

Freshwater Mussels (Unionidae) of The Hatchie River, a Tributary of the Mississippi River, in West Tennessee

Don Manning

Rt. 2, Box 81A

Buchanan, Tennessee, 38222

ABSTRACT

A brief survey of the Hatchie River, a West Tennessee stream draining directly into the Mississippi River, during the summers of 1980 through 1983 revealed 33 taxa of unionacean mussels and the Asian clam, *Corbicula fluminea* (Muller, 1774). Three of these species, *Uniomerus declivis* (Say, 1831), *Obovaria jacksoniana* (Frierson, 1912) and *Villosa vibex* (Conrad, 1834), have not been previously reported as occurring in the State of Tennessee. The mussel assemblage of the Hatchie River shows a definite southern or Gulf Coastal affinity.

INTRODUCTION

Several surveys of the freshwater bivalves of western Tennessee have been reported. Ortmann (1925) surveyed the Tennessee River below Walden Gorge. This survey was later supplemented by van der Schalie (1938) with emphasis on that portion of the river bordering West Tennessee. Scruggs (1960), Bates (1962), Isom (1969) and Yokley (1972) have all done post-impoundment studies of the lower Tennessee River. Brown and Pardue (1980) recently reported the occurrence of *Uniomerus terralasmus* in the lower Tennessee River drainage. Ortmann (1926) published the most recent survey of the mussels of West Tennessee, from rivers draining directly into the Mississippi River. An earlier report (Pilsbry and Rhoads, 1896) was incorporated into Ortmann's survey as was Lea's record from "Horn Lake Creek, Shelby Co., Tenn." Superficial recent surveys of the benthic organisms in the Obion, Forked Deer and Hatchie Rivers by the Corps of Engineers show *Corbicula fluminea (manilensis)* as the only bivalve inhabiting any of the three rivers (Anon., 1982). No other published report of the mussels from tributaries of the Mississippi in West Tennessee has come to the attention of the author. This survey was done in conjunction with the Tennessee Wildlife Resources

Agency to establish a baseline from which to compare the Hatchie River, a relatively undisturbed river, with the Obion and Forked Deer Rivers which have undergone channel "improvement" and are essentially drainage ditches.

STUDY AREA

The Hatchie River is located on the Mississippi Embayment of the Gulf Coastal Plain in southwestern Tennessee and northern Mississippi. The river arises in Northern Mississippi and is joined near the Mississippi-Tennessee state line by the Tuscumbia River and Cypress and Muddy Creeks. From there it flows northwesterly across Tennessee to its outlet at Mississippi River mile 773, about 35 miles north of Memphis. The drainage basin is about 110 miles long. The river meanders within this basin and is considerably longer. The eastern one third of the basin lies within the physiographic region known as the West Tennessee Uplands, which is characterized as hilly with bands of rolling topography. The remainder of the basin falls within that region known as the West Tennessee Plain which has gently rolling topography with small ridges and drainage divides. The flood plain in the main stem of the river is quite wide and flat in the downstream section of the basin and narrows to a ridge and valley type in a fan-patterned area upstream. The main channel of the river has not been physically manipulated to any appreciable extent by man. However, a major portion of the main channel in Mississippi has been altered by stream excavation and realignment as has the main channel of the Tuscumbia River and fifty per cent of the other fifteen major tributaries (USDA 1970). That section of the Hatchie River from the Mississippi-Tennessee state line (Hatchie River mile 191.3) to its confluence with the Mississippi River has been designated a Class I State Scenic River by the 1970 amendment to the Tennessee Scenic Rivers Act of 1968 (Tenn. Dept of Public Health, 1976).

Table I
COLLECTING STATIONS

Station Number*	Description
1	From Hwy 64 bridge upstream approx. 1 mile. East of Bolivar, Hardeman Co., TN
2	Ditch entering the Hatchie R. approx 1 mile above Hwy 76 bridge south of Brownsville, Haywood Co., TN
3	Bluff approx. 1/2 mile upstream from Hwy 76 bridge, south of Brownsville, Haywood, Co., TN
4	From Hwy 76 bridge downstream approx. 200 yds. South of Brownsville, Haywood Co., TN
5	From Interstate 40 bridge upstream to approx. 200 yds. below Hwy 76 bridge. South of Brownsville, Haywood Co., TN
6	Borrow pit along road in Hatchie National Wildlife Refuge, parallel to river between Hwy 76 and I-40 bridges, South of Brownsville, Haywood Co., TN
7	Borrow pit (McCool Lake) south of Hatchie R. and west of I-40 in Haywood Co., TN
8	Three mile section of Bear Cr., a cypress slough running through the Hatchie Nat. Wildlife Refuge, South of Brownsville, Haywood Co., TN
9	From Hwy 70 bridge upstream for approx. 1 mile. South of Brownsville, Haywood Co., TN
10	From Hwy 54 bridge west of Brownsville, to a point approx. 1 mile upstream. Haywood and Tipton Co., TN
11	From Hwy 54 bridge west of Brownsville, to a point approx. 1/2 mile upstream. Haywood and Tipton Co., TN
12	From Hwy 51 bridge north of Covington to a point approx 1 1/2 mile upstream. Tipton Co., TN

* listed in order from uppermost station downstream

Collecting for this survey was concentrated in the lower half of the basin. The river in this area winds slowly over a wide flood plain and has a slow but steady current. The only areas of slack current were encountered on the inside of the river bends and below sand bars. The river ranges from 20 to 30 meters in width and varies from 1 to 5 meters in depth. The substrate is primarily sandy silt or shifting sand in the faster current changing to silt along the edges and in areas of slack current. Limited reaches of the river have a firm pebbly or clay substrate, particularly where the river runs along low sandstone or clay bluffs. The majority of shells were found in the shoal-like areas associated with these bluffs or in the stable silt

deposits along the stream edges. The ox-bow lakes, sloughs and borrow pits found on the flood plain and subject to flooding by the river were surveyed and the records collected from these sites have been included in this report as belonging to the Hatchie River Basin fauna.

River sections were surveyed during the low flow conditions encountered during the summers of 1980 through 1983. Collections were made by hand picking and looking for muskrat middens along the river while some collection was done with a four foot crowfoot brail.

Distinctions are drawn, in this report, between dead, relic and live shells. Dead shells were those found with no soft parts but with a lustre to the nacre, an intact hinge ligament and no

erosion of the edges of the shell. Relic shells exhibited a soft and lusterless nacre and erosion of the periphery of the shell. Live mussels were found with the soft parts intact. Examples of all taxa collected are listed in this report as occurring in the Hatchie River Basin although they may be represented by only relic or dead specimens (Table II).

A complete set of voucher specimens has been deposited in the Harvard Museum of Comparative Zoology, Harvard University, with most taxa represented in a set deposited in the Ohio State Museum, Ohio State University. The remainder of the shells are in the author's personal collection.

DISCUSSION

The brief survey work done in the summers of 1980 through 1983 on the Hatchie River revealed 33 taxa of unionids and the Asiatic clam, *Corbicula fluminea*, living in the river basin. All species previously reported from the direct drainage of the Mississippi River in western Tennessee were found in the Hatchie River. In addition, eleven species were found which have not previously been reported as occurring in this drainage (Table III). These species are: *Fusconaia ebenus*, *Quadrula nodulata*, *Plethobasus cyphus*, *Pleurobema cordatum*, *Unio merus tetralasmus*, *Unio merus declivis*, *Leptodea laevis*, *Obovaria jacksoniana*, *Villosa vibex*, *Obliquaria reflexa* and *Corbicula fluminea*. H. and A. van der Schalie (1950) considered *ebenus*, *nodulata*, *cyphus*, *cordatum*, *laevis* and *reflexa* part of the Mississippi River fauna, so their occurrence in the Hatchie is to be expected. *Unio merus tetralasmus* is widespread in the lower Mississippi basin (Johnson, 1970), was recently reported from the lower Tennessee drainage (Brown and Pardue, 1980), and is common in all drainages in western Tennessee. *Unio merus declivis* is found in the Gulf drainages from the Rio Grande drainage in Texas to the Coosa River system in Alabama and could have entered from the Mississippi River (Morrison, 1977). *Obovaria jacksoniana* and *Villosa vibex* are found in rivers to the south which now have no direct link to the Hatchie although only a low ridge separates the headwaters of the Hatchie and the Tombigbee River near Bonnevill, Mississippi. The occurrence of *Corbicula fluminea* in the Hatchie is to be expected in light of the spread of this introduced clam (MaMahon, 1982).

The identification of *Unio merus declivis* has

been confirmed by Dr. David H. Stansbery (pers. Comm.) although Richard I. Johnson (1970) considered *declivis* an ecophenotype of *tetralasmus*. Morrison (1977) later gave cogent reasons for maintaining *declivis* as a distinct species. It has been included in this report because two isolated populations were found which differed markedly from the dominant type found in the western Tennessee drainages. Individuals from these populations differ from the dominant type by being smaller, much more arcuate, having a rough periostracum, having a distinct point at the posterior base and having no concentric bands of color. Examples of the dominant type (*tetralasmus*) were found nearby with no evidence of intergrading.

Burch (1973) lists *Anodonta grandis grandis* and *Anodonta grandis corpulenta* for the two forms found in the Hatchie River. H. and A. van der Schalie (1950) treat these two forms as species while noting the complexity of the *grandis* group. The examples from the Hatchie River are readily separable although existing in the same habitat so they are listed in this report as separate species. Richard I. Johnson and David H. Stansbery have confirmed the identifications of these two taxa.

Ortmann (1926) separated his examples of *Carunculina* from West Tennessee into *parva* and *texasensis* and noted that they were distinct. Since two forms were found in the Hatchie basin, the distinctions have been maintained in this report despite the opinion of Johnson (1976), shared by Burch (1973), that only *parva* is found west of the Appalachian Mountains.

Lampsilis anodontoides anodontoides and *L. anodontoides fallaciosa* are included in this report because examples fitting the description of both forms were found along with numerous intergrades. Ortmann (1926) treated all West Tennessee records as *fallaciosa* while van der Schalie (1950) lists both forms as occurring in the Mississippi River. Burch (1973), probably correctly, lists only *anodontoides*. The distinctions have been maintained in this report only to show that both "forms" are present.

Considerable controversy surrounds the identification of the *Lampsilis ovata-ventricosa* group from the Hatchie. Johnson (pers. comm) assigns *Lampsilis satur* to this group. Ortmann (1926) assigned *Lampsilis ovata satura* to his example from the Obion River while noting that it represented *ventricosa* in the south and intergraded with *ventricosa* in northern Arkansas. Most malacologists who have examined the Hatchie series assign *ventricosa* to the series.

inadequate sewage treatment, there still exists in the Hatchie River a remarkable mussel fauna with a definite southern or Gulf coastal affinity. The presence of *Plectomerus dombeanus*, *Unio-merus declivis*, *Carunculina texasensis*, *Lampsilis satur*, *Obovaria jacksoniana*, *Proptera purpurata* and *Villosa vibex* clearly demonstrates this affinity. Six of these species (*Plectomerus dombeanus*, *Unio-merus declivis*, *Lampsilis satur*, *Obovaria jacksoniana*, *Proptera purpurata* and *Villosa vibex*) are not found in any other stream in Tennessee although *Plectomerus dombeanus* has been found in the Kentucky portion of Kentucky Lake (Pharris et al., 1982).

Obovaria jacksoniana seems to be rare within its historic range. It is listed as endangered in Alabama (Stansbery, 1976) and Strecker (1931) listed the shell as "exceedingly rare" in Texas. The Texas listing is under *Obovaria castanea* (Lea, 1831) which Stansbery (1976) has pointed out is preoccupied by *Unio castaneus* (Raf., 1831). *Obovaria jacksoniana* should be listed as endangered in Tennessee because of its rarity and restriction to one river.

Proptera purpurata and *Villosa vibex*, while common within their ranges, should be listed as threatened in Tennessee because of their restriction to one river with a history of catastrophic pollution spills (Tenn. Dept of Public Health, 1976).

In most cases the nomenclature used in this paper is that suggested by Ortmann and Walker (1922) and used by Burch (1973). The problems associated with having two or three Linnaean names appearing in various publications for the same species of mussel has been discussed by van der Schalie (1952, 1981). The taxonomic list (Table III) used in this paper includes all available records from the West Tennessee drainages, with common synonyms.

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Table III
MUSSEL SPECIES RECORDS FOR MISSISSIPPI DRAINAGE IN WEST TENNESSEE
Recent and Historic records

Species	Locality Record*				
	Hatchie River	Obion River	Reelfoot Lake	Horn Lake Creek	Wolf River
<i>Amblema</i> (<i>Crenodonta</i>) <i>costata</i> (Raf. 1820)	X	O	-	-	-
incl. <i>Amblema peruviana</i> (Lamarck 1819)	-	-	-	-	-
as <i>Unio plicatus</i> Say 1817	-	-	P	-	-
<i>Amblema plicata</i> (Say 1817)	-	-	-	-	-
<i>Fusconaia ebenus</i> (Lea 1831)	X	-	-	-	-
<i>Fusconaia flava</i> (Raf. 1820)	X	-	-	-	-
incl. <i>flava trigona</i> (Lea 1831)	-	O	-	-	-
<i>Plectomerus dombeyanus</i> (Val. 1833)	X	-	-	-	-
as <i>Plectomerus trapezoides</i> (Lea 1831)	-	O	P	-	-
<i>Quadrula nodulata</i> Raf. 1820	X	-	-	-	-
<i>Quadrula pustulosa</i> (Lea 1831)	X	-	P	-	-
incl. <i>pustulosa mortoni</i> (Conrad 1836)	-	O	-	-	-
as <i>Unio turgidus</i> Lea 1831	-	-	-	-	P
<i>Quadrula quadrula</i> (Raf. 1820)	X	-	O	-	-
as <i>Unio asperrimus</i> Lea 1831	-	-	P	-	-
<i>Tritogonia verrucosa</i> (Raf. 1820)	X	-	-	-	-
as <i>Quadrula verrucosa</i>	-	O	-	-	P
<i>Megaloniaias gigantea</i> (Barnes 1823)	X	O	-	-	-
incl. <i>Megaloniaias nervosa</i> (Raf. 1820)	-	-	-	-	-
<i>Plethobasus cyphyus</i> (Raf. 1820)	X	-	-	-	-
<i>Pleurobema cordatum</i> (Raf. 1820)	X	-	-	-	-
<i>Unio merus tetralasmus</i> (Say 1831)	X	-	-	-	-
<i>Unio merus declivis</i> (Say 1831)	X	-	-	-	-
<i>Anodonta grandis</i> Say 1829	X	-	P	-	-
incl. <i>grandis grandis</i>	-	-	-	-	-
<i>Anodonta corpulenta</i> Cooper 1834	X	-	-	-	-
as <i>grandis gigantea</i> Lea 1838	-	-	O	-	-
incl. <i>grandis corpulenta</i>	-	-	-	-	-
<i>Anodonta imbecillis</i> Say 1829	X	-	O,P	-	-
incl. <i>Anodonta ohioensis</i> Raf. 1820	-	-	-	-	-
<i>Anodonta suborbiculata</i> Say 1831	X	-	O,P	-	-
<i>Arcidens confragosus</i> (Say 1829)	X	O	P	-	-
<i>Lasmigona complanata</i> (Barnes 1823)	X	O	-	-	-
<i>Strophitus undulatus</i> (Say 1817)	X	-	-	-	-
as <i>Anodonta shaefferiana</i> (Lea 1852)	-	-	-	L	-
incl. <i>rugosus</i> (Swainson 1822)	-	-	-	-	-
<i>Carunculina</i> (<i>Toxalasma</i>) <i>parva</i> (Barnes 1823)	X	-	O,P	-	-

Table III (Continued)

Species	Locality Record*				
	Hatchie River	Obion River	Reelfoot Lake	Horn Lake Creek	Wolf River
<i>Carunculina</i> (<i>Toxalasma</i>) <i>texasensis</i> (Lea 1859)	X	-	O,P	-	-
<i>Lampsilis anodontoides anodontoides</i> (Lea 1834) as <i>Unio anodontoides</i> incl. <i>teres anodontoides</i>	X -	- -	- -	- -	- -
<i>Lampsilis anodontoides fallaciosa</i> (Smith 1899) incl. <i>teres teres</i> (Raf. 1820)	X	O	-	-	-
<i>Lampsilis satur</i> (Lea 1852) as <i>ovata satura</i>	X -	- O	- -	- -	- -
<i>Leptodea fragilis</i> (Raf. 1820) as <i>Unio gracilis</i> Barnes 1823	X -	O -	- -	- -	- P
<i>Leptodea laevissima</i> (Lea 1829) incl. <i>Potamilus ohioensis</i> (Raf. 1820)	X	-	-	-	-
<i>Ligumia subrostrata</i> (Say 1831)	X	-	O,P	-	-
<i>Obovaria jacksoniana</i> Frierson 1912 incl. <i>Unio castaneus</i> Lea 1831	X	-	-	-	-
<i>Proptera</i> (<i>Potamilus</i>) <i>purpurata</i> (Lamarck 1819)	X	-	-	-	P
<i>Truncilla truncata</i> Raf. 1820 as <i>Unio elegans</i> Lea 1831	X -	- -	- P	- -	- -
<i>Villosa</i> (<i>Micromya</i>) <i>lienosa</i> (Conrad 1834)	X	O	-	-	-
<i>Villosa</i> (<i>Micromya</i>) <i>vibex</i> (Conrad 1834)	X	-	-	-	-
<i>Obliquaria reflexa</i> Raf. 1820	X	-	-	-	-
<i>Corbicula fluminea</i> (Muller 1774) incl. <i>manilensis</i> (Philippi 1841) <i>leana</i> (Prime 1864)	X	-	-	-	-

* X- Present study
O- Ortmann, 1926

P- Pilsbry and Rhodes, 1896
L- Lea