

REGULAR ARTICLE

PROVENANCE AND DISPOSITION OF SPECIMENS APPEARING IN COLOR PLATES OF *THE FRESHWATER MUSSELS OF TENNESSEE*

Gerald R. Dinkins

McClung Museum of Natural History and Culture, 1327 Circle Park Drive, Knoxville, TN 37996-3200 USA

ABSTRACT

A total of 260 specimens of native freshwater mussels and numerous specimens of three introduced bivalves were photographed and published in *The Freshwater Mussels of Tennessee*, but the provenance and disposition for these specimens were not included. All but nine of the 260 bookplate freshwater mussel specimens and all of the introduced bivalve specimens used in the figures were recently found. Information on length, catalogue number, collection locality, date of collection, and collector(s) is provided herein.

KEY WORDS: freshwater mussels, Tennessee, provenance, disposition

INTRODUCTION

In 1998, Paul W. Parmalee and Arthur E. Bogan published *The Freshwater Mussels of Tennessee*, which features individual species accounts for 129 native species, state and USA distribution maps, and color photographs of individual specimens featuring the interior and exterior of the shell. It also presents individual chapters on various topics, including structure, development and growth, taxonomy, classification, ecology, and aboriginal exploitation. For each native species treated in *The Freshwater Mussels of Tennessee*, two representative specimens are depicted to show subtle variations in shell characteristics and sexual dimorphism (where it exists). Three nonnative species, *Corbicula fluminea* (Müller, 1774), *Dreissena polymorpha* (Pallas, 1771), and *Mytilopsis leucophaea* (Conrad, 1831), also are depicted; these show two to nearly one dozen specimens. Unfortunately, provenance (location where the specimen originated) and disposition (museum and catalogue number) of figured specimens are not provided. Subsequent to 1998, several books and reports added significantly to the body of knowledge on freshwater mussels in the USA. These include the mussel faunas of Alabama (Williams et al. 2008), Ohio (Watters et al. 2009),

and Florida (Williams et al. 2014). Each monograph presents two or more color photographs for all species and provides provenance and disposition for the figured specimens.

During a recent reorganization of the mollusk collection at the University of Tennessee McClung Museum of Natural History and Culture (UTMM), most of the book plate specimens used in *The Freshwater Mussels of Tennessee* were found. Fortunately, nearly all of the figured specimens bear a small inscription on one valve indicating the book plate in which it appeared; otherwise it would have been difficult to discern which individuals were used as figured specimens, at least for some of the more common species from which there are several thousand available specimens. Although the UTMM collection contains all species treated in *The Freshwater Mussels of Tennessee*, specimens were borrowed from other institutions for photographic purposes or to gain a clearer understanding of various shell characteristics presented in the text. Institutions from which shell material was borrowed in preparation for *The Freshwater Mussels of Tennessee* include the Illinois Natural History Survey (INHS), Ohio State University Museum of Biological Diversity (OSUM), University of Michigan Museum of Zoology (UMMZ), Carnegie Museum of Natural History (CM), and the Academy of Natural Sciences of Drexel University

Corresponding Author: gdinkins@utk.edu

(ANSP). Several of these borrowed specimens appear as book plate specimens in *The Freshwater Mussels of Tennessee*.

Properly referenced voucher material and voucher collections are valuable to researchers and natural resource managers. Although reference material can be used in the field to compare with live specimens and assist with identification, it often is not possible or convenient to have reference shells on hand during fieldwork. In these circumstances, a book with high-quality color plates can be particularly useful. West Virginia and Ohio now require each applicant for a state collecting permit to pass an identification test (Clayton et al. 2018; Ohio Department of Natural Resources and U.S. Fish and Wildlife Service 2018), and several other states are considering a similar requirement. In Ohio, the test is administered “open book” and the applicant is allowed to bring any outside source to use while taking the test, including reference books (J. Navarro, Ohio Department of Natural Resources, personal communication). Identifying live mussels can be challenging and shell characteristics for many of our native species vary considerably across their ranges or even within the same drainage (i.e., headwaters to big river), a concept described by Ortmann (1920). Many of the native species of the USA are protected by the U.S. Endangered Species Act and dead shells of federally protected species cannot be retained legally unless the collector has been issued a federal salvage permit. Sometimes, a dead shell is the only proof a species existed or continues to exist in a particular stream or river. In Tennessee, 51 freshwater mussel species are protected by federal law, and the Tennessee Wildlife Resources Agency does not allow live native mussels to be taken without prior permission, even species that are not under federal protection. For these reasons, it is useful (for identification purposes) and historically important to understand the origin, history, and size of book plate specimens appearing in *The Freshwater Mussels of Tennessee*.

METHODS

Of the 260 specimens of native species depicted in the Tennessee book, 232 were taken from the UTMM collection; the remainder were borrowed from the INHS (10 specimens) and the UMMZ (nine specimens). Each figured specimen in the UTMM collection has now been segregated from the general collection and placed in an archival, acid-free foam package. A notation has been made in the electronic database accompanying each figured specimen. Book plate specimens were measured to the nearest millimeter (greatest length) using Vernier calipers; their collection locality was verified using U.S. Geological Survey quadrangle maps, although a few specimens lacked a specific provenance. Species accounts presented herein are as presented in *The Freshwater Mussels of Tennessee* (plate number, scientific name, authority, and common name). Catalogue number follows the abbreviation for the collection from which the specimen originated. The use of river mile (RM), creek mile (CM), and air mile in the collection locality was retained because this is the increment

used in quadrangle maps. State route and county road are abbreviated as SR and CR, respectively. When the collector(s), collection locality, or date of collection was unknown or could not be inferred from other specimens, it was left blank. Museum acronyms follow Sabaj (2016).

RESULTS

Book plate specimens used in *The Freshwater Mussels of Tennessee* were found in the mollusk collections at UTMM, INHS, and UMMZ. Despite a careful search of each mollusk collection where figured specimens were known to have been borrowed, nine could not be located: *Epioblasma biemarginata* (plate 21, lower), *Epioblasma flexuosa* (plate 24, upper and lower), *Epioblasma lenior* (plate 28, upper), *Epioblasma lewisii* (plate 29, upper and lower), *Pleurobema rubellum* (plate 90, upper and lower), and *Quadrula fragosa* (plate 103, upper).

Since 1998, there have been numerous revisions to the taxonomy of freshwater mussels in the USA. Of the 129 species treated in *The Freshwater Mussels of Tennessee*, 38 have been revised (Williams et al. 2017). These revisions range from relatively minor emendations such as correcting the species name to conform to the gender of the genus, to significant changes on the basis of phylogenetic analysis. A summary of these revisions is provided in Table 1 and is based on the list of species in Williams et al. (2017) unless otherwise noted. Taxonomy used in the species accounts is as it appears in *The Freshwater Mussels of Tennessee*.

Provenance and Disposition of Book Plate Specimens Appearing in *The Freshwater Mussels of Tennessee*

Plate 1. Cumberlandia monodonta (Say, 1829), *Spectacle-case*.—Upper specimen: 125 mm (right valve), 129 mm (left valve). UTMM 2229. Clinch River, U.S. Highway 25E, RM 151.9, Claiborne Co., TN. March 1, 1975 (the two valves in the upper figure of plate 1 are from different individuals).

Lower specimen: 113 mm. UTMM 2227. Clinch River, Kyles Ford, RM 190, Hancock Co., TN. October 21, 1973.

Plate 2. Actinonaias ligamentina (Lamarck, 1819), *Mucket*.—Upper specimen: 83 mm. UTMM 1823. Clinch River, Kyles Ford, RM 190, Hancock Co., TN. September 15, 1973.

Lower specimen: 105 mm. UTMM 1803. Cumberland River, Rome Landing, Smith Co., TN. September 10, 1977.

Plate 3. Actinonaias pectorosa (Conrad, 1834), *Pheasant-shell*.—Upper specimen: 96 mm. UTMM 1789. Red River, Community of Dot where SR 96 runs adjacent to river, Logan Co., KY. August 27, 1977.

Lower specimen: 108 mm. UTMM 1835. Powell River, Buchanan Ford, RM 99.2, Claiborne Co., TN. July 17, 1983.

Plate 4. Alasmidonta atropurpurea (Rafinesque, 1831), *Cumberland Elktoe*.—Upper specimen: 77 mm. UTMM 4197.

Lower specimen: 64 mm. Same as preceding.

Plate 5. Alasmidonta marginata Say, 1818. *Elktoe*.—Upper

Table 1. Taxonomic status of species presented in Parmalee and Bogan (1998). Only species that have changed since 1998 are presented herein.

Name in Parmalee and Bogan (1998)	Changes Since 1998	Current Name(s) if Different from Parmalee and Bogan (1998)
<i>Anodonta suborbiculata</i> Say, 1831 Flat Floater	Reassigned to <i>Utterbackiana</i>	<i>Utterbackiana suborbiculata</i> (Say, 1831) Flat Floater
<i>Anodontoides ferussacianus</i> (Lea, 1834) Cylindrical Papershell	Populations above Cumberland Falls elevated from synonymy	<i>Anodontoides ferussacianus</i> (Lea, 1834), <i>Anodontoides denigrata</i> (Lea, 1852), Cumberland Papershell
<i>Elliptio dilatata</i> (Rafinesque, 1820) Spike	Reassigned to <i>Eurynia</i>	<i>Eurynia dilatata</i> Rafinesque 1820, Spike
<i>Epioblasma capsaeformis</i> (Lea, 1834) Oyster Mussel	New species described from lower TN drainage	<i>Epioblasma capsaeformis</i> (Lea, 1834) Oyster Mussel <i>Epioblasma ahlstedti</i> Jones and Neves, 2010, Duck River Dartersnapper
<i>Epioblasma florentina florentina</i> (Lea, 1857) Yellow Blossom	Nominotypical subspecies not required	<i>Epioblasma florentina</i> (Lea, 1857), Yellow Blossom
<i>Epioblasma florentina walkeri</i> (Wilson and Clark, 1914) Tan Riffleshell	Elevated to species; new subspecies described from upper TN drainage and elevated to species	<i>Epioblasma walkeri</i> (Wilson and Clark, 1914), Tan Riffleshell <i>Epioblasma aureola</i> Jones and Neves, 2010, Golden Riffleshell
<i>Epioblasma torulosa torulosa</i> (Rafinesque, 1820) Tubercled Blossom	Nominotypical subspecies not required	<i>Epioblasma torulosa</i> (Rafinesque 1820), Tubercled Blossom
<i>Epioblasma torulosa gubernaculum</i> (Reeve, 1865) Green Blossom	Elevated to species	<i>Epioblasma gubernaculum</i> (Reeve, 1865), Green Blossom
<i>Fusconaia barnesiana</i> (Lea, 1838) Tennessee Pigtoe	Reassigned to <i>Pleuroaia</i>	<i>Pleuroaia barnesiana</i> (Lea, 1838), Tennessee Pigtoe
<i>Fusconaia ebena</i> (Lea, 1831) Ebonyshell	Reassigned to <i>Reginaia</i> ; species name corrected	<i>Reginaia ebenus</i> (Lea, 1831), Ebonyshell
<i>Lampsilis altilis</i> (Conrad, 1834) Finelined Pocketbook	Reassigned to <i>Hamiota</i>	<i>Hamiota altilis</i> (Conrad, 1834), Finelined Pocketbook
<i>Lampsilis straminea claibornensis</i> (Lea, 1838) Southern Fatmucket	Subspecies no longer recognized	<i>Lampsilis straminea</i> (Conrad, 1834), Southern Fatmucket
<i>Lampsilis teres</i> (Rafinesque, 1820) Yellow Sandshell	Two geographically overlapping phenotypes elevated to species ¹	<i>Lampsilis teres</i> (Rafinesque, 1820) Yellow Sandshell <i>Lampsilis sietmani</i> Keogh and Simons 2019, Canary Kingshell
<i>Lasmigona holstonia</i> (Lea, 1838) Tennessee Heelsplitter	Mobile Basin populations elevated to species	<i>Lasmigona holstonia</i> (Lea, 1838), Tennessee Heelsplitter <i>Lasmigona etowaensis</i> (Conrad, 1849), Etowah Heelsplitter
<i>Lexingtonia dolabelloides</i> (Lea, 1840) Slabside Pearlymussel	Reassigned to <i>Pleuroaia</i>	<i>Pleuroaia dolabelloides</i> (Lea, 1840), Slabside Pearlymussel
<i>Obovaria jacksoniana</i> (Frierson, 1912) Southern Hickorynut	Synonymized with <i>Obovaria arkansasensis</i>	<i>Obovaria arkansasensis</i> (Lea, 1862), Southern Hickorynut
<i>Pleurobema chattanoogaense</i> (Lea, 1858) Painted Clubshell	Synonymized with <i>Pleurobema decusum</i>	<i>Pleurobema decusum</i> (Lea, 1831), Southern Clubshell
<i>Pleurobema gibberum</i> (Lea, 1838) Cumberland Pigtoe	Reassigned to <i>Pleuroaia</i> ; species name corrected	<i>Pleuroaia gibber</i> (Lea, 1838), Cumberland Pigtoe
<i>Pleurobema johannis</i> (Lea, 1859) Alabama Pigtoe	Synonymized with <i>Pleurobema perovatum</i> ; not part of TN fauna	<i>Pleurobema perovatum</i> (Conrad, 1834), Ovate Clubshell

Table 1, continued.

Name in Parmalee and Bogan (1998)	Changes Since 1998	Current Name(s) if Different from Parmalee and Bogan (1998)
<i>Pleurobema perovatum</i> (Conrad, 1834) Ovate Clubshell	Range in Alabama River drainage redefined; not part of TN fauna	
<i>Pleurobema rubellum</i> (Conrad, 1834) Warrior Pigtoe	Range in Alabama River drainage redefined; not part of TN fauna	
<i>Pleurobema troschelianum</i> (Lea, 1852) Alabama Clubshell	Synonymized with <i>Pleurobema georgianum</i>	<i>Pleurobema georgianum</i> (Lea, 1841), Southern Pigtoe
<i>Ptychobranhus greeni</i> (Conrad, 1834) Triangular Kidneyshell	Subspecies elevated from synonymy; range of <i>Ptychobranhus greenii</i> redefined (not part of TN fauna)	<i>Ptychobranhus foremanianus</i> (Lea, 1842), Rayed Kidneyshell
<i>Ptychobranhus subtentum</i> (Say, 1825) Fluted Kidneyshell	Species name corrected	<i>Ptychobranhus subtentus</i> (Say, 1825), Fluted Kidneyshell
<i>Quadrula cylindrica</i> (Say, 1817) Rabbitsfoot	Reassigned to <i>Theliderma</i>	<i>Theliderma cylindrica</i> (Say, 1817), Rabbitsfoot
<i>Quadrula intermedia</i> (Conrad, 1836) Cumberland Monkeyface	Reassigned to <i>Theliderma</i>	<i>Theliderma intermedia</i> (Conrad, 1836), Cumberland Monkeyface
<i>Quadrula metanevra</i> (Rafinesque, 1820) Monkeyface	Reassigned to <i>Theliderma</i>	<i>Theliderma metanevra</i> (Rafinesque, 1820), Monkeyface
<i>Quadrula nodulata</i> (Rafinesque, 1820) Wartyback	Reassigned to <i>Cyclonaias</i>	<i>Cyclonaias nodulata</i> (Rafinesque, 1820), Wartyback
<i>Quadrula pustulosa</i> (Lea, 1831) Pimpleback	Reassigned to <i>Cyclonaias</i>	<i>Cyclonaias pustulosa</i> (Lea, 1831), Pimpleback
<i>Quadrula sparsa</i> (Lea, 1841) Appalachian Monkeyface	Reassigned to <i>Theliderma</i>	<i>Theliderma sparsa</i> (Lea, 1841), Appalachian Monkeyface
<i>Strophitus connasaugaensis</i> (Lea, 1858) Alabama Creekshell	Reassigned to <i>Pseudodontoideus</i> ²	<i>Pseudodontoideus connasaugaensis</i> (Lea, 1858) Alabama Creekshell
<i>Toxolasma lividus</i> Rafinesque, 1831 Purple Lilliput	Species name corrected	<i>Toxolasma lividum</i> Rafinesque, 1831, Purple Lilliput
<i>Toxolasma parvus</i> (Barnes, 1823) Lilliput	Species name corrected	<i>Toxolasma parvum</i> (Barnes, 1823), Lilliput
<i>Toxolasma texasensis</i> (Lea, 1857) Texas Lilliput	Species name corrected	<i>Toxolasma texasiense</i> (Lea, 1857), Texas Lilliput
<i>Villosa iris</i> (Lea, 1829) Rainbow	Caney Fork population elevated from synonymy	<i>Villosa iris</i> (Lea, 1829) Rainbow <i>Villosa sima</i> (Lea, 1838) Caney Fork Rainbow
<i>Villosa perpurpurea</i> (Lea, 1861) Purple Bean	Synonymized with <i>Venustaconcha trabalis</i>	<i>Venustaconcha trabalis</i> (Conrad, 1834), Tennessee Bean
<i>Villosa trabalis</i> (Conrad, 1834) Cumberland Bean	Reassigned to <i>Venustaconcha</i> ; split into two species	<i>Venustaconcha trabalis</i> (Conrad, 1834), Tennessee Bean <i>Venustaconcha troostensis</i> (Lea, 1834), Cumberland Bean
<i>Villosa vanuxemensis</i> (Lea, 1838) Mountain Creekshell	Subspecies elevated to species	<i>Villosa vanuxemensis</i> (Lea, 1838), Mountain Creekshell <i>Villosa umbrans</i> (Lea, 1857), Coosa Creekshell

¹Keogh, S. M. and A. M. Simons (2019).²Smith et al. (2018).

specimen: 79 mm. UTM 1905. Clinch River, Kyles Ford, RM 190, Hancock County, TN. October 21, 1973. Paul Parmalee.

Lower specimen: 75 mm. Same as preceding (length of specimen in bottom figure estimated because tip of posterior margin is missing).

Plate 6. Alasmidonta raveneliana (Lea, 1834), Appalachian Elktoe.—Upper specimen: 70 mm. UTM 1848. Little Tennessee River, CR 1456, Macon Co., NC. September 13, 1989. Richard Biggins.

Lower specimen: 81 mm. Same as preceding.

Plate 7. Alasmidonta viridis (Rafinesque, 1820), Slipper-shell.—Upper specimen: 39 mm. UTM 1851. Floyds Fork of Salt River, 3.4 miles NW of Ft. Washington, Bullitt Co., KY. June 26, 1983. Glen Fallo.

Lower specimen: 49 mm. Same as preceding.

Plate 8. Amblema plicata (Say, 1817), Threeridge.—Upper specimen: 86 mm. UTM 1932. Mississippi River, lock and dam no. 18, Henderson Co., IL. November 14, 1988.

Lower specimen: 114 mm. UTM 1984. Harpeth River, 1 mile E of Pegram, Davidson Co., TN. December 12, 1973.

Plate 9. Anodonta suborbiculata Say, 1831. Flat Floater.—Upper specimen: 117 mm. UTM 2137. Reelfoot Lake, Buzzard Slough, Obion Co., TN. August 1985. Paul Parmalee.

Lower specimen: 127 mm. UTM 2141. Marais de St. Friol Slough of Mississippi River, RM 635.2, Crawford Co., WI.

Plate 10. Anodontoides ferussacianus (Lea, 1834), Cylindrical Papershell.—Upper specimen: 65 mm. UTM 3356. Horicon Marsh, Dodge Co., WI. July 26, 1972. Harold Mathiak.

Lower specimen: 65 mm. UTM 3355. Rock River, Allentown, Washington Co., WI. August 1971. Harold Mathiak.

Plate 11. Arcidens confragosus (Say, 1829), Rock Pocketbook.—Upper specimen: 103 mm. UTM 3327. Mississippi River, 1 mile south of lock and dam 22, Ralls Co., MO. July 12, 1977.

Lower specimen: 118 mm. UTM 2214. Lake Springfield, Sangamon Co., IL. March 1977.

Plate 12. Cyclonaias tuberculata (Rafinesque, 1820), Purple Wartyback.—Upper specimen: 71 mm. UTM 2264. Tennessee River, approximately 5 miles downstream of Pickwick Dam, Hardin Co., TN. December 21, 1985. Paul Parmalee.

Lower specimen: 93 mm. UTM 2252. Duck River, Lillard Mill, Marshall Co., TN. April 12, 1985. Paul Parmalee.

Plate 13. Cyprogenia stegaria (Rafinesque, 1820), Fanshell.—Upper specimen: 57 mm. UTM 2268. Cumberland River, Rome, between RM 293 and 296, Smith Co., TN. June 8, 1980.

Lower specimen: 54 mm. UTM 2271. Licking River, Butler, Pendleton Co., KY. August 23, 1971.

Plate 14. Dromus dromas (Lea, 1834), Dromedary Pearlmussel.—Upper specimen: 66 mm. UTM 2311. Cumberland River, Celina, Clay Co., TN. November 14, 1930.

Lower specimen: 68 mm. UTM 2310. Clinch River, Frost Ford, Hancock Co., TN.

Plate 15. Ellipsaria lineolata (Rafinesque, 1820), Butterfly.—Upper specimen: 62 mm. UTM 1281. Green River, lock and dam no. 5, Butler/Warren cos., KY. August 9, 1983. Glen Fallo.

Lower specimen: 91 mm. UTM 1283. Mississippi River, 1 mile south of lock and dam no. 22, Ralls Co., MO. July 12, 1977.

Plate 16. Elliptio arca (Conrad, 1834), Alabama Spike.—Upper specimen: 49 mm. UTM 8969. Conasauga River, upstream of SR 74, Polk Co., TN. July 11, 1977.

Lower specimen: 61 mm. UTM 10876. Conasauga River, downstream of SR 74, Bradley Co., TN. October 11, 1988.

Plate 17. Elliptio arcata (Conrad, 1834), Delicate Spike.—Upper specimen: 77 mm. UTM 3359. Kinchafoonee Creek, Webster Co., GA. April 27, 1995. Gerald Dinkins, Paul Parmalee, and Mark Hughes.

Lower specimen: 76 mm. UTM 3360. Tombigbee River, Vienna Landing, Pickens Co., AL. July 25, 1977. Paul Parmalee.

Plate 18. Elliptio crassidens (Lamarck, 1819), Elephant-tear.—Upper specimen: 94 mm. UTM 2623. Tennessee River, 1 mile E of Faxon, Hardin Co., TN. August 24, 1984.

Lower specimen: 113 mm. Same as preceding.

Plate 19. Elliptio dilatata (Rafinesque, 1820), Spike.—Upper specimen: 109 mm. UTM 8205. Cumberland River, Rome, Smith Co., TN. July 12, 1978.

Lower specimen: 98 mm. UTM 10879. Cumberland River, Rome, Smith Co., TN. September 10, 1977.

Plate 20. Epioblasma arcaeformis (Lea, 1831), Sugar-spoon.—Upper specimen: Female, 43 mm. UTM 3880. Cumberland River, TN (specimen has barely legible writing that appears to indicate its origin was the Cumberland River, TN).

Lower specimen: Male, 47 mm. UTM 3894. Holston River, Austin Mills, Hawkins Co., TN. September 9, 1927.

Plate 21. Epioblasma biemarginata (Lea, 1857), Angled Riffleshell.—Upper specimen: Female, 36 mm. INHS 20271.4. Tennessee River, Florence, Lauderdale Co., AL.

Lower specimen: Male. Provenance and disposition unknown.

Plate 22. Epioblasma brevidens (Lea, 1831), Cumberlandian Combshell.—Upper specimen: Female, 54 mm. UTM 4111. Powell River, 1 mile upstream of Riverside, CR 2548, Claiborne Co., TN. March 1, 1975.

Lower specimen: Male, 53 mm. UTM 4110. Powell River, McDowell Ford, RM 107, Hancock Co., TN. June 24, 1980.

Plate 23. Epioblasma capsaeformis (Lea, 1834), Oyster Mussel.—Upper specimen: Female, 50 mm. UTM 9370. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. December 17, 1985.

Lower specimen: Male, 54 mm. UTM 4118. West Prong

Little Pigeon River, Sevierville, Sevier Co., TN. September 4, 1985.

Plate 24. Epioblasma flexuosa (Rafinesque, 1820), Leafshell.—Upper specimen: Provenance and disposition unknown.

Lower specimen: Provenance and disposition unknown.

Plate 25. Epioblasma florentina florentina (Lea, 1857), Yellow Blossom.—Upper specimen: Female, 51 mm. UMMZ 58249. Stones River at Walter, Rutherford Co., TN. 1933. William Clench and Henry van der Schalie.

Lower specimen: Male, 60 mm. Same as preceding.

Plate 26. Epioblasma florentina walkeri (Wilson and Clark, 1914), Tan Riffleshell.—Upper specimen: Female, 45 mm. UTMM 3874. Hiwassee River, RM 54, Polk Co., TN. August 5, 1992. Paul Parmalee and Mark Hughes.

Lower specimen: Male, 47 mm. UTMM 9593. Hiwassee River, RM 54, Polk Co., TN. August 15, 1992. Paul Parmalee and Mark Hughes.

Plate 27. Epioblasma haysiana (Lea, 1834), Acornshell.—Upper specimen: Female, 29 mm. UTMM 3887. Holston River, Austin Mills, Hawkins Co., TN.

Lower specimen: Male, 37 mm. UTMM 3884. Elk River, Franklin Co., TN. October 11, 1963.

Plate 28. Epioblasma lenior (Lea, 1842), Narrow Cat-spaw.—Upper specimen: Provenance and disposition unknown.

Lower specimen: Male, 41 mm. INHS 20298. North Fork Clinch River, TN.

Plate 29. Epioblasma lewisii (Walker, 1910), Forkshell.—Upper specimen: Provenance and disposition unknown.

Lower specimen: Provenance and disposition unknown.

Plate 30. Epioblasma metastrata (Conrad, 1838), Upland Combshell.—Upper specimen: Female, 32 mm. INHS 20296.4. Black Warrior River, AL.

Lower specimen: Male, 30 mm. INHS 20296.3. Black Warrior River, AL.

Plate 31. Epioblasma obliquata (Rafinesque, 1820), Catspaw.—Upper specimen: Female, 51 mm. UTMM 10863. Cumberland River, Rome, RM 296.8, Smith Co., TN. June 10, 1980. Steven Ahlstedt.

Lower specimen: Male, 65 mm. Same as preceding.

Plate 32. Epioblasma othcaloogensis (Lea, 1857), Southern Acornshell.—Upper specimen: Male, 30 mm. UMMZ 91452. Chattooga River, GA.

Lower specimen: Male, 32 mm. Same as preceding.

Plate 33. Epioblasma personata (Say, 1829), Round Combshell.—Upper specimen: Female, 45 mm. UTMM 3881. Alabama.

Lower specimen: Male, 44 mm. Same as preceding.

Plate 34. Epioblasma propinqua (Lea, 1857), Tennessee Riffleshell.—Upper specimen: Female, 52 mm. INHS 20306.12. Tennessee River, Florence, Lauderdale Co., AL.

Lower specimen: Male, 56 mm. INHS 20306.13. Same as preceding.

Plate 35. Epioblasma stewardsonii (Lea, 1852), Cumber-

land Leafshell.—Upper specimen: Female, 40 mm. UTMM 10761. Clinch River, Edywood, TN.

Lower specimen: Male, 42 mm. UTMM 3875. Holston River, Austin Mills, Hawkins Co., TN. September 9, 1927.

Plate 36. Epioblasma torulosa torulosa (Rafinesque, 1820), Tubercled Blossom.—Upper specimen: Female, 57 mm. UTMM 4191. Provenance unknown.

Lower specimen: Male, 61 mm. Same as preceding.

Plate 37. Epioblasma triquetra (Rafinesque, 1820), Snuff-box.—Upper specimen: Female, 41 mm. UTMM 10842. Clinch River, Kyles Ford, Hancock Co., TN. September 15, 1973.

Lower specimen: Male, 54 mm. UTMM 9737. Clinch River, Kyles Ford, Hancock Co., TN. October 21, 1973.

Plate 38. Epioblasma turgidula (Lea, 1858), Turgid Blossom.—Upper specimen: 46 mm. INHS 20295.10. Duck River, Columbia, Maury Co., TN.

Lower specimen: 38 mm. INHS 20295.9. Duck River, Columbia, Maury Co., TN.

Plate 39. Fusconaia barnesiana (Lea, 1838), Tennessee Pigtoe.—Upper specimen: 57 mm. UTMM 10796. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. March 14, 1987. Paul Parmalee.

Lower specimen: 69 mm. UTMM 10953. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. August 14, 1985. Paul Parmalee.

Plate 40. Fusconaia cor (Conrad, 1834), Shiny Pigtoe.—Upper specimen: 34 mm. UTMM 1404. Paint Rock River, 2 miles E of Trenton, Jackson Co., AL. August 18, 1976. Paul Parmalee.

Lower specimen: 69 mm. Same as preceding.

Plate 41. Fusconaia cuneolus (Lea, 1840), Finerayed Pigtoe.—Upper specimen: 59 mm. UTMM 12125. Clinch River, Frost Ford, Hancock Co., TN. September 29, 1974. Paul Parmalee.

Lower specimen: 63 mm. UTMM 12126. Clinch River, Kyles Ford, Hancock Co., TN. September 15, 1973. Paul Parmalee.

Plate 42. Fusconaia ebena (Lea, 1831), Ebonyshell.—Upper specimen: 73 mm. UTMM 1298. Cumberland River, near Hartsville, Trousdale Co., TN. November 19, 1982. Paul Parmalee.

Lower specimen: 75 mm. UTMM 1291. Tennessee River, Crump, Hardin Co., TN (commercial sheller cull pile). August 26, 1977.

Plate 43. Fusconaia flava (Rafinesque, 1820), Wabash Pigtoe.—Upper specimen: 71 mm. UTMM 1346. Cumberland River, Rome, Smith Co., TN. September 10, 1977.

Lower specimen: 65 mm. UTMM 3354. Harpeth River, near substation off I-40, Davidson Co., TN. May 18, 1974. E. Breitburg.

Plate 44. Fusconaia subrotunda (Lea, 1831), Longsolid.—Upper specimen: 62 mm. UTMM 1455. Cumberland River at Rome, Smith Co., TN. June 18, 1978.

Lower specimen: 80 mm. UTMM 1304. Powell River, McDowell Ford, RM 107, Hancock Co., TN. August 4, 1979.

Plate 45. Hemistena lata (Rafinesque, 1820), Cracking Pearlymussel.—Upper specimen: 78 mm. UTM 12127. Clinch River, RM 179.8, Hancock Co., TN. November 17, 1978.

Lower specimen: 71 mm. UTM 12128. Clinch River, Frost Ford, Hancock Co., TN. September 29, 1974.

Plate 46. Lampsilis abrupta (Say, 1831), Pink Mucket.—Upper specimen: Female, 94 mm. UTM 3352. Tennessee River, Kentucky Lake, KY. August 19, 1982. Clyde Brown.

Lower specimen: Male, 93 mm. UTM 0323. Cumberland River, Hartsville, Trousdale Co., TN. September 11, 1977.

Plate 47. Lampsilis altilis (Conrad, 1834), Finelined pocketbook.—Upper specimen: Female, 73 mm. UTM 1132. Conasauga River, SR 74, Bradley Co., TN. October 8, 1978.

Lower specimen: Male, 76 mm. UTM 12129. Conasauga River, SR 74, Bradley Co., TN. May 4, 1975.

Plate 48. Lampsilis cardium Rafinesque, 1820, Plain Pocketbook.—Upper specimen: Female, 102 mm. UTM 3347. Mississippi River, RM 633.2, Crawford Co., WI. September 9, 1986. James Theler.

Lower specimen: Male, 126 mm. UTM 3346. Muskingum River, Lowell, Washington Co., OH. September 9, 1973. Bob Winters.

Plate 49. Lampsilis fasciola Rafinesque, 1820, Wavyrayed Lampmussel.—Upper specimen: Female, 67 mm. UTM 12130. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. June 22, 1985. Paul Parmalee.

Lower specimen: Male, 75 mm. UTM 12131. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. December 17, 1985. Paul Parmalee.

Plate 50. Lampsilis ornata (Conrad, 1835), Southern Pocketbook.—Upper specimen: Male, 82 mm. UTM 12132. Conasauga River, SR 2, Murray Co., GA. October 4, 1978. Paul Parmalee.

Lower specimen: Male, 93 mm. UTM 12133. Conasauga River, SR 286, Murray Co., GA. October 8, 1978. Paul Parmalee.

Plate 51. Lampsilis ovata (Say, 1817), Pocketbook.—Upper specimen: Female, 93 mm. UTM 0305. Little River, U.S. Highway 411, Blount Co., TN. July 30, 1976.

Lower specimen: Male, 122 mm. UTM 0303. Tennessee River, Hardin Co., TN. August 1984. Ed Hunt.

Plate 52. Lampsilis siliquioidea (Barnes, 1823), Fatmucket.—Upper specimen: Female, 98 mm. UTM 0948. Wolf River, E of Moscow, Fayette Co., TN. October 31, 1994. Don Manning.

Lower specimen: Male, 100 mm. Same as preceding.

Plate 53. Lampsilis straminea claibornensis (Lea, 1838), Southern Fatmucket.—Upper specimen: Female, 82 mm. UTM 1136. Tombigbee River, Vienna Landing, Pickens Co., AL. July 25, 1977.

Lower specimen: Male, 95 mm. Same as preceding.

Plate 54. Lampsilis teres (Rafinesque, 1820), Yellow Sandshell.—Upper specimen: Female, 105 mm. UTM

0156. Tennessee River, below Pickwick Dam, Hardin Co., TN. August 24, 1984. Paul Parmalee and Ed Hunt.

Lower specimen: Male, 101 mm. Same as preceding.

Plate 55. Lampsilis virescens (Lea, 1858), Alabama Lampmussel.—Upper specimen: Female, 52 mm. UTM 4076. Hurricane Creek, CM 2.9, Jackson Co., AL. May 29, 1980.

Lower specimen: Male, 61 mm. UTM 4075. Paint Rock River, Jackson Co., AL.

Plate 56. Lasmigona complanata (Barnes, 1823), White Heelsplitter.—Upper specimen: 117 mm. UTM 3350. Cumberland River, Trousdale Co., TN (commercial sheller cull pile). November 19, 1982. Paul Parmalee.

Lower specimen: 135 mm. UTM 3351. Little Tennessee River (Tellico Reservoir), silo along northern end of Tellico Parkway, Loudon Co., TN. February 25, 1990. Paul Parmalee and Mark Hughes.

Plate 57. Lasmigona costata (Rafinesque, 1820), Fluted-shell.—Upper specimen: 85 mm. UTM 3358. Little South Fork Cumberland River, Freedom Church Ford, Wayne Co., KY. October 30, 1977. Arthur Bogan.

Lower specimen: 118 mm. UTM 0446. Clinch River, SR 23, 3 miles SW of Clinchport, Scott Co., VA. September 2, 1977.

Plate 58. Lasmigona holstonia (Lea, 1838), Tennessee Heelsplitter.—Upper specimen: 66 mm. UTM 0474. Pinhook Creek, SR 225, Murray Co., GA. March 22, 1988. Paul Parmalee.

Lower specimen: 72 mm. Same as preceding.

Plate 59. Lasmigona subviridis (Conrad, 1835), Green Floater.—Upper specimen: 42 mm. UTM 104159. Reed Creek, Wythe Co., VA. September 16, 1912. Arnold Ortmann.

Lower specimen: 49 mm. Same as preceding.

Plate 60. Lemiox rimosus (Rafinesque, 1831), Birdwing Pearlymussel.—Upper specimen: Female, 33 mm. UTM 0497. Duck River, Lillard Mill, RM 177.2, Marshall Co., TN. August 6, 1979. Steven Ahlstedt.

Lower specimen: Male, 44 mm. Same as preceding.

Plate 61. Leptodea fragilis (Rafinesque, 1820), Fragile Papershell.—Upper specimen: 124 mm. UTM 0520. Harpeth River, 1 mile S-SE of Pegram, Cheatham Co., TN. August 13, 1988. Paul Parmalee.

Lower specimen: 119 mm. UTM 0535. Muskingum River, Lowell, Washington Co., OH. June 28, 1975. Robert Winter.

Plate 62. Leptodea leptodon (Rafinesque, 1820), Scale-shell.—Upper specimen: 78 mm. UTM 1236. Meramec River, Missouri. Ronald Oesch.

Lower specimen: 67 mm. UTM 1237. Meramec River, above Times Beach, Franklin Co., Missouri. June 24, 1972. Ronald Oesch.

Plate 63. Lexingtonia dolabelloides (Lea, 1840), Slabside Pearlymussel.—Upper specimen: 65 mm. UTM 0554. Duck River, RM 174, Marshall Co., TN. July 6, 1979.

Lower specimen: 51 mm. UTM 5538. Provenance

unknown (specimen donated to UTMM from William Strode Collection).

Plate 64. Ligumia recta (Lamarck, 1819), Black Sandshell.—Upper specimen: Female, 115 mm. UTMM 0573. Tennessee River, Hardin Co., TN. August 24, 1984. Paul Parmalee.

Lower specimen: Male, 119 mm. UTMM 0591. Mississippi River, 1 mile S of lock and dam number 22, Ralls Co., MO. July 12, 1977.

Plate 65. Ligumia subrostrata (Say, 1831), Pondmussel.—Upper specimen: Female, 93 mm. UTMM 3353. Hatchie River drainage, TN. Don Manning.

Lower specimen: Male, 113 mm. Same as preceding.

Plate 66. Medionidus acutissimus (Lea, 1831), Alabama Moccasinshell.—Upper specimen: 47 mm. UTMM 0971. Conasauga River, 1.5 miles W of Tennga, Polk Co., TN. October 8, 1978. John Hurd.

Lower specimen: 43 mm. UTMM 0970. Conasauga River, SR 74, Bradley Co., TN. October 8, 1978. John Hurd.

Plate 67. Medionidus conradicus (Lea, 1834), Cumberland Moccasinshell.—Upper specimen: 53 mm. UTMM 0664. Clinch River, Kyles Ford, Hancock Co., TN. September 15, 1973. Paul Parmalee.

Lower specimen: 60 mm. UTMM 0666. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. December 6, 1986.

Plate 68. Medionidus parvulus (Lea, 1860), Coosa Moccasinshell.—Upper specimen: 48 mm. UTMM 0645. Conasauga River, SR 74, Bradley Co., TN. October 8, 1978. John Hurd.

Lower specimen: 51 mm. Same as preceding.

Plate 69. Megaloniais nervosa (Rafinesque, 1820), Washboard.—Upper specimen: 103 mm. UTMM 12134. Tennessee River, approximately 0.5 miles downstream of Pickwick Dam, RM 206.3, Hardin Co., TN. December 21, 1985.

Lower specimen: 112 mm. UTMM 12135. Tennessee River, RM 198.5, Hardin Co., TN. May 1, 1987. Paul Parmalee.

Plate 70. Obliquaria reflexa Rafinesque, 1820, Threehorn Wartyback.—Upper specimen: 52 mm. UTMM 0740. Little Tennessee River (Tellico Reservoir), approximately 1.6 miles S of Little Tennessee River bridge, Loudon Co., TN. February 25, 1990. Paul Parmalee and Mark Hughes.

Lower specimen: 53 mm. Same as preceding.

Plate 71. Obovaria jacksoniana (Frierson, 1912), Southern Hickorynut.—Upper specimen: Female, 33 mm. UTMM 3335. Provenance unknown.

Lower specimen: Male, 40 mm. UTMM 3335. Provenance unknown.

Plate 72. Obovaria olivaria (Rafinesque, 1820), Hickorynut.—Upper specimen: Female, 63 mm. UTMM 0212. Mississippi River, 1 mile S of lock and dam 22, Ralls Co., MO. July 12, 1977. Paul Parmalee.

Lower specimen: Male, 75 mm. UTMM 0220. Cumberland River, Rome, RM 296, Smith Co., TN. July 12, 1978.

Plate 73. Obovaria retusa (Lamarck, 1819), Ringpink.—

Upper specimen: Female, 50 mm. UTMM 3332. Ohio River, Falls of the Ohio, Louisville, KY. E.W. Payne.

Lower specimen: Female, 49 mm. UTMM 3333. Alabama.

Plate 74. Obovaria subrotunda (Rafinesque, 1820), Round Hickorynut.—Upper specimen: 44 mm. UTMM 0240. Duck River, RM 174, Marshall Co., TN. July 6, 1979.

Lower specimen: 58 mm. UTMM 3334. Embarrass River, 3 miles SE of Sainte Marie, Jasper Co., IL. August 21, 1955.

Plate 75. Pegias fabula (Lea, 1838), Littlewing Pearly-mussel.—Upper specimen: Female, 28 mm. UTMM 12136. Little South Fork Cumberland River, Freedom Church Road, Wayne Co., KY. October 30, 1977.

Lower specimen: Male, 28 mm. UTMM 12137. Little South Fork Cumberland River, Freedom Church Road, Wayne Co., KY. September 7, 1979.

Plate 76. Plectomerus dombeyanus (Valenciennes, 1827), Bankclimber.—Upper specimen: 102 mm. UTMM 0249. Hatchie River, E-SE of SR 51, Lauderdale Co., TN. August 25, 1984. Paul Parmalee and Don Manning.

Lower specimen: 109 mm. Same as preceding.

Plate 77. Plethobasus cicatricosus (Say, 1829), White Wartyback.—Upper specimen: 88 mm. UMMZ 81933. Cumberland River, Nashville, TN. Albert G. Wetherby.

Lower specimen: 79 mm. Same as preceding.

Plate 78. Plethobasus cooperianus (Lea, 1834), Orangefoot Pimpleback.—Upper specimen: 75 mm. UTMM 0288. Tennessee River, RM 198.5, Hardin Co., TN (commercial sheller cull pile). Spring 1987. Paul Parmalee.

Lower specimen: 83 mm. UTMM 12138. Tennessee River, RM 198.5, Hardin Co., TN (commercial sheller cull pile). December 26, 1992. Paul Parmalee.

Plate 79. Plethobasus cyphus (Rafinesque, 1820), Sheepnose.—Upper specimen: 77 mm. UTMM 0270. Clinch River, Kyles Ford, Hancock Co., TN. July 29, 1974.

Lower specimen: 89 mm. UTMM 0264. Cumberland River, Rome, Smith Co., TN. July 12, 1978.

Plate 80. Pleurobema chattanoogaense (Lea, 1858), Painted Clubshell.—Upper specimen: 62 mm. UTMM 9515. Conasauga River, Murray Co., GA. October 4, 1978.

Lower specimen: 62 mm. Same as preceding.

Plate 81. Pleurobema clava (Lamarck, 1819), Clubshell.—Upper specimen: 57 mm. UTMM 12139. Allegheny River, West Hickory, Forest Co., PA. July 6, 1973.

Lower specimen: 52 mm. UTMM 12140. Allegheny River, West Hickory, Forest Co., PA. August 14, 1974.

Plate 82. Pleurobema cordatum (Rafinesque, 1820), Ohio Pigtoe.—Upper specimen: 86 mm. UTMM 12141. Tennessee River, Crump, Hardin Co., TN (commercial sheller cull pile). August 26, 1977.

Lower specimen: 85 mm. UTMM 12142. Tennessee River, Crump, Hardin Co., TN (commercial sheller cull pile). August 24, 1984.

Plate 83. Pleurobema georgianum (Lea, 1841), Southern Pigtoe.—Upper specimen: 55 mm. UTMM 10963. Conasauga River, Mitchell Bridge, Whitfield/Murray cos., GA. November 12, 1978. John Hurd.

Lower specimen: 45 mm. UTM 0960. Conasauga River, SR 74, Bradley Co., TN. October 8, 1978. John Hurd.

Plate 84. Pleurobema gibberum (Lea, 1838), Cumberland Pigtoe.—Upper specimen: 46 mm. UTM 0957. Collins River, SR 56, 1 mile E of Mt. Olive, Grundy Co., TN. September 3, 1978. Arthur Bogan.

Lower specimen: 52 mm. Same as preceding.

Plate 85. Pleurobema hanleyianum (Lea, 1852), Georgia Pigtoe.—Upper specimen: 55 mm. UTM 7420. Conasauga River, SR 74, Bradley Co., TN. October 8, 1978. John Hurd.

Lower specimen: 49 mm. Same as preceding.

Plate 86. Pleurobema johannis (Lea, 1859), Alabama Pigtoe.—Upper specimen: 27 mm. INHS 24411.2. Cahaba River, AL.

Lower specimen: 24 mm. INHS 24411.1. Cahaba River, AL.

Plate 87. Pleurobema oviforme (Conrad, 1834), Tennessee Clubshell.—Upper specimen: 66 mm. UTM 0993. Tellico River, RM 25.4, Monroe Co., TN. November 26, 1983.

Lower specimen: 64 mm. UTM 0977. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. March 31, 1986.

Plate 88. Pleurobema perovatum (Conrad, 1834), Ovate Clubshell.—Upper specimen: 49 mm. UTM 3336. Chewacla Creek, 4 miles S-SW of Tuskegee, Macon Co., AL. June 18, 1995. Doug Shelton.

Lower specimen: 55 mm. Same as preceding.

Plate 89. Pleurobema plenum (Lea, 1840), Rough Pigtoe.—Upper specimen: 62 mm. UTM 1041. Cumberland River, Rome, Smith Co., TN. June 5, 1979.

Lower specimen: 55 mm. UTM 1043. Green River, Honakers Ferry, Butler Co., KY. August 20, 1971.

Plate 90. Pleurobema rubellum (Conrad, 1834), Warrior Pigtoe.—Upper specimen: Provenance and disposition unknown.

Lower specimen: Provenance and disposition unknown.

Plate 91. Pleurobema rubrum (Rafinesque, 1820) Pyramid Pigtoe.—Upper specimen: 66 mm. UTM 4443. Clinch River, Frost Ford, Hancock Co., TN. November 20, 1992. Mark Hughes.

Lower specimen: 64 mm. UTM 3337. Cumberland River, Rome, Smith Co., TN. September 10, 1977.

Plate 92. Pleurobema sintoxia (Rafinesque, 1820), Round Pigtoe.—Upper specimen: 92 mm. UTM 1039. Cumberland River, Trousdale Co., TN. November 19, 1982.

Lower specimen: 102 mm. UTM 1065. Big South Fork, RM 62, Scott Co., TN. September 1982. R. Hoffman.

Plate 93. Pleurobema troschelianum (Lea, 1852), Alabama Clubshell.—Upper specimen: 41 mm. UTM 0998. Conasauga River, SR 74, Bradley Co., TN. October 1, 1978.

Lower specimen: 46 mm. UTM 0961. Conasauga River, approximately 1.5 miles downriver of U.S. Highway 411, Polk Co., TN. October 8, 1983. Paul Parmalee.

Plate 94. Potamilus alatus (Say, 1817), Pink Heelsplitter.—Upper specimen: 165 mm. UTM 3330. Cumberland River, RM 141-142, Montgomery Co., TN. July 8, 1983.

Lower specimen: 140 mm. UTM 0765. Clinch River, Kyles Ford, Hancock Co., TN. July 29, 1974.

Plate 95. Potamilus ohiensis (Rafinesque, 1820), Pink Papershell.—Upper specimen: 134 mm. UTM 0764. Iowa River, near Hills, Johnson Co., IA. August 1983.

Lower specimen: 157 mm. Same as preceding.

Plate 96. Potamilus purpuratus (Lamarck, 1819), Bluefer.—Upper specimen: Female, 94 mm. UTM 0835. Hatchie River, E-SE of SR 51, Lauderdale Co., TN. August 25, 1984.

Lower specimen: Male, 132 mm. UTM 0836. Old St. Francis River, above mouth of Tyronza River, RM 81.5, Cross Co., AR. September 30, 1986. Steven Ahlstedt.

Plate 97. Ptychobranhus fasciolaris (Rafinesque, 1820), Kidneyshell.—Upper specimen: 120 mm. UTM 0890. Powell River, U.S. Highway 25E, Claiborne Co., TN. October 21, 1973.

Lower specimen: 102 mm. UTM 0933. Cumberland River, Trousdale Co., TN. November 19, 1982. Jake Petty.

Plate 98. Ptychobranhus greeni (Conrad, 1834), Triangular Kidneyshell.—Upper specimen: 66 mm. UTM 12143. Conasauga River, SR 2, Murray Co., GA. October 4, 1978. Paul Parmalee.

Lower specimen: 56 mm. UTM 12144. Conasauga River, SR 2, Murray Co., GA. October 8, 1978. David Stansbery.

Plate 99. Ptychobranhus subtentum (Say, 1825), Fluted Kidneyshell.—Upper specimen: 77 mm. UTM 0869. Clinch River, Frost Ford, Hancock Co., TN. October 1, 1992.

Lower specimen: 87 mm. UTM 3331. Middle Fork Holston River, 0.5 miles E of Seven Mile Ford, Smyth Co., VA. August 4, 1972.

Plate 100. Pyganodon grandis (Say, 1829), Giant Floater.—Upper specimen: 167 mm. UTM 3348. Watauga Reservoir, near Wagnor Island, Johnson Co., TN. February 4, 1984. Paul Parmalee.

Lower specimen: 129 mm. UTM 3349. Rhea Springs Hatchery, NE Knoxville, Knox Co., TN. January 16, 1974.

Plate 101. Quadrula apiculata (Say, 1829), Southern Mapleleaf.—Upper specimen: 87 mm. UTM 1543. Coosa River (Lay Reservoir), Shelby Co., AL. June 15, 1993. U.S. Shell Company, Hollywood, AL.

Lower specimen: 93 mm. UTM 3329. Tennessee River (Kentucky Reservoir), TN. 1991.

Plate 102. Quadrula cylindrica (Say, 1817), Rabbitsfoot.—Upper specimen: 95 mm. UTM 1644. Powell River, Buchanan Ford, RM 99, Claiborne Co., TN. April 30, 1976.

Lower specimen: 101 mm. UTM 1648. Tennessee River, RM 198.5, Hardin Co., TN. Spring 1987.

Plate 103. Quadrula fragosa (Conrad, 1835), Winged Mapleleaf.—Upper specimen: Provenance and disposition unknown.

Lower specimen: 87 mm. UMMZ 75809. Duck River, Columbia, Maury Co., TN. Albert G. Wetherby.

Plate 104. Quadrula intermedia (Conrad, 1836), Cumberland Monkeyface.—Upper specimen: Female, 72 mm. UTM

1640. Powell River, McDowell Ford, RM 107, Hancock Co., TN. June 24, 1980.

Lower specimen: Male, 60 mm. Same as preceding.

Plate 105. *Quadrula metanevra* (Rafinesque, 1820), *Monkeyface*.—Upper specimen: 72 mm. UTMM 3328. Tennessee River, Reynoldsburg Island, 6 miles S of New Johnsonville, Humphreys Co., TN. June 1983.

Lower specimen: 67 mm. UTMM 1538. Tennessee River, RM 191, Hardin Co., TN. November 8, 1980.

Plate 106. *Quadrula nodulata* (Rafinesque, 1820), *Wartyback*.—Upper specimen: 59 mm. UTMM 1518. Sangamon River, Sangamon Co., IL. November 29, 1975.

Lower specimen: 49 mm. UTMM 1499. Licking River, Butler, Pendleton Co., KY. August 23, 1971.

Plate 107. *Quadrula pustulosa* (Lea, 1831), *Pimpleback*.—Upper specimen: 68 mm. UTMM 1526. Cumberland River, Rome, Smith Co., TN. September 7, 1978.

Lower specimen: 57 mm. UTMM 1632. Tennessee River (Watts Bar Reservoir), Roane Co., TN. March 14, 1992. Paul Parmalee and Mark Hughes.

Plate 108. *Quadrula quadrula* (Rafinesque, 1820), *Mapleleaf*.—Upper specimen: 70 mm. UTMM 4509. Provenance unknown.

Lower specimen: 72 mm. UTMM 1531. Cumberland River, RM 141-142, Montgomery Co., TN. July 8, 1983.

Plate 109. *Quadrula sparsa* (Lea, 1841), *Appalachian Monkeyface*.—Upper specimen: 55 mm. UTMM 12145. Powell River, Fugate Ford, RM 100, Claiborne Co., TN. August 29, 1975.

Lower specimen: 64 mm. UTMM 1639. Powell River, Buchanan Ford, RM 99, Claiborne Co., TN. April 30, 1976.

Plate 110. *Simpsonia ambigua* (Say, 1825), *Salamander Mussel*.—Upper specimen: 46 mm. UTMM 3325. Provenance unknown.

Lower specimen: 46 mm. UTMM 3325. Provenance unknown.

Plate 111. *Strophitus connasaugaensis* (Lea, 1858), *Alabama Creekmussel*.—Upper specimen: 70 mm. UTMM 2729. Conasauga River, U.S. 411, Polk Co., TN.

Lower specimen: 85 mm. UTMM 2728. Conasauga River, SR 74, Bradley Co., TN. January 26, 1989. Paul Parmalee.

Plate 112. *Strophitus undulatus* (Say, 1817), *Creepers*.—Upper specimen: 79 mm. UTMM 2716. Licking River, Butler, Pendleton Co., KY. August 23, 1971.

Lower specimen: 81 mm (right valve), 79 mm (left valve). UTMM 2709. Rock River, Allenton, Washington Co., WI. August 9, 1971 (the two valves are from different individuals).

Plate 113. *Toxolasma cylindrellus* (Lea, 1868), *Pale Lilliput*.—Upper specimen: Male, 29 mm. UTMM 3386. Estill Fork Paint Rock River, Estill Fork, 18.1 miles NW of Scottsboro, Jackson Co., AL. September 28, 1976. David Stansbery and Kathy Borrer.

Lower specimen: Male, 30 mm. UTMM 4215. Paint Rock River, AL.

Plate 114. *Toxolasma lividus* Rafinesque, 1831, *Purple Lilliput*.—Upper specimen: Female, 36 mm. UTMM 12146.

West Prong Little Pigeon River, Sevierville, Sevier Co., TN. March 31, 1986.

Lower specimen: Male, 43 mm. UTMM 12147. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. February 1, 1986.

Plate 115. *Toxolasma parvus* (Barnes, 1823), *Lilliput*.—Upper specimen: Female, 34 mm. UTMM 2756. Lake Springfield, Sangamon Co., IL. March 1977. Walter Klippel.

Lower specimen: Male, 37 mm. Same as preceding.

Plate 116. *Toxolasma texasensis* (Lea, 1857), *Texas Lilliput*.—Upper specimen: Female, 52 mm. UTMM 3324. Tulot Seep Ditch No. 123, above bridge S of Anderson Tully (Stewart), Poinsett Co., AR. August 8, 1987. Steven Ahlstedt.

Lower specimen: Male, 48 mm. UTMM 2772. South Fork Ouachita River, SR 379, Montgomery Co., AR. June 6, 1980. John Harris.

Plate 117. *Tritogonia verrucosa* (Rafinesque, 1820), *Pistolgrip*.—Upper specimen: Male, 111 mm. UTMM 2826. Paint Rock River, 1.2 miles N of Princeton, Jackson Co., AL. August 18, 1976.

Lower specimen: Female, 127 mm. UTMM 3326. Little South Fork Cumberland River, Freedom Ford, Wayne Co., KY. October 30, 1977.

Plate 118. *Truncilla donaciformis* (Lea, 1828), *Fawnsfoot*.—Upper specimen: 37 mm. UTMM 2885. Licking River, Butler, Pendleton Co., KY. August 23, 1971.

Lower specimen: 43 mm. UTMM 2888. Iowa River, Hills, Johnson Co., IA. August 1983.

Plate 119. *Truncilla truncata* (Rafinesque, 1820), *Deer-toe*.—Upper specimen: 54 mm. UTMM 2891. Sangamon River, approximately 2 miles E of Salisbury, Sangamon Co., IL. November 29, 1975.

Lower specimen: 52 mm. UTMM 2884. Licking River, 328 feet upstream of mouth of Steer Creek, Pendleton Co., KY. July 21, 1984. Glen Fallo.

Plate 120. *Unio merus declivis* (Say, 1831), *Tapered Pondhorn*.—Upper specimen: 70 mm. UTMM 2954. Bear Creek, Hatchie National Wildlife Refuge, S of Brownsville, Haywood Co., TN. August 27, 1983. Don Manning.

Lower specimen: 86 mm. Same as preceding.

Plate 121. *Unio merus tetralasmus* (Say, 1831), *Pondhorn*.—Upper specimen: 81 mm. UTMM 2956. South Fork Forked Deer River, S of Bells, Haywood Co., TN. November 9, 1982. Don Manning.

Lower specimen: 80 mm. UTMM 2952. Creek on Crestview Golf Course, Wichita, Sedgwick Co., KS. July 28, 1983. Kent Vickery.

Plate 122. *Utterbackia imbecillis* (Say, 1829), *Paper Pondshell*.—Upper specimen: 78 mm. UTMM 4187. Provenance unknown.

Lower specimen: 71 mm. UTMM 3357. Buffalo River, 0.25 miles E of Beardstown, Perry Co., TN. December 12, 1973. Paul Parmalee.

Plate 123. *Villosa fabalis* (Lea, 1831), *Rayed Bean*.—Upper specimen: Female, 30 mm. UTMM 3015. French Creek, Utica, Venango Co., PA. June 1, 1986.

Lower specimen: Male, 38 mm. UTMM 3125. French Creek, Saegertown, Crawford Co., PA. August 22, 1970. Walter Klippel.

Plate 124. Villosa iris (Lea, 1829), Rainbow.—Upper specimen: Female, 63 mm. UTMM 3027. East Fork Stones River, 0.5 miles N of Sharpsville, Rutherford Co., TN. September 7, 1978. Arthur Bogan and Paul Parmalee.

Lower specimen: Male, 76 mm. UTMM 3086. North Fork Holston River, 1 mile upstream of SR 23, Scott Co., VA. August 25, 1977.

Plate 125. Villosa lienosa (Conrad, 1834), Little Spectacle-case.—Upper specimen: Female, 60 mm. UTMM 12148. Ouachita River, McGuire Access, SR 88, Polk Co., AR. September 12, 1978. Wayne Starnes.

Lower specimen: Male, 70 mm. UTMM 12149. Ouachita River, McGuire Access, SR 88, Polk Co., AR. September 11, 1978. Wayne Starnes.

Plate 126. Villosa perpurpurea (Lea, 1861), Purple Bean.—Upper specimen: Female, 37 mm. UTMM 3041. Copper Creek, CM 4.0, Scott Co., VA. October 19, 1979.

Lower specimen: Male, 42 mm. Same as preceding.

Plate 127. Villosa taeniata (Conrad, 1834), Painted Creekshell.—Upper specimen: Female, 66 mm. UTMM 3064. Little Jack Creek, 4 miles NE of Fairview, Fentress Co., TN. May 7, 1980. David Etnier and Bruce Bauer.

Lower specimen: Male, 72 mm. UTMM 3042. Duck River, 2 miles E of Fairview, Coffee Co., TN. October 24, 1973. Paul Parmalee.

Plate 128. Villosa trabalis (Conrad, 1834), Cumberland Bean.—Upper specimen: Male, 50 mm. UTMM 12150. Rockcastle River, Rockcastle Co., KY. June 1975.

Lower specimen: Female, 49 mm. UTMM 3018. Rockcastle River, SR 80, Rockcastle Co., KY. August 4, 1970.

Plate 129. Villosa vanuxemensis (Lea, 1838), Mountain Creekshell.—Upper specimen: Female, 64 mm. UTMM 3246. West Prong Little Pigeon River, Sevierville, Sevier Co., TN. January 1, 1986.

Lower specimen: Male, 69 mm. UTMM 3244. Little Pigeon River, SR 66, Sevierville, Sevier Co., TN. March 14, 1987. Paul Parmalee.

Plate 130. Villosa vibex (Conrad, 1834), Southern Rainbow.—Upper specimen: Female, 70 mm. UTMM 3323. Provenance unknown.

Lower specimen: Male, 66 mm. Same as preceding.

Plate 131. Corbicula fluminea (Muller, 1774), Asian Clam.—Upper specimen: 50 mm. UTMM 5566. Tennessee River (Fort Loudoun Reservoir), TN.

Middle right specimen: 35 mm. Same as preceding.

Middle left specimen: 34 mm. Same as preceding.

Lower specimen: 43 mm. Same as preceding.

Plate 132A. Dreissena polymorpha (Pallas, 1771), Zebra Mussel.—(clockwise from top, in mm) 18, 15, 15, 16, 17, 17, 15, 15, 16, 17, 16. UTMM 5567. Provenance unknown.

Plate 132B. Dreissena polymorpha (Pallas, 1771), Zebra Mussel.—UTMM 5568. Provenance unknown. Attached to *Leptodea fragilis* specimen approximately 87 mm in length.

Plate 133. Mytilopsis leucophaeata (Conrad, 1831), Dark Falsemussel.—(mm) 23, 22, and 19. UTMM 5569. Provenance unknown (only four of the 12 figured specimens could be located in the UTMM collection).

ACKNOWLEDGMENTS

This paper would not have been possible without the help and encouragement of Art Bogan. Numerous people assisted in the search for book plate specimens including Daniel Schilling, Liz Lovett, Barbara Dinkins, Bob Butler, John Harris, and Todd Amacker. Kristin Irwin helped segregate the figured specimens in the UTMM collection and resolved numerous catalogue issues. Several curators and collection managers graciously allowed me or others access to their mollusk collections in search of missing book plates: Gary Rosenberg and Paul Callomon (ANSP), Tim Pearce (CM), Tom Watters (OSUM), Taehwan Lee (UMMZ), and Kevin Cummings (INHS). Bob Butler, Art Bogan, Dave Berg, and two anonymous reviewers provided comments on earlier versions of this manuscript and improved it greatly.

LITERATURE CITED

- Clayton, J. L., B. Douglas, and P. Morrison. 2018. West Virginia Mussel Survey Protocols, March 2018. Available at: <http://www.wvdnr.gov/Mussels/2018 WV Mussel Survey Protocols.pdf> (accessed May 22, 2019).
- Keogh, S. M., and A. M. Simons. 2019. Molecules and morphology reveal 'new' widespread North American freshwater mussel species (Bivalvia: Unionidae). *Molecular Phylogenetics and Evolution* 138:182–192.
- Ohio Department of Natural Resources and U.S. Fish and Wildlife Service. 2018. Ohio Mussel Survey Protocol, April 2018. Available at: <https://wildlife.ohiodnr.gov/portals/wildlife/pdfs/licenses & permits/OH Mussel Survey Protocol.pdf> (accessed May 22, 2019).
- Ortmann, A. E. 1920. Correlation of shape and station in fresh-water mussels (Naiades). *Proceedings of the American Philosophical Society* 59:268–312.
- Parmalee, P. W., and A. E. Bogan. 1998. *The Freshwater Mussels of Tennessee*. The University of Tennessee Press, Knoxville. 328 pp.
- Sabaj, M. H. 2016. Standard symbolic codes for institutional resource collections in herpetology and ichthyology: An Online Reference. Version 6.5 (August 16, 2016). Available at: https://asih.org/sites/default/files/documents/symbolic_codes_for_collections_v6.5_2016.pdf (accessed August 7, 2019).
- Smith, C. H., N. A. Johnson, J. M. Pfeiffer, and M. M. Gangloff. 2018. Molecular and morphological data reveal non-monophyly and speciation in imperiled freshwater mussels (*Anodontoides* and *Strophitus*). *Molecular Phylogenetics and Evolution* 119:50–62.
- Watters, G. T., M. A. Hoggarth, and D. H. Stansbery. 2009. *The Freshwater Mussels of Ohio*. The Ohio State University Press, Columbus. xii + 421 pp.
- Williams, J. D., A. E. Bogan, R. S. Butler, K. S. Cummings, J. T. Garner, J. L. Harris, N. A. Johnson, and G. T. Watters. 2017. A revised list of the freshwater mussels (Mollusca: Bivalvia: Unionida) of the United States and Canada. *Freshwater Mollusk Biology and Conservation* 20:33–58.
- Williams, J. D., A. E. Bogan, and J. T. Garner. 2008. *Freshwater Mussels of Alabama and the Mobile Basin in Georgia, Mississippi, and Tennessee*. University of Alabama Press, Tuscaloosa. xv + 908 pp.
- Williams, J. D., R. S. Butler, G. L. Warren, and N. A. Johnson. 2014. *Freshwater Mussels of Florida*. The University of Alabama Press, Tuscaloosa. 498 pp.