Captive Propagation of Chubs of the Genus *Erimystax*

Conservation Fisheries, Inc.
3709 N. Broadway, Knoxville, TN 37917, noturus@aol.com

The slender chub, *Erimystax cahni* (Fig. 1), is known only from larger tributaries of the upper Tennessee drainage (Etnier and Starnes 1993). Specimens have been collected from the Powell, Clinch and Holston rivers, the latter being represented by a single specimen collected in 1941. Collections in the Powell and Clinch have diminished to the point that only a single specimen has been collected (from the Clinch, D. A. Etnier, pers. comm.) since the late 1980s.

Jenkins and Burkhead (1993) characterized the slender chub as an inhabitant of shallow, flat shoals of larger, low-gradient streams and rivers. Large areas of clean pea-sized gravel (greater than 25 square meters according to Jenkins and Burkhead, 1993) appear to be required. Even in the lower reaches of the Clinch and Powell Rivers, these areas are few and far between.

Both the Clinch and Powell rivers have endured massive fish kills over the past 50 years or more. Some species disappeared, but others, like the slender chub, held on in low numbers. Burkhead and Jenkins (1982) reported the species as rare to relatively common at some sites during the later 1970s and early 1980s. Now, however, this elegant minnow has all but disappeared from both rivers.

The rarity of the slender chub has prompted regulatory agencies to pursue a program to develop techniques for the captive propagation of this species. Lacking specimens of the slender chub to use for this program, we chose to use two closely related species, the blotched chub, *E. insignis* (Fig. 2), and the streamline chub, *E. dissimilis* (Fig. 3), as surrogates. Adult specimens of the streamline chub (N=16) were obtained from the Clinch river in October 1997 and specimens of blotched chub (N=19) were obtained from the Powell river in October of 1998.

Methods

Specimens were housed in a 100 gallon (360 liter) glass aquarium equipped with internal and external pumps to provide water movement. Fishes were conditioned by allowing water temperatures and daylength to closely approximate seasonal changes outdoors. Initially, the aquarium was furnished with relatively fine substrate (2-3 mm), several slab-rocks, and nylon spawning mops. Fish were fed a variety of live, frozen and dry foods to maintain optimum condition.

Eggs were collected by siphoning substrate with an aquarium gravel vacuum. Water, debris and eggs from the substrate were collected in a plastic bucket. Most of the water was decanted from the bucket. The remaining water and debris was poured into a clear, plastic shoebox. The shoebox was then examined for the presence of eggs and/or larvae by placing a light source beneath it. Any eggs or larvae were then transferred to a modified shoebox that had been equipped with a screened overflow. This allowed the modified shoebox to be placed in such a way as to allow water flow to enter the box and drain off through the overflow screen.

Once larvae hatched and became free-swimming, they were transferred to larger (20 gallon) aquaria.

Results

The first spawning activities were observed in February 1999. Eggs and larvae were collected on 11 Feb. 1999. The first eggs were collected not long after the addition of a pile of coarse gravel located in the main current of the aquarium. Spawning took place in and around the coarse gravel pile. At the time of collection, it was not clear which species had spawned. As the larvae developed and grew, it became

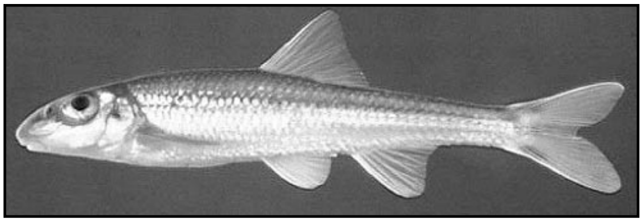

Fig. 1.
Slender chub, *Erimystax cahni*.
Courtesy: Conservation Fisheries, Inc.

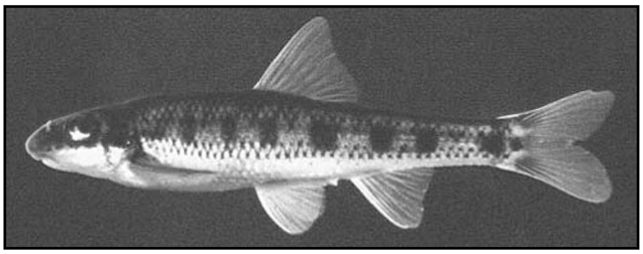

Fig. 2.
Blotched chub, *Erimystax insignis*.
Courtesy: Conservation Fisheries, Inc.

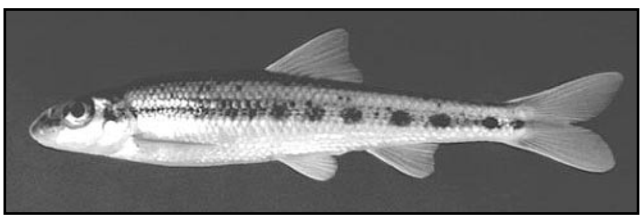

Fig. 3.
Streamline chub, *Erimystax insignis*.
Courtesy: Conservation Fisheries, Inc.

apparent that both species were represented.

Eggs were approximately 2 mm in diameter with thin, translucent, chorions. Eggs were smooth, demersal and non-adhesive. Hatching time appeared to be roughly four days. Newly hatched larvae were approximately 5 mm TL and somewhat "S" shaped. The yolk was substantial and nearly teardrop shaped. They rested motionlessly on the bottom of the container. When disturbed, they would attempt to swim down. Such activity in the wild drove them further into the substrate.

Within 48 hours of hatching, the first of the larvae began to swim up into the water column. They drifted back to the bottom of the container when not actively swimming. Larvae were approximately 7.25 mm TL at this point and yolks were more elongated.

Larvae began feeding at approximately one week post hatching. Larvae were still primarily benthic at this point, about 10 mm TL, and behaved much like the larvae of spotfin chub, *Erimonax monachus* (pers. obs.). Larvae were able to feed on *Artemia* nauplii.

Eggs were apparently laid in relatively small numbers. During most collection efforts, fewer than 35 eggs were collected. We continued to collect eggs until 13 March 1999. At this point egg numbers had dwindled to only a few per collection.

Once larvae began feeding, rearing was relatively simple. Eventually, all remaining adults and sub-adults were transferred to the Tennessee Aquarium in Chattanooga for display.

Discussion

The systems designed by Conservation Fisheries, Inc. for holding, spawning and rearing *Erimystax* species worked well for both *E. dissimilis* and *E. insignis*. We believe a similar system would allow us to captively propagate *E. cahni*. At this point, we are unsure if housing the fishes in groups, as we did with the surrogates, would be necessary, but we suspect that at least five or six individuals would be preferred.

We now know that the larvae of both species of *Erimystax* spawned at CFI are benthic. This would suggest the need for a relatively clean substrate to insure maximum larval survival in nature.

Our hope is to collect specimens of *E. cahni* that can be brought into captivity and spawned. Captively produced individuals can then be used to supplement declining populations in the Clinch and Powell rivers if conditions are deemed suitable for such an effort. Several sections of the Holston River have improved in recent years. Therefore, the possibility of re-establishing this, presumably, rarest of North American minnows into yet another locality might become a reality.

Unfortunately, we failed to collect *E. cahni* in 2000. So far in 2001 we've made six collecting trips to 11 promising sites (mostly recent historic record sites), both seining and snorkeling (the latter is the best technique by far for detecting *Erimystax* when conditions permit), without any luck. We still have some field work to complete this year, but things aren't looking good. If there are any *E. cahni* left in the world, they're few and far between and we don't know where they are.

Literature Cited

Burkhead, N. M., and R. E. Jenkins. 1982. Five year status review of the slender chub, *Hybopsis cahni*, a threatened cyprinid fish of the upper Tennessee drainage. Report to the U.S. Fish and Wildlife Service, Newton Corner, Mass.

Etnier, D. A. and W. C. Starnes. 1993. *The fishes of Tennessee*. Knoxville: University of Tennessee Press.

Jenkins, R. E., and N. M. Burkhead. 1993. *Freshwater fishes of Virginia*. Bethesda, MD: American Fisheries Society.