

the shells, overall, have a smooth and slightly glossy appearance. Shell *b* is greatly bleached and coated with calcium carbonate dorsally. It appears to be fossil or subfossil.

Etymology: The epithet *eulaliae* refers to the saint after which is named the Sierra Santa Eulalia, the type locality.

Type locality: The types and paratypes are reported by Mr. Wally Lippincott as being taken on the west side of the Sierra Santa Eulalia in easternmost Chihuahua, Mexico, near the border with the state of Coahuila, in an area centering around 27°12'N; 103°47'36"W. On the DETENAL 1:50,000 topographic quadrangle for Guimbalete (G-13, B-44) the locality is indicated by the collector as along walls of a canyon debouching southwestward about midway of the Santa Eulalia range. The mouth of the canyon is 1.3 km E of "El Pinolero" and 7.5 km N and 1.5 km E of "Penoles" on the Guimbalete quadrangle. The canyon is ca. 2.5 km long, heading at ca. 1650 m and debouching at ca. 1250 m. Mr. Lippincott writes (*in litt.*, 26 June 1982): "Within the canyon the snails were taken from the south facing ledges. These ledges were approxi-

mately 10-20 meters above the dry creek bed. They were characterized by smooth, broken up stones interspersed between talus areas. The snails were taken from under the smooth rocks.

Disposition of Types: Holotype: National Museum of Natural History, USNM 820297; Paratypes: University of Arizona 6262 (shell a), University of Texas at El Paso 8785 (shells b and c).

Discussion: The mountains of eastern Chihuahua and adjacent Coahuila are almost unknown malacologically. In the region, two species have been described that are provisionally assigned to *Humboldtiana*: the present one and *H. plana* Metcalf and Riskind, 1976. Shells of both these species are atypical of *Humboldtianas* in general. Further collecting in these areas will probably reveal other new species and eventually should lead to an understanding of the relationships of these unusual shells.

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FRESHWATER MUSSELS (BIVALVIA: UNIONIDAE) OF MONROE COUNTY, WEST VIRGINIA

Michael A. Zeto
West Virginia Department of
Natural Resources
Division of Water Resources
350 North Vance Drive
Beckley, West Virginia 25801

and

John E. Schmidt
West Virginia Department of
Natural Resources
Division of Water Resources
1201 Greenbrier Street
Charleston, West Virginia 25311

ABSTRACT

A survey of the mussel fauna of Monroe County, West Virginia, was conducted during the spring of 1983 and 1984. This survey included samples from the Greenbrier River, Indian Creek, and South Fork of Potts Creek. Twelve species of unionid mussels and Corbicula fluminea were collected from these three watersheds, including a new state record, Canthyria collina, which is found in the South Fork of Potts Creek.

Information on the extant mussel populations of West Virginia was extremely limited until the past decade. Mussel surveys conducted during

this period, especially in the past five years, has greatly enhanced this information. This study was performed in conjunction with a statewide

inventory of mussels conducted by the West Virginia Department of Natural Resources, Division of Water Resources. This inventory has investigated approximately fifty percent of the state's streams with known mussel populations (Schmidt and Zeto, 1984), yielding 49 naiad species. Recent studies in the state have been conducted by Schmidt, Zeto and Taylor (1983) on the Little Kanawha River Basin, Zeto (1982) on the Monongahela River Basin, and Clarke (1982) on the upper Kanawha River. Taylor and Hughart (1981), Morris and Taylor (1978), and Taylor (1980) have also conducted taxonomic surveys on the Elk, Kanawha, and Ohio rivers, respectively. The only recent published studies performed in the vicinity of Monroe County were those conducted by Bates (1971) and Stauffer, Hocutt, and Markham (1980) on New River. The U.S. Fish and Wildlife Service also conducted a 1983 mussel survey in the study area (New and Bluestone Rivers) in conjunction with the U.S. Army Corps of Engineers, Huntington District. An earlier survey of mussels from the study area which has not been published upon was conducted by Stansbery (pers. comm.) in 1964. Many of the species recorded in this study represent the first published mussel records for the respective watersheds.

Study Area

Monroe County is located in the extreme southeast portion of West Virginia. It is bordered to the north by Greenbrier County and by Summers and Mercer counties to the west. Monroe County is bordered by the State of Virginia to the south and east. The majority of the county (the western half) lies in the New River basin. The northern and central portions of the county are in the Greenbrier River drainage, while the extreme eastern section of the county is in the James River (Virginia) drainage. The streams specifically concerned in this study are the Greenbrier River and Indian Creek of New River, and Potts Creek of James River.

Site 1 is located on the Greenbrier River off State Route 3, 3.22 kilometers southwest of Alderson, Greenbrier County ($37^{\circ}41'56''N \times 80^{\circ}40'07''W$). The river at this location lies entirely in Monroe County for a very short distance of approximately 0.8 kilometers. Greenbrier River originates in Randolph County and

flows in a generally southwesterly course across Pocahontas, Greenbrier, Monroe and Summers counties to its confluence with the New River at Hinton, Summers County. Greenbrier River is 246.33 kilometers long and falls at an average of 3.14 meters per kilometer. The West Virginia Department of Natural Resources Greenbrier River Basin Plan (1983) states that excellent water quality exists in the river.

Indian Creek rises in the limestone sinks of south-central Monroe County. The stream flows in a general westerly direction to its confluence with New River near Junta, Summers County. Indian Creek is 54.74 kilometers long. According to the West Virginia Department of Natural Resources New River Basin Plan (1983), the stream receives pollution from cropland erosion and the inadequate disposal of human and/or animal wastes. Three sites were surveyed on Indian Creek in Monroe County. These are in upstream sequence: site 2a at county route 23 bridge, 1.6 kilometers north of Red Sulphur Springs ($37^{\circ}31'44''N \times 80^{\circ}46'13''W$); site 2b off County Route 23, 6.44 kilometers northeast of Red Sulphur Springs ($37^{\circ}33'27''N \times 80^{\circ}45'18''W$) and site 2c off State Route 122, 2.42 kilometers west of Greenville ($37^{\circ}33'11''N \times 80^{\circ}42'33''W$).

Potts Creek heads in the southwestern corner of Monroe County and flows northeastward into Craig County, Virginia. The stream is in the James River drainage. The entire portion of the Potts Creek watershed lying in West Virginia was surveyed for freshwater mussels, however mussels were found only in the South Fork.

The South Fork of Potts Creek is 9.34 kilometers in length and falls at a rate of 21.66 meters per kilometer. Mussels were located at two sampling points on South Fork. Site 3a is located off County Route 17, 1.6 kilometers northeast of Waiteville ($37^{\circ}29'03''N \times 80^{\circ}24'50''W$), while site 3b is located further upstream off County Route 17, 0.8 kilometers west of Waiteville ($37^{\circ}28'21''N \times 80^{\circ}25'54''W$).

Figure 1 depicts sampling sites where mussels are located.

Methods

All sampling sites were examined during normal or slightly low flow conditions. Each site consisted of at least one riffle and one pool. The sites were sampled by walking the banks looking

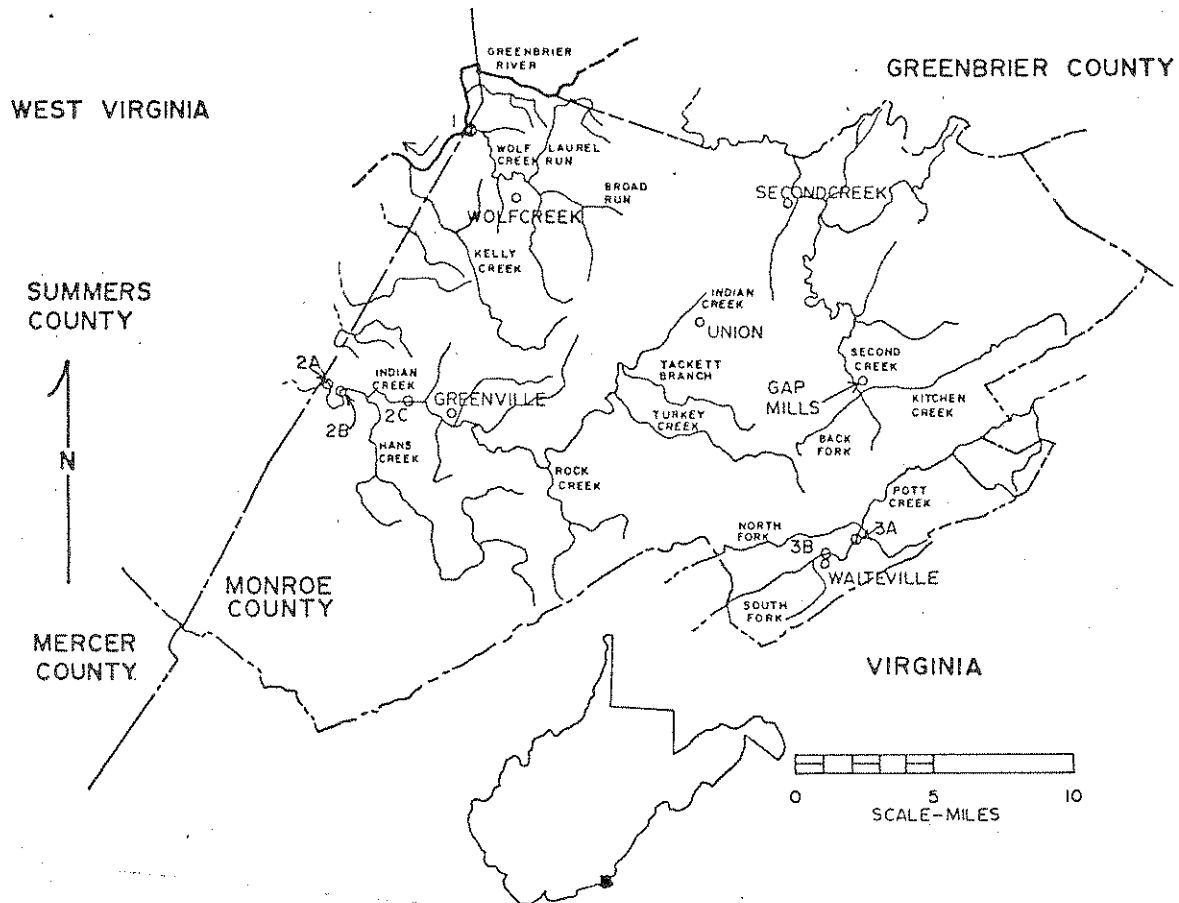


FIG. 1. Mussel collection sites in Monroe County, West Virginia. Localities are identified in text.

for shell material, while water scopes were used in the streams to locate live specimens.

As material was collected in the field, a preliminary species list was compiled on site. Live specimens were sacrificed and retained only if suitable dead material was not available. All collected material was bagged, labeled and returned to the lab for positive identification. Dr. David Stansbery (The Ohio State University) aided in the identification of difficult specimens and confirmed all others. Voucher specimens have been accessioned in the Ohio State University, Museum of Zoology.

Results and Discussion

A total of 12 species of freshwater unionid mussels and *Corbicula fluminea* were collected during this Monroe County survey (Table 1). Greenbrier River supported seven species of

mussels, the dominant species being *Elliptio dilatata*, *Cyclonaias tuberculata* and *Actinonaias ligamentina carinata*. Other species in Greenbrier River include *Alasmidonta marginata*, *Tritogonia verrucosa*, *Lampsilis ventricosa* and *Lampsilis fasciola*. All seven species were collected by Stansbery in 1964, however Bates reported "negative results" for the Greenbrier River in his 1971 survey. Apparently, the results of this latter survey were erroneously reported, as there are currently dense populations of naiads in the Greenbrier River representing numerous age classes. Indian Creek also contained seven species of mussels, with the population being greatly dominated by *Elliptio dilatata*. Other species collected from Indian Creek include *Anodonta grandis grandis*, *C. tuberculata*, *Toxolasma parvus*, *Villosa iris iris*, *L. ventricosa* and *L. fasciola*. Potts Creek con-

TABLE 1. Freshwater Mussels of Monroe County, West Virginia, 1983-1984.

Species	Site Number					
	1	2a	2b	2c	3a	3b
<u>Anodonta grandis grandis</u> (Say, 1829)		X				
<u>Strophitus undulatus undulatus</u> (Say, 1817)					X	X
<u>Alasmidonta marginata</u> (Say, 1818)	X					
<u>Tritogonia verrucosa</u> (Raf., 1820)	X					
<u>Cyclonaias tuberculata</u> (Raf., 1820)	X	X	X			
<u>Elliptio dilatata</u> (Raf., 1820)	X	X	X	X		
<u>Actinonaias ligamentina carinata</u> (Barnes, 1823)	X					
<u>Toxolasma parvus</u> (Barnes, 1823)			X			
<u>Villosa iris iris</u> (Lea, 1829)		X				
<u>Lampsilis ventricosa</u> (Barnes, 1823)	X	X	X			
<u>Lampsilis fasciola</u> (Raf., 1820)	X	X	X	X		
<u>Canthyria collina</u> (Conrad, 1837)					X	X
<u>Corbicula fluminea</u> (Muller, 1774)	X	X	X	X		

tained two species of unionids of relative equal abundance. These species are *Strophitus undulatus undulatus* and *Canthyria collina*. None of the species collected is currently listed as endangered, however *Canthyria* (alias *Fusconaiia*) *collina* is currently listed in the Federal Register (1984) by the U.S. Fish and Wildlife Service for possible listing as a threatened or endangered species.

Greenbrier River and Indian Creek both contained seven species of Unionidae, however only four of these (*C. tuberculata*, *E. dilatata*, *L. ventricosa* and *L. fasciola*) were common to both drainages. This variation in species is probably attributed to the difference in habitat between the two watersheds.

Greenbrier River is a much larger water body possessing fairly turbulent water, with a substrate consisting mainly of rocks, cobble and sand. Indian Creek is smaller in size with calm water. There is also much more silt in the substrate of Indian Creek due to cropland erosion.

The mussel population existing in the South Fork of Potts Creek is somewhat a surprise, since this is an extreme headwater stream which usually are non-supportive of mussels. One of the species, *Canthyria collina*, found in

this stream is restricted to the James River drainage, while *Strophitus undulatus undulatus* is common to both the Atlantic Coastal and Mississippian mussel faunas. *Canthyria collina* represents the first record for this mussel in West Virginia.

Acknowledgments

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BERMUDA MARINE MOLLUSK TYPE SPECIMENS TRANSFERRED TO THE SMITHSONIAN

Joseph Rosewater

National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560

Recently, a number of type specimens of mollusks described by William Healey Dall and Paul Bartsch were transferred from the Bermuda Aquarium, Museum and Zoo, Flatt's, Smith's Parish, Bermuda, to the collection of Recent Mollusks, Department of Invertebrate Zoology, National Museum of Natural History, Washington, D.C.

Since these type specimens were originally mentioned as being in the Bermuda Museum, or in the collection of Mr. Arthur Haycock, of Bermuda, it is necessary to put on record their new location for the benefit of malacologists who may wish to examine them in connection with research projects. In some cases the numbers of specimens per species sent from the Bermuda Museum (Haycock Collection) and labeled as Cotypes (= Syntypes or where a Holotype or Lectotype can be distinguished, Paratypes or Paralectotypes) exceed the number originally mentioned by Dall and Bartsch in their publications. It is probable that Haycock did not originally send or mention all the specimens he had available for examination.

The types of the following species are involved and are listed in order of their publication.

Argyrodonax haycocki Dall, 1911:86 (Bermuda: Lectotype USNM 842643; Paralectotypes USNM 783533). The type lot was described by Dall as consisting of one complete specimen and a single additional valve all in the collection of Arthur Haycock, Bermuda [later in the collection of the Bermuda Museum]. In 1979 NMNH received from the Bermuda Museum two single and unrelated valves of this species labeled as Syntypes. Recently a complete specimen marked "type" was received that matches Dall's description and measurements and it is here designated the Lectotype. *Argyrodonax haycocki* originally assigned by Dall to the family Mesodesmatidae, has the dentition and sculpture of *Cumingia* and therefore appears to belong in the family Semelidae.

Columbella somersiana Dall and Bartsch, 1911:278, pl. 35, fig. 2 (Bermuda; Holotype USNM 842644). This species originally was described from a single specimen. In 1912 an additional specimen, so named, was received