Scaly Sand Darter (*Ammocrypta vivax*): Observations and Captive Spawning

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I stepped out of the van at the first collecting site of the 2005 NANFA Convention in Little Rock, Arkansas. For this northerner, the air was thick with humidity and simply too hot to survive in for long. I hurried down to the river's edge, thinking more about cooling off in the water than of the fishes that lived in it. I walked in until it was up to my neck and found that it seemed to match the temperature of the air. (Thank God my grandfather, who once lived in Little Rock, had moved north.) Knowing that I wouldn't last long in this heat, the sooner I started sampling the river, the better. So I walked upriver along the bank looking for the shallow riffles that are prime darter habitat. I found a small island with sand and gravel edges and joined a small group of fellow NANFAns working the seines. Quickly we began to catch darters, much different darters, of course, than the ones I have back home in Michigan.

What first attracted me to darters are their often unbelievable colors, but the darters we were catching were rather dull. They were Scaly Sand Darter, *Ammocrypta vivax*. I had never seen any species of *Ammocrypta* before.[1] They are virtually colorless and have a different shape from the darters with which I am most familiar. They reminded me of a Johnny Darter, *Etheostoma nigrum*, stretched to twice its normal size. Knowing that this might be my only chance to breed any of the six species of *Ammocrypta*, I collected several 40-mm specimens and hastily retreated to the air-conditioned van. Upon returning home, I placed the darters into a tank of their own and waited for the next spring to attempt breeding. When spring came I repeatedly searched through the gravel looking for eggs, but never found any. Failing to breed them, I gave the darters away.

A year later, at the 2006 NANFA Convention in Cape Girardeau, Missouri, we caught more *A. vivax* on the Black River. These specimens were much longer than the ones from the year before. Wondering if my Arkansas specimens were too young to spawn, I took four specimens home for another try at breeding.

These *A. vivax* ranged from 60 to 75 mm in length. I placed them in a 4' x 7" x 7" river tank. A Whisper® power filter was at one end of the tank. Attached to its inflow tube was a piece of PVC pipe that ran along the tank's bottom to the far end. At this point, using elbows and a tee fitting, two 5-inch-long pieces of pipe extended perpendicularly from the long pipe. I had drilled many quarter-inch holes throughout the pipe and covered it with cylindrical sponge filters. The suction produced by this extended filter inflow tube produced a current that ran the length of the tank. The bottom was bare except for several baseball-sized rocks for cover. The tank was in my "cold room," in which the temperature got down to about 4°C on 21 Dec. 2006. I kept the lights on for nine hours and gradually extended the photoperiod to 16 hours by 21 June 2007. In April 2007, when the temperature reached 20°C, I placed a tray of gravel into the tank to serve as a spawning medium.

As soon as I added the gravel tray, the darters submerged themselves in it and spent most of their time there. The literature says they bury themselves with only their eyes exposed, but my specimens were totally submerged with nothing exposed. When I sifted through the gravel looking for eggs,

[1] There are sand darters in Michigan, but they are rare. The Eastern Sand Darter, *A. pellucida*, is found in a few rivers in the southeast part of the state. The Western Sand Darter, *A. clara*, is found in one river in the extreme western part of Michigan's Upper Peninsula.

I could feel the fish swimming through the gravel between my fingers. It took considerable effort to get any of the darters to abandon their hiding places, and when they did it wasn't for long. As soon as I poked them with my fingers they plunged back under the safety of the gravel. The only time I found them out of the gravel was when I turned the tank's light on in the morning.

Unlike most other darters species I have kept, my *A. vivax* never seemed to consume all the frozen brine shrimp and bloodworms I offered. Much of the food remained on the tank bottom. To prevent uneaten frozen food from getting fungused, I began feeding them live blackworms exclusively. Usually, feeding live blackworms to darters causes a feeding frenzy. Not with my *A. vivax*. Even when I dropped live blackworms directly onto them, they almost always ignored them. In fact, I never observed any of my *A. vivax* actually feeding. Since a quantity of blackworms always remained uneaten and alive in the gravel, I wonder if the darters were eating them there. I also wonder if *A. vivax*, due to their inactive lifestyle, have lower caloric needs than more active *Etheostoma* and *Percina* darters and therefore require less food.

When working with gravel-spawning *Etheostoma* darters, I sift through the gravel to find clusters of gravel and eggs cemented together. I tried the same with my *A. vivax* twice a week throughout April, but found no eggs. I asked fellow Michigan NANFAan Leo Long if he would like the darters since I was unable to breed them and because I needed the tank for other projects. He said yes. After I had caught them and put them into a bucket for Leo, I looked for eggs one last time. In a hurry, I was rougher than usual in sifting through the gravel when a number of white infertile eggs floated up into the water column. I vigorously swished through the gravel several more times, but did not find any fertile eggs. I then shined a flashlight up through the tank's bottom and found it covered with small, clear fertile eggs glowing like little light bulbs. Well, Leo didn't get the fish. Back into the breeding tank they went.

The eggs I gathered that day were all well developed, with bodies wrapped around the yolk, some with no pigment and some with dark eyes. I continued to gather eggs about once a week but none of them were fertile. Eventually, I found eggs with only a few cells clustered on the yolk. Even though I gathered eggs for an extended period of time, rarely did I find newly laid ones. Other newly laid darter eggs I've worked with are often extremely sticky and difficult to remove from my fingers. Within a few hours these eggs lose their stickiness but remain cemented to the gravel, where they have to be individually removed. *A. vivax* eggs, however, seem to have just enough adhesion to remain attached to gravel, but were easily knocked off several hours later when I sifted my fingers through it. *A. vivax* also seem to deposit their eggs not in large clusters, but in smaller numbers scattered through the gravel. Here are the dates and quantities of *A. vivax* eggs I gathered:

Date (2007)	# Eggs Gathered
5-12	150
5-18	130
5-24	80
5-29	57
6-10	90
6-13	67
6-21	91
6-29	86

The eggs are 1.2 mm in diameter, clear in color, and hatch in eight days at 21°C. The pelagic larvae are 5.5 mm long and thin as hair at hatching. They are clear with only pigment in the eyes. The larvae need green water for about a week, as they cannot eat live brine shrimp nauplii when first hatched. They are easily raised and were 12 mm long in seven weeks, at which time they settled to the bottom, only occasionally rising into the water column.

I believe that green water has an important use other than for food. Many fish in the perch family seem to use light to orient themselves upright; in an aquarium, when the light comes from all sides, it can play havoc with their orientation. I've noticed with several darter species that if I remove the green water and replace it with clear water, even when they are well past the time of feeding on green water, too much light enters from all sides of the tank and they slowly begin to die. In my fry tanks, the green water is so green that I need to shine a small bright flashlight into the tank in order to attract the fry to see if they are eating well. Species that seem to be most attracted by the light are the ones that need green water longer. My *A. vivax*, which were highly attracted to light, were no exception. I didn't start to dilute the green water until the fry were six weeks old, after which I had no problems growing them out.

I discovered another unusual thing about my *A. vivax* when I studied photographs I had taken of them. One specimen had a significant amount of color in its pelvic fins (see front cover, bottom right photograph). The margins were clear, but the center area had many white rays with **cont. on p. 23**

Muller, "Scaly Sand Darter," cont. from p. 2 mottled yellow and black membranes. The base of the fins had only black. I closely examined my other three specimens, whose pelvic fins were mostly clear with an occasional light cream coloration. The only reference I could find to *A. vivax* having color in their pelvic fins was in *Inland Fishes of Mississippi* (2002) by Stephen T. Ross: "Pectoral and pelvic fin membranes are cream colored to light yellow . . ." (p. 454). All four of my fish had clear pectoral fins. Could it be that the specimen with strongly colored pelvic fins was a male? I had hoped to do rotations of only two fish at a time in the breeding tank to try and confirm the sexes of the four fish, but it was late June and breeding season was over. I looked closely at all four darters on 19 Aug. 2007, seven weeks after spawning had stopped. All of them exhibited the light coloration on their pelvic fins I had seen on three of my specimens in June.

A. vivax is the most interesting darter I have kept in years, quite different from the *Etheostoma* and *Percina* I am used to working with. Since I have limited space in my fish room, I tend to give away the fishes I've spawned to other native fish enthusiasts in order to make room for new species to breed. But I intend to keep my *A. vivax*, although when I place them into my 50-gallon native fish community tank, with six inches of gravel, I suspect I will never see them again.

Scaly Sand Darter in the aquarium. Photographs by Bob Muller.

"We have never seen *Ammocrypta* taste of food, nor do we expect to do so; for although its mouth bristles with teeth, its small size forbids an attack on any game which we can offer. Its quiescent habits and the character of the bottoms to which it confines itself seem to indicate that its prey is minute if not microscopic. But speculation about what we do not know as to its food might lead us to speculation as to the origin of its characteristic features, — how, for instance, the hard snout, the transparent muscles, and the burrowing habits are consequent on its loss of scales, or how the loss of unncecessary scales and pigment cells is consequent on its burrowing habits. . . . And we might go on with endless queries like these, which would take us far beyond the purpose of this article. We have wished only to introduce our aquarium friends, and to commend them to all lovers of beautiful things in Nature."

— David Starr Jordan (1896)