tropical fish books! When

collecting natives you can't help but learn about—and begin to appreciate—a fish's relationship to its environment and its role in the ecosystem.

The adventure of collecting and keeping temperate fishes is exploring the unknown. But from the names of authors I see on articles, it seems that only a handful of native fishkeepers are actually spawning and raising natives. If you spawn a fish you need to write about it—new knowledge is worthless if you don't share it with the world. The best reason to keep natives is to learn about them and pass on what you have learned. This is the greatest service a hobbyist can provide.

If you get a North American native fish to breed, write it up and get it into *American Currents* so that rest of us can benefit from your accomplishment. 🐟