

FIERY & FIREPROOF: Spawning of Common Shiners, *Luxilus cornutus*

by Bruce Gebhardt

My AMERICAN CURRENTS article "Elephants' Graveyard" (AC, Spring '91, 27) described bizarre, fungus-like projections on the heads of some old male Common Shiners (*Luxilus* [*Notropis*] *cornutus*) at spawning time in the Wissahickon Creek, Philadelphia. I was again able to observe a spawning this year, May 21-25, a week earlier than "standard" (Memorial Day is the accustomed time) at an upstream location, in Ambler, Montgomery County, Pa. The males bore no bizarre headdress of the same type this time. Instead, I observed a new, probably normal and healthy type of head adornment I'd never noticed nor read about before. This article is to record that observation, spawning behavior, and differences among reports of Common Shiner spawnings.

The downstream (Philadelphia) specimens are much bigger, some 5" to 7". Males at their peak are dark steel-blue on back and sides with bright scarlet edges to the fins. Somewhat older ones have a slate-blue head. The red, white, and gray pattern found on much older, dying males at the "Elephants' Graveyard" has never been seen upstream, nor is there any "fungus."

Females are olive, brassy, or brownish where the males are blue. Females have no red in their fins.

Upstream, spawning males are as little as 4"; few exceed 5". I'd never seen such colorful males at such a small size. Some females are as short as 3", with vastly swollen bellies. Male color, though flamboyant and variable, is not quite as drop-dead brilliant as on some of the bigger males downstream. An excellent upstream male has a slate-blue head, but this is rarer than downstream; with many, the head is the same dark blue as the rest of the back, or slightly paler. In a few specimens it is darker blue than the rest of the back. The lower sides are flushed with variable pink, red, or red-orange. The throat may be bright carmine to scarlet, though the brightest color fades quickly in a tank. The belly is pink to salmon. The fins are not quite as brilliant as on bigger specimens; they're more likely to be red-orange than scarlet.

Spawning exaggerates one of the most distinctive features of the species. Common Shiners have three lengthwise stripes of gold: one at "shoulder height" on each side, one down the back. The sketch in the Atlas hints at these stripes. In spawning males, the stripes glow brilliantly and slightly greenish.

It seems as though the upstream group is not just an isolated population of runts. They are younger. Perhaps as the fish get bigger, they head downstream.

Like many male minnows in spawning season, male Common Shiners develop "nuptial tubercles"--horny bumps all over the snout and back onto the head. There also appear to be six on the lower jaw. These are white or gray for most species, and my previous photos show them thus on Commons. But these males, this year, had bright blue-green tubercles, just a shade deeper than turquoise, and quite beautiful. I was fortunate to record this adornment on film, though the pictures otherwise aren't that great.

Peak body color fades quickly on capture. Streamside photography is a virtual necessity. The in-stream, underwater method of William Rosten (see, for example, Fishes of Arkansas) would ordinarily be ideal in the relatively clear water, but would have to be set up beforehand based on previous observation; spawning occurs in water no deeper than the diameter of a camera lens. I'd want water a lot purer than the Wissahickon before I'd stretch out full-length in it.

If it is necessary to take the fish home, some of the color will fade; however, it may come back after some time in a photo tank or aquarium--especially if a couple of males contend, as usually happens. Occasionally one finds males that remain almost fully colored.

Spawning in the upper Wissahickon takes place in rather shallow but slightly depressed areas in otherwise very shallow flowing-water areas with mostly sandy-gravel bottom (the creek generally has sand, gravel, stone, and rock substrate in faster sections, but is quite silted in slower sections). The water is from 3/4" to 5" deep where the most serious action takes place. Most of it occurs toward the shallower end of that range. Since the shallows extend in a strip along the north bank of the creek, all activity funnels into that strip. The water off the south bank is rather deep, so that only the north bank is suitable. The area of spawning is 6" to 3' wide for a discontinuous 75'. The creek at this point is about 40' wide.

It is obvious above water that something is going on below, because there's a lot of splashing. In many areas, the fishes' backs are out of water. At this site, there is a convenient, high foot bridge just downstream from the prime spawning area--perfect for (a person) scouting where the action is.

Little of the splashing is spawning. It's mostly males jostling and fighting for position. Sometimes there are fierce chases out into the main current.

When I've netted aggregations of fish, the ratio has been typically six or seven males to one female. When the females

are ready, they join the fray, but they mostly avoid it. This was a bit of a surprise to me, but I believe that the profiles of the females and the creek itself dictate their reticence. Many of the females are really swollen, as though balanced horizontally on a marble. It must be awkward and uncomfortable for these deep-draft females to wriggle over rocks in water barely capable of floating a popsicle stick. A female has to be serious to want to enter the spawning grounds.

But there's no doubt that action does take place. When I brought some fish home in a bucket, then put them into a photo tank, there were many eggs. Whether these had just been swept up from the current or the pebbles, or whether they were actually produced in handling or in transit--as occasionally happens with killifish--I'm not certain, but probably they were merely swept up at the site.

When I collect my photo specimens, I'm not the only predator. Typically there are three to five water snakes, positioned like me on the stream side looking shoreward, sniping with reckless reptilian abandon at the obsessed fish. The snakes can't easily handle the bigger fish they catch, and most fish escape, but the snakes succeed in injuring them. "Elephants' Graveyard" described a scene in which burnt-out old male shiners loll around waiting to die after spawning. Here, there are none such evident, but there are always a few badly injured fish swimming around. Probably the snakes and I are not the only predators, as in the early mornings there are usually Great Blue Herons at the site. It has been reported that Commons only spawn in daylight, so nocturnal mammals would probably have no special opportunity.

It was interesting to compare my observations with those of others. The source for these more professional accounts was Modes of Reproduction in Fishes, which summarizes studies published up to the sixties. The Common Shiner has attracted many observers, unsurprisingly. The most striking oddity a review of Modes... turned up was that all other observers reported a preponderance of females. Perhaps their stations featured deeper water that allowed the females to participate more comfortably. Supporting this was the fact that most of the other observations involved Commons spawning over nests made by other fishes--Central Stonerollers (Campostoma anomalum), Creek Chubs (Semotilus atromaculatus), and Cutlips Minnows (Exoglossum maxillina). None of these species inhabit the Wissahickon to my knowledge; any Creek Chubs, which are a possibility, would be far upstream. Another nest possibility cited is Largemouth Bass (Micropterus salmoides). They do exist in the creek, but do not spawn in the rapids area. Indeed, the other observations include the possibility of Commons spawning in pools; this may happen in the Wissahickon, but I have not observed it.

Thus, in the absence of any vigorous nest-builders, Wissahickon Commons have to make do with what's available, i.e., slight natural depressions. If they consciously or incidentally deepen and widen the depressions, their work is not evident.

I've had trouble consistently photographing the magnificent colors of spawning males, as indicated, but it's nothing like the trouble I've had photographing the spawning run itself. In 1990, I took some beautiful pictures from the bank. Then, when I went to photograph some just-caught fish in the photo tank on a lawn, I put the roll of film aside on the grass. It disappeared, probably stolen by some other park visitors when I returned to my car for something or other (no, I didn't leave my camera on the lawn). I don't think I've ever lost a roll of film before or since.

Naturally I was determined to do better in 1991, but when I started looking for the fish, they'd already been and gone.

After two successive failures, this had to be the year. Bingo! They were there in substantial numbers. I actually took the chance of walking out onto the slippery rocks on the stream side of the spawning run with my camera. The last time I took a camera into a stream, in 1986, I slipped, and slammed camera, lens, and rear end down on rock.

I burnt a whole roll of extremely expensive film on the cooperative spawners. After a week's agonized wait to see the glorious slides, I received a note from the processor. Due to machine problems, my film had been ruined. The processor, Konica Quality East, Mt. Laurel, NJ, probably has contracts to process for many stores in the East, especially Pathmark supermarkets, which used to own the labs. Avoid submitting your film to any store that does business with KQ. Yeah, any lab can screw up, but this isn't the only instance with KQ-- just the worst.

There's always next year, they say. I'll try to be there. Almost anyone in the northeast, the Mississippi drainage, or even in parts of the western states and southern Canada, has the opportunity to view a similar spectacle starring this seasonally ornate, widespread, "common" species.

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References

Note: Readers might find it interesting--if only as an explanation of the title--that the spawning runs are intersected by a small jughandle of the Wissahickon that runs by the former Keasby & Mattison plant, an historic major processor of asbestos. The site was once among the very highest-priority toxic-waste sites listed by the Environmental Protection Agency. A Wall Street Journal front-page feature column even featured it. Allegedly, the piles of tailings--large hills visible from the creek--have been sufficiently

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covered or contained that no traces of the main ingredient ever show up in frequent creek testing by the state. NANFA Member Charlie O'Neill of Atlanta, a professor of internal medicine, once collected with me at the site. He wasn't fearful; asbestos is a threat mainly when airborne, he said, not in the water.

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