

BRIEF NOTE

Discovery of a Population of *Cyclonaias tuberculata* (Rafinesque), the Purple Wartyback Mussel (Bivalvia: Unionidae), in the Olentangy River, Delaware County, Ohio

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ABSTRACT. Freshwater mussels (Unionidae) were collected from the Olentangy River upstream from the city of Delaware, Delaware County, Ohio to verify the existence of a population of *Cyclonaias tuberculata* (Rafinesque), the Purple Wartyback Mussel. Eleven live specimens of *C. tuberculata* were found, including two juveniles, in the second and third riffle complexes downstream from the Panhandle Road dam (40°19'21.03"N, 83°4'13.68"W). This is the first time that this species has been found alive in the Olentangy River basin since the 1800s.

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INTRODUCTION

There are 80 species or subspecies of freshwater mussels (Bivalvia: Unionoida: Margaritiferidae, Unionidae) thought to be indigenous to Ohio, of which five are considered to be extinct, 14 extirpated, 24 endangered, four threatened, and nine species of concern (Watters 1995, ODNR 2007). *Cyclonaias tuberculata* (Rafinesque), the Purple Wartyback Mussel, is widely distributed in Ohio and found in clean streams and rivers. Like many species of freshwater mussels, the distribution of *C. tuberculata* has declined over the years (Watters et al. in press). It is currently listed as a species of concern by the Ohio Department of Natural Resources, Division of Wildlife (2007). This species is widely distributed in eastern North America from Minnesota, Ontario, and Pennsylvania in the north to Oklahoma and Alabama in the south. It has been reported from the Mississippi River, Ohio River, Lake Michigan, Lake St. Clair, and Lake Erie drainages (Burch 1975). The conservation status of this species over its entire range was listed as special concern by Williams et al. (1993) and secure by NatureServe (2008). Within the 21 states and provinces it originally inhabited, it is listed as extirpated from Pennsylvania; endangered in North Carolina, Mississippi, and Wisconsin; threatened in Illinois, Iowa, and Minnesota; and a species of concern in Michigan and Ohio. The other states considered it to have stable populations, did not have sufficient information, or did not have a state list.

Hoggarth (1990) did not find *C. tuberculata* in his 1989 survey of the Olentangy River. Stein (1963) documented the collection of five weathered shells from between Wilson Bridge Road and Henderson Road in northern Franklin County from 1958 to 1962. An on-line search of The Ohio State University Museum of Biological Diversity Freshwater Bivalve Database and examination of the specimens in the museum added two specimens that were apparently collected live from "at Delaware" in the 1800s and an additional weathered specimen from near Wilson Bridge Road collected in 1974 by Carol Stein. Apparently, *C. tuberculata* has not been seen alive or fresh-dead in the Olentangy River watershed since the 1800s. The purpose of this study was to verify the existence of a population of this species in the Olentangy River and make some notes on the extent and condition of that population.

MATERIALS AND METHODS

After an initial discovery on 15 June 2007 of what was believed to be a specimen of *C. tuberculata* from the Olentangy River, a more thorough search of the area was initiated. Freshwater mussels were searched for by visually scanning the stream substrates for live and dead shells and the stream banks for dead shells. Water clarity was low on every visit with an effective viewing depth of about 20 cm. Therefore, searches were primarily restricted to riffle and shallow run habitats. Another factor that impeded the study of this area was that Delaware Lake, a large impoundment about 4.6 river miles upstream, is a flood control reservoir and often alters the stream flow. The stream search started on 18 June 2007 at the location where the initial specimen was found in the Olentangy River just north of the town of Delaware. The upstream edge of the riffle complex was adjacent to where Hudson Road turns to the east away from the river, 0.87 km south of Panhandle Road dam at Ohio EPA River Mile (RM) 27.45 (40°18'55.14"N, 83°3'57.65"W). During subsequent visits on 27 June 2007, 30 June 2007, and 8 July 2007 the stream was searched from the first riffle complex downstream from the Panhandle Street dam (RM 27.90; 40°19'16.78"N, 83°4'10.81"W) to the downstream edge of the third riffle complex downstream from the dam (RM 27.35; 40°18'50.94"N, 83°3'53.17"W). A total of eight hours and 41 minutes were spent searching for mussels with the great majority of it spent on the second and third riffle complexes downstream from the dam. Representative fresh-dead shells were retained and deposited in the Ohio State University Museum of Biological Diversity Freshwater Bivalve Collection, Columbus, Ohio, at which time Dr. Tom Watters verified the identification of the *C. tuberculata* specimens. Live specimens of *C. tuberculata* were photographed and morphometric data was recorded (length, height, and annual growth lines). All live mussels were returned to the stream in the same location and position that they were found.

RESULTS

Eleven live *C. tuberculata* were found in the Olentangy River downstream from the Panhandle Road dam and upstream from Delaware. Three were found near the second riffle complex downstream from the dam and the remaining eight were found associated with the third riffle complex downstream from the dam (Table 1). Specimen 4 was the original shell found on 15 June and was not recollected during this study. Shell length ranged from 4.9 to 12.5 cm with age estimations ranging from four to 22 years.

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Table 1

Specimens of Cyclonaias tuberculata found in the Olentangy River 2007

Specimen	Shell Length (cm)	Shell Heights (cm)	Growth Lines
1	9.4	8.4	16
2	11.2	10.0	17
3	10.9	10.0	22
4	~5.0	--	--
5	11.2	9.5	17
6	12.5	10.5	18
7	11.0	9.9	~17
8	4.9	4.2	4
9	11.5	10.5	20
10	12.0	10.9	22
11	10.0	9.3	18

Specimens 4 and 8 were juveniles, which, along with the fairly large number of mussels found here, indicate the population is viable. All the specimens were partially buried in the substrates except number 7 that was wedged between cobble and boulder substrates. Figure 1 is a photo of specimens 1 and 2 showing the clean part of their shells that was buried in the substrates. A total of eight species of freshwater mussels were collected live during this study with an additional four species collected as weathered or sub-fossil specimens (Table 2). Live specimens of the introduced bivalves *Corbicula fluminea* (Asian Clam) and *Dreissena polymorpha* (Zebra Mussel) were observed in low numbers at this site.

DISCUSSION

The collection of 11 specimens of *C. tuberculata* at this site compares favorably with the average number of specimens collected from other well-studied Ohio streams that support healthy populations. Live specimens of this species were found at 13 sites in Fish Creek (Maumee River basin) with an average of eight per site and a maximum of 25; 10 sites in the St. Joseph River (Maumee River basin) with an average of seven per site and a maximum of 29 (Hoggarth 1986, Watters 1988); 15 sites in Big Darby Creek (Scioto River basin) with an average of nine per site and a maximum of 46 (Watters 1990, Tetzloff Per. Com.); and 14 sites in the Walhonding River (Muskingum River basin) with an average of nine per site and a maximum of 40 (Hoggarth 1994). Of course, these comparisons are superficial due to differences

FIGURE 1. *Cyclonaias tuberculata* specimens 2 and 1.

in search methodologies and sampling conditions (i.e. distance searched, man-hours per site, visibility, etc.).

The OSU Freshwater Bivalve Collection database has Ohio records for this species from 31 streams and Lake Erie. Of these, 13 streams and Lake Erie are documented to have extant populations since 1980. Many of the extant populations appear to be limited to short stream segments similar to the one found in the Olentangy River, compared to a more extensive distribution from older records (Watters et al. in press). Of course, not all streams have been extensively surveyed recently, and small restricted populations are easy to miss. Regardless, these data document the significant decline of *C. tuberculata* in Ohio.

The freshwater mussel populations in the Olentangy River are on the decline. Hoggarth (1990) found 21 species surviving in the river compared to 25 found in studies conducted in the 1950s and 1960s and 30 species believed to be the original fauna of the river. *Actinonaias ligamentina carinata* (Mucket), *C. tuberculata* (Purple Wartyback), *Elliptio crassidens* (Elephant-Ear), *Epioblasma torulosa rangiana* (Northern Riffleshell), and *Ligumia recta* (Black Sandshell) were thought to be extirpated sometime between European settlement and the 1960s. *Alasmidonta viridis* (Slippershell Mussel), *Obovaria subrotunda* (Round Hickorynut), *Pleurobema clava* (Clubshell), *Quadrula cylindrica* (Rabbitsfoot), and *Simpsonaias ambigua* (Salamander Mussel) were extirpated since the 1960s. Hoggarth (1990) suggested that *Fusconaia flava* (Wabash Pigtoe), *Pleurobema sintoxia* (Round Pigtoe), and *Villosa fabalis* (Rayed Bean) were on the verge of extirpation from the river. The state endangered species *Epioblasma triquetra* (Snuffbox) and *V. fabalis* (Rayed Bean) were found to still exist, in low numbers, in the lower Olentangy River in 1989. He found that the *Lasmigona complanata* (White Heelsplitter) had extended its range into the

river. One-third of the mussel species in the Olentangy River have disappeared, due apparently to human activities in the basin. Hoggarth (1990) attributed this decline in mussel populations to increasing silt loads, impoundments, and channel modifications. In particular, many of the declining species generally live completely buried in the substrate and are therefore extremely sensitive to the suffocation and reduced feeding efficiencies caused by heavy silt deposition. The *C. tuberculata* found during this study are probably a relict population that was overlooked during previous studies.

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Table 2

Freshwater mussels found in the Olentangy River
(RM ~27.7 to 27.35), 2007

Species	Live	Fresh Dead	Weathered	Sub- Fossil
<i>Alasmidonta marginata</i>				X
<i>Amblema plicata</i>	3		X	X
<i>Cyclonaias tuberculata</i>	11	2	X	
<i>Elliptio dilatata</i>	16	4	X	
<i>Lampsilis cardium</i>	4	1	X	
<i>Lampsilis fasciola</i>	1			
<i>Lampsilis radiata luteola</i>			X	
<i>Lasmigona costata</i>	2		X	
<i>Pleurobema sintoxia</i>	1		X	
<i>Ptychobranthus fasciolaris</i>	1		X	
<i>Pyganodon grandis</i>			X	
<i>Utterbackia imbecillis</i>			X	