

Breeding Experiments with Fishes of the Sipsey Fork: Warrior Bridled Darter, Speckled Darter, Tuskaloosa Darter, and Burrhead Shiner

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The collecting trips at NANFA's annual conventions allow me the opportunity to explore two of my biggest passions—native fishes and native trees—far from my southern Michigan home. Wherever I travel, I take along a small book on the trees of North America. There is always a tree that catches my eye because it doesn't match anything I see at home. Such was the case at the 2003 NANFA Convention in Huntsville, Alabama. Traveling from a northern border state to one on the Gulf of Mexico, I expected the forest to have a different look. At first, the forest at our collecting site on the Sipsey Fork, a small tributary of the Black Warrior River, looked almost like the forest back home—densely packed with white oaks. Then I saw trees that didn't match, like the bigleaf magnolia, with its 30-inch leaves and white flowers a foot in diameter. I also saw hemlocks, which surprised me. We have hemlocks in Michigan, but only north of where I live. Southern Michigan is too warm for this tree, but here it was, in the heat of the Deep South, growing on a limestone bluff along the river. The trees here were different yet familiar at the same time.

The fishes of Sipsey Fork continued this theme. I found minnows and darters in the same microhabitats I found them in back home, but they were new to me. Even a somewhat familiar species, the river darter (*Percina shumardi*), appeared "new." River darters occur in Michigan, but they are rare and state-threatened. Now my first opportunity to see this Michigan native was in a river far from Michigan.

Blame the glaciers. Michigan has had only 14,000 years since the glaciers retreated and fish moved back in. That's not much time for evolution. As a result, Michigan's fish species are, for the most part, uniformly distributed across the state. In Alabama, however, evolution has had time. The state has a diverse group of fishes, several of which are endemic to Sipsey Fork. On this trip we caught Alabama shiner (*Cyprinella callistia*), burrhead shiner (*Notropis asperifrons*), Tuskaloosa darter (*Etheostoma douglasi*), speckled darter (*E. stigmaceum*), redspot darter (*E. artesia*), Sipsey darter (*E. cf. bellator*), and Warrior bridled darter (*Percina cf. macrocephala*).

My main interest as a native fish enthusiast is figuring out how to breed North American fishes in captivity. *Etheostoma* is the group of native fishes I have worked with the most, but only with northern specimens, so I was eager to collect some on the Sipsey Fork trip. Fortunately, the Tuskaloosa darter, which is endemic to Sipsey Fork, was extremely common with young-of-the-year everywhere. I took back several Tuskaloosa darters for my fish room, as well as four speckled darters and two Warrior bridled darters. Four burrhead shiners, which I found in a bucket of Alabama shiners collected by my fellow Michigander and NANFA member Leo Long, also made the trip. Since most of my breeding tanks are small (15 gallons), I opted to try my hand with the burrhead shiner, the smaller of the two shiner species Leo had in his bucket.

The first thing I did upon returning home was research the annual temperature range of the Huntsville area (not cold

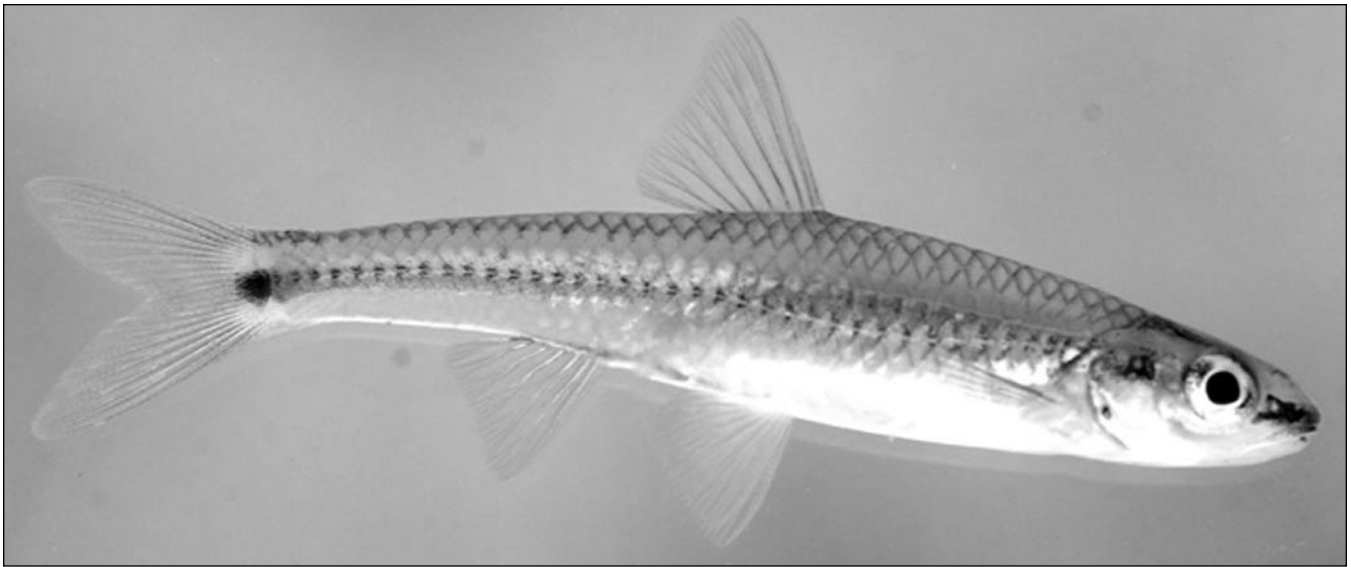


Fig. 1.

Burrhead shiner, *Notropis asperifrons*. Photo: W. Mike Howell and Ronald L. Jenkins, Department of Biology, Samford University, Birmingham, AL.

by my standards, but not tropical either). Michigan fish generally need a period of low temperature and low light to recycle their reproductive calendar. Alabama fishes may not need to undergo such seasonal thermal extremes, but why take chances? In September, I placed the fish in my “cold room” (a basement room with an uninsulated cement ceiling directly under my front porch), and by December the temperature of these tanks was in the low- to mid-40s coupled with nine hours of light per day. Christmas week all the Alabama fishes were moved to the main basement and placed in blacked-out tanks. Within a day the water temperature was up to 16°C (60°F). I added three hours of light per week for two weeks until the fish were receiving 15 hours a day. Now all that was left was to wait and see.

Warrior Bridled Darter,
Percina cf. macrocephala

The Warrior bridled darter is an undescribed species endemic to the Black Warrior River system in Alabama, and to the Sipsey Fork proper (see Boschung and Mayden, *Fishes of Alabama*, p. 586). Most *Percina* are not very colorful, and the Warrior bridled darter is no exception. It’s a small, thin darter with a tan back, light belly and black stripe, but right before I moved my two specimens from my cold room, some unexpected color caught my eye: small metallic blue markings on the head. Looking closer, I could see an iridescent blue-green curved stripe starting behind the eye and running

beneath it almost to the nostril. When viewed from the front it looked like two spots beneath the eyes. Since both of my specimens were showing what I hoped were spawning colors, I set them up in a bare-bottomed breeding tank with a gravel spawning box.

Apparently, they were both males. I searched the tank daily for several months and never saw any eggs. Eventually their color faded away, upon which they were housed in one of my native fish community tanks.

Speckled Darter,
Etheostoma stigmaeum

Speckled darters are found over a fairly large area of the southeastern U.S., from southeastern Missouri to the western part of the Florida panhandle. They’re thin and small darters, with a brown pattern. At breeding time, the male darkens up and develops a pattern of brilliant metallic blue on his body and head. The female, to a lesser extent, shows the same metallic blue. The color change is amazing. The fish is so vibrant that visitors to my fish room noticed them in a tank two feet off the floor that was seven or eight feet away!

My research indicated that speckled darters spawned in gravel or sand, so I set up their tank just as I did for the Warrior bridled darter, described above. Although males mounted females on the gravel, spawning occurred at the surface. Unlike other gravel-spawning darters I’ve worked with, I found individual eggs rather than egg clusters in the gravel

(see Tuskaloosa darter, below). I also noticed the fish spawning on the tank's bare glass bottom; eggs were usually found near, but not on, the glass sides of the gravel-spawning box. I then added several pieces of river stone (20-30 mm in diameter) to the tank. I found eggs near the stones, but not on them.

Could it be that speckled darters spawn over the slab rock that's common in the Sipsey rather than in the stream's sand and gravel beds? Wondering if this might be the case, I added a 4" x 6" piece of ceramic tile to the tank with the rough unglazed side facing up. Maybe it was the tile; maybe it was the lateness of spawning season. Whatever the explanation, I never found any more eggs.

The eggs I did find from the initial spawning were 1.2 mm in diameter, with a clear yolk. They hatched in 10-11 days at 20°C (68°F) and the fry were pelagic. Table 1 shows the daily number of eggs I gathered.

Tuskaloosa Darter,
Etheostoma douglasi

Like the Warrior bridled darter, the Tuskaloosa darter is endemic to the Black Warrior River system of Alabama, of which Sipsey Fork is a part. It's common in the riffles; every pull of the seine had at least a few. Males have a band of rusty red and yellow followed by a thin black margin on the caudal fin. The first dorsal fin has a black spot at the base in the front, and a thin red line on the margin. The second dorsal fin has a thin black margin with a yellow line below. The anal fin is brilliant blue. At spawning time the males' bodies turn very dark brown to black.

I placed seven males ranging from 35-60 mm long and six females ranging from 40-50 mm long in a spawning tank as described above. The eggs are very adhesive, which causes the gravel and eggs to cement together into clusters. Since each cluster represents an individual spawning act, I could determine the number of eggs per spawning act by carefully separating the gravel from the eggs (Table 2). Tuskaloosa darter eggs are

Table 1. Daily number of eggs gathered for speckled darter (*Etheostoma stigmaeum*). Males = 2. Females = 1. Juveniles = 1. Dates do not conform to wild spawning times.

Date (2004)	Eggs In Gravel	Eggs On Tank Bottom
2-4	1	These eggs always found individually. Spawning occurred at surface; female never buried in gravel.
2-10	1	
2-11	3	
2-12	26	
2-13	4	
2-14		12
2-15		36
2-19		20

1.6 mm in diameter and have yellow yolks. They hatch in 14 days at 18°C (65°F). Fry are 6.5 mm long and pelagic.

I've always been curious when working with two darter species from the same river to see if they spawned in different areas in order to avoid competition. Based on my preliminary results, it seems that speckled darter and Tuskaloosa darter are not in competition.

Burrhead Shiner,
Notropis asperifrons

The burrhead shiner (Fig. 1) is a small, slender minnow with dark back, light belly, and a weak black stripe running the length of its body. It's endemic to every river system of the Mobile Basin except the Tombigbee.

I've had success with the other *Notropis* species, so I thought that finding out something about the burrhead's reproduction might be of value. The name "burrhead" comes from the tubercles on the breeding fish's heads. You can't see these tubercles with the naked eye, but they're visible under the microscope. I'm sure if you handled a dead or preserved specimen you could feel the tubercles on your fingertips.

My burrhead shiner tank was outfitted with a piece of plastic egg crate light diffuser (from a fluorescent light fixture) covered with netting. On top of the egg crate I placed a pile

Table 2. Daily number of eggs gathered and the number of eggs per spawning act for Tuskaloosa darter (*Etheostoma douglasi*). Males = 7. Females = 6. Dates do not conform to wild spawning times.

Date (2004)	Eggs Gathered	Eggs per Spawning Act
2-13	3	3
2-16	26	1, 1, 2, 4, 14 (4 loose)
2-23	44	2, 3, 3, 5, 7, 11, 11 (2 loose)
2-24	12	1, 1, 1, 2, 4 (3 loose)
2-29	36	16, 20
3-1	19	8, 10 (1 loose)
3-2	22	10, 12
3-6	43	11, 14, 18
3-7	24	6, 7, 11
3-8	25	11, 14
3-9	28	28
3-14	43	2, 9, 16, 16
3-17	25	8, 17
3-22	19	4, 15
3-28	38	3, 3, 7, 11, 14
3-29	14	14
4-4	41	2, 8, 9, 22
4-6	27	8, 19
4-10	27	11, 16
4-11	6	6
4-14	8	8
4-17	27	11, 16
4-18	5	5
4-20	3	3
4-25	36	10, 10, 16

of 15-30 mm diameter stones to serve as a spawning medium. The power filter outflow was pointed over the stones to create an artificial riffle.

Spawning started as soon as the temperature rose from the 60s to the 70s and occurred several times daily every 2-7 days. The burrheads often buried themselves in the gravel and remained there for long periods of time. They were much less frantic and nervous than other minnows I had spawned. I could not discern any difference between males and females.

I was able to look up through the bottom of the spawning tank to see if any eggs lay under the egg crate material. But from January to May I saw nothing. Finally, at the end of May, I saw what looked like a small egg. I removed the gravel and lifted the egg crate just enough to grab the egg with an eyedropper. It was not a new egg; I could see the beginning of the fish's body wrapped around the yolk. I eventually realized that the burrheads had been broadcasting eggs regularly, but that the clear 2-mm eggs were practically invisible unless the light hit the 1-mm yolk inside them at just the right angle.

I needed newly laid eggs in order to record time from spawning to hatching, but I kept finding well-developed eggs.

At length I recovered some eggs with only a small cluster of cells formed in them and thus was able to watch their development. The adults, unlike other minnows I have spawned, showed no interest in the eggs or the fry unless they were stirred up into the water column. This makes gathering the eggs easy since I don't have to remove the adults. The eggs hatched in 82 hours at 22°C (72°F). The fry remained within the bottom 50 mm of the tank. Table 3 shows the number of eggs I gathered. After several spawnings, I removed the adults from the spawning tank, so I do not know the duration of their spawning season. At 60 days the fry were 15 mm long.

More Exciting than the Amazon

Three of my Sipsev Fork fishes spawned and I saw surprising breeding colors on the fourth. Alabama regional rep and 2003 convention organizer Bruce Stallsmith gave me some more Warrior bridled darters at the 2004 convention in Columbia, SC, which I will attempt to spawn in the spring. Successful or not, I will at least take some close-up photographs of their heads showing their spawning colors.

In between the 2003 Huntsville and 2004 Columbia conventions, I had the opportunity to collect in the Amazon Basin of Peru. It's an extremely interesting place, but the southeast corner of North America is far more exciting. I have just returned home from the Columbia convention with more fascinating fishes, and lots of work for next spring. I hope to explore the Southeast again soon. 🐟

Table 3. Daily number of eggs gathered for burrhead shiner (*Notropis asperifrons*). Four specimens, sex ratio unknown. Dates do not conform to wild spawning times.

Date (2004)	Eggs
5-25	not counted
6-1	10
6-6	43
6-9	37
6-11	23

Nomenclatural Changes for Fishes in 4th Edition of *Delaware's Freshwater and Brackish-Water Fishes*

The 6th edition of the American Fisheries Society list, *Common and Scientific Names of Fishes* (ref. 4 in my book on Delaware fishes) was predicted to come out in December 2002, then 2003, and was finally issued in July 2004. Revisions promulgated in the 6th edition and which do not appear in my book, which used 4th and 5th edition names, are as follows:

My page numbers	4th/5th edition	6th edition
36, 174	silvery anchovy	silver anchovy
59, 151, 176	cutlips minnow	cutlip minnow
69, 151, 175	blacknose dace	eastern blacknose dace
73, 151, 174	<i>Catostomus commersoni</i>	restored to <i>Catostomus commersonii</i>
77, 152, 174	bullhead catfish family	North American catfish family
91, 152, 177	trout family	trout and salmon family
100, 153, 177	silverside family	New World silverside family
102, 153, 175	killifish family	topminnow family
143, 154, 175	<i>Stizostedion vitreum</i>	changed to <i>Sander vitreus</i>
153, 174	<i>Cottus bairdii</i>	restored to <i>Cottus bairdii</i>

— Maynard S. Raasch