Quadrula stapes

Stansbery
1981

THE STATUS OF *QUADRULA STAPES* (LEA, 1831) (MOLLUSCA:BIVALVIA:UNIONOIDA).

by

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for

Office of Endangered Species
Fish and Wildlife Service
U.S. Department of the Interior
Jackson, Mississippi Office

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QUADRULA STAPES (LEA, 1831).

Synonymy

Unio stapes Lea, 1831.
Original Description: Observations on the naiades, and descriptions of new species of that and other families. Trans. Amer. Philos. Soc. 4, Article 5: 77-78, pl. 7, fig. 8.
Type Locality: "Alabama river [sic], Judge [Charles] Tait." (Lea, 1831: 77)
Type Material: "Figured holotype USNM 84212." (Johnson, 1974: 136).
Etymology: Lea (1831: 78), in his remarks on this species, writes "The truncature behind is almost as abrupt as that of any *Donox*. This truncature gives the shell the form of a stirrip,. . ." Latin *stapes*, a stirrup (Webster, 1973: 1773).

Unio retusa (Rafinesque, 1820) per errorum (Say, 1834: no pagination).*

Margarita (Unio) stapes (Lea, 1831). (Lea, 1836:15).

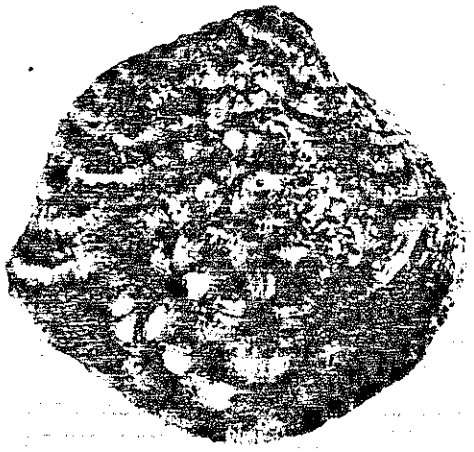
Margaron (Unio) stapes (Lea, 1831). (Lea, 1852:22).

Quadrula stapes (Lea, 1831). (Simpson, 1900:775). **

Orthonymus stapes (Lea, 1831). (Haas, 1969:310).

* Say (1834) lists "*stapes* ? Lea. (var.)" as a possible synonym or variety of *Obliquaria (Unio) retusa* Rafinesque, 1820. This latter name refers, however, to a species restricted to the Ohio River system where *Q. stapes* has never been found. See Rafinesque (1820: 306) and Say (1834, American Conchology Number 6: An attempt to exhibit a synonymy of the western North American species of the genera Unio and Alasmodonta).

** Simpson (1900: 775; 1914: 839) lists *Unio stegaria* (Rafinesque, 1820) as used by Kuester (1861: 211, pl. 70, fig. 3) as a synonym of *Q. stapes*. An examination of Kuester's description and the accompanying figure prove it to be *Cyprogenia stegaria* (Rafinesque, 1820) and not the error suspected by Simpson. *Unio stapes* is not listed or figured by Kuester.

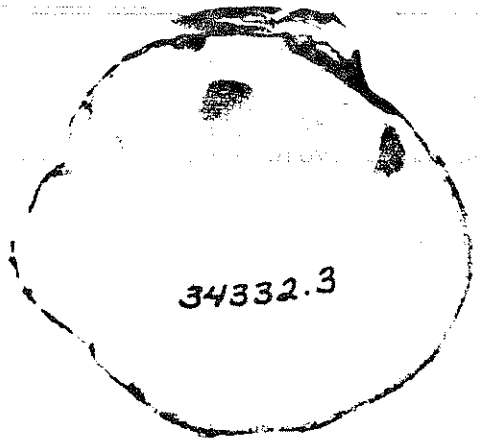


Quadrula stapes
(Lea, 1831).

OSUM 34332.3

Tombigbee River about
2 mi. N of Gainesville,
Sumter Co., Alabama.
24 June 1972.

Length = 40 mm
Height = 35 mm
Width = 21 mm



Taxonomic Status

The nearest relatives of *Quadrula stapes* are those species presently grouped under the subgenus *Orthonymus* Agassiz, 1852. Included are *Q. cylindricus* (Say, 1817), *Q. metanevrus* (Rafinesque, 1820), *Q. sparsa* (Lea, 1841), *Q. intermedia* (Conrad, 1836) and *Q. tuberosa* (Lea, 1840) in addition to *Q. stapes* (Lea, 1831). Within this group *Q. stapes* appears to be most similar to *Q. sparsa* and should, perhaps be placed near *Q. metanevra* or *Q. sparsa* in the list above. This speculation is based upon the similarities of shell characteristics, however, and a careful study of the anatomy of the soft parts of these animals may reveal different affinities. It appears, however, not to have any closely related species and, with the very early exception (Say, 1834) noted in the synonymy above, it has not been considered a synonym nor a subspecies of another species nor has it ever been considered to consist of two or more distinct taxa combined under one name. Its status as a distinct species appears to be without question.

Nomenclatorial Status

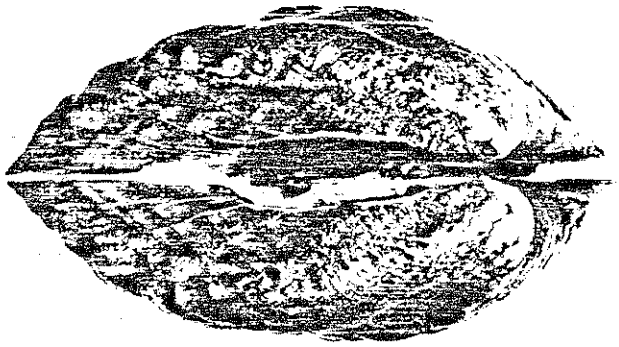
Unio stapes has been listed at one time or another in five different genera. This reflects the efforts of early systematists to make an acceptable classification out of the chaos that was the genus *Unio* until Simpson's *Synopsis of the Naiades. . .* (1900). The only exception to the above generalization is the use of *Orthonymus* in the generic sense. This is the result of the fact that several natural groups of species exist within the genus *Quadrula* as currently used. Whether or not *Orthonymus* should continue as a subgenus or be raised to generic rank is a question yet to be decided in the opinion of most students of this complex.

Obliquaria (Unio) retusa Rafinesque, 1820, was thought by Say (1834) to possibly be a senior synonym of *Unio stapes* Lea, 1831, or that the two names represented varieties of the same species. A careful study of the original description of *Obliquaria retusa* Rafinesque, 1820, reveals it to be a variant of *Obliquaria flava* Rafinesque, 1820, known today as *Fusconaia flava* (Rafinesque, 1820). These two species *(flava* and *stapes)* occupy two distinct drainage systems (Mississippi and Mobile Rivers) and are placed in two different genera. It is highly unlikely that these two species will ever be placed in the same genus much less share positions within the same species.

The nomenclatorial status of *Quadrula stapes* (Lea, 1831) seems firm for the present even though additional study may change its present subgeneric grouping to the generic standing proposed by Haas (1969: 310).

Diagnostic Characteristics

Quadrula stapes differs from all other taxa in the subgenus *Orthonymus* by the presence of a very sharp posterior ridge subtending a very

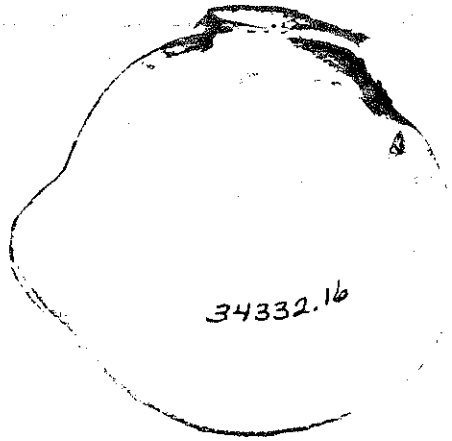


Quadrula stapes
(Lea, 1831).

OSUM 34332.16

Tombigbee River about
2 mi. N of Gainesville,
Sumter Co., Alabama.
24 June 1972.

Length = 55 mm
Height = 49 mm
Width = 29 mm



narrow posterior slope. The posterior slope extends from the umbo post-ventrally to the posterior extremity of the shell, is usually coarsely costate and sulcate in a furrow-like manner. When placed in standard position (with the greatest length horizontal) the umbo varies in location from distinctly to scarcely anterior to central. The outline of the shell, broadly rounded anteriorly and ventrally with a narrowly rounded point posteriorly, could be described as either quadrate or triangulate. No other species of *Quadrula* is so sharply ridged and narrowly truncated posteriorly as is *Q. stapes*.

Former Distribution

This species was first described from the Alabama River by Judge Charles Tait of Claiborne, Monroe County, Alabama (Lea, 1831: 77). It was later sent out from the Tombigbee River at Columbus, Lowndes County, Mississippi, by Dr. William Spillman (USNM, OSUM). All later records appear to be from one or the other of these two rivers with a few additional collections from the lowermost parts of their tributaries.

The species has never been found outside the Mobile River system of Mississippi and Alabama. Even within this system it has not been generally distributed, in historic times at least, if museum and literature records give an accurate picture.

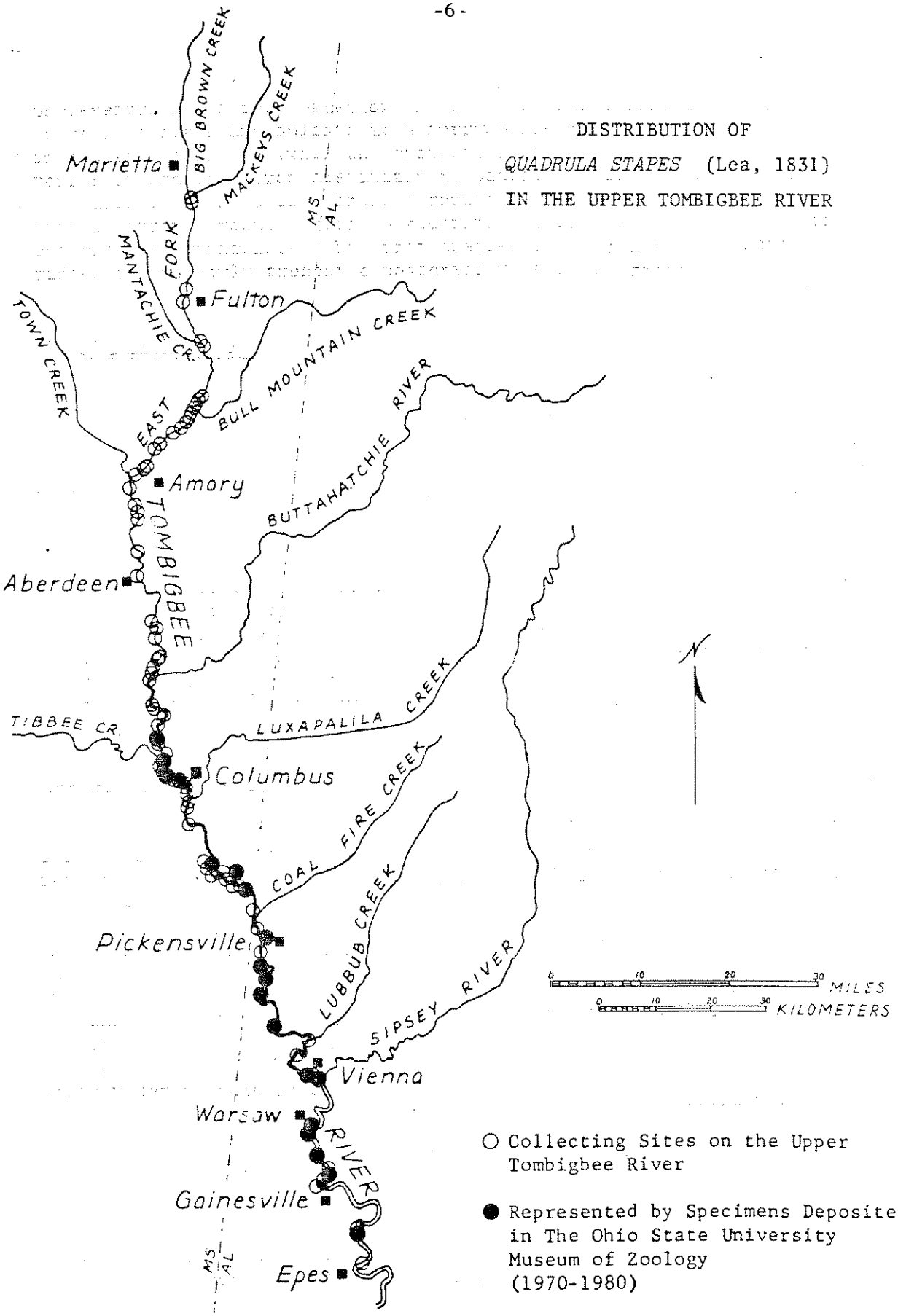
Simpson (1914: 838) also gives the distribution as "Alabama and Tombigbee rivers." Burch (1975: 10) repeats the quote from Simpson (1914) above indicating that in three-quarters of a century our concept of the geographic range of this species has not been modified.

Present Distribution

In more recent times (1970-1980) we have had the opportunity to collect the upper Tombigbee River with some thoroughness. This has resulted in the collection of 26 lots from 17 different sites from just above Epes, Sumpter County, Alabama, upstream to the vicinity of the mouth of Tibbee Creek, 6.4 miles northwest of Columbus, Lowndes County, Mississippi. This may represent the historic and recent geographic range of this species in the upper Tombigbee River. Yokley (1978) surveyed the Buttahatchie River, one of the tributaries of the Tombigbee and did not report any evidence of *Q. stapes* in that stream. The lower Tombigbee River is impounded and it seems doubtful that few, if any individuals of this riffle-run (shoal) species have survived in the slack water of this impoundment.

Although first described from the Alabama River, records of living specimens or fresh shells from this stream have been lacking for several decades. Hurd (1974) searched the literature and most major museums for unionid records from the Coosa River and found none for *Q. stapes*. It appears from present evidence that this species may well have been restricted to the lowermost part of the Alabama River and that it may be entirely extirpated from this part of its former range today. A comprehensive survey of the historic and recent distribution of naiades in the Alabama River system (museum records and especially comprehensive field collecting) is badly needed today.

DISTRIBUTION OF
QUADRULA STAPES (Lea, 1831)
IN THE UPPER TOMBIGBEE RIVER



○ Collecting Sites on the Upper Tombigbee River

● Represented by Specimens Deposited in The Ohio State University Museum of Zoology (1970-1980)

There remains the possibility that self-sustaining populations of this rare species may yet survive in the riffle-run habitats of the lower reaches of the larger tributaries of the Tombigbee River or in similar suitable habitats elsewhere in the Mobile River system. It is likely, however, that specimens of this species found in streams smaller than the Tombigbee River at the mouth of Tibbee Creek are due to larger populations downstream or in the main stem and are not self-sustaining. It should be noted that the reverse is true of headwater species. The presence of a few living specimens of a species in any habitat should not be interpreted as a revealing of the presence of a self-sustaining population.

The transformation of most of the Tombigbee River into a barge canal may well reduce the available habitat of this species to a level at which it will become extinct. This possibility should be carefully considered before this project is allowed to destroy all or nearly all of the remaining habitat of this rare species.

Habitat

The Stirrup Shell has been most commonly found in the riffles and runs of rather large rivers. The species has been recorded within historic times from only two large rivers: the Tombigbee and the Alabama. These habitats are associated with moderate to strong current over a relatively stable substrate of sand, gravel and cobble. This type of habitat is characteristic of most other species of the subgenus *Orthonymus* in other drainage systems. Habitat requirements would include: 1) moderate to strong current, 2) stable substrate of coarse sediments, 3) sufficient amounts of the necessary life-materials in solution or suspension in the river water, 4) lack of excessive amounts of toxic materials and 5) the presence of the host species of fish in adequate numbers at the right place at breeding time.

Potential Threats

Any quantitative or qualitative changes in the factors listed above which go beyond the range of tolerance of the species might result in its extirpation or, if relatively widespread in the range, in its extinction. The transformation of the free flowing Tombigbee River into a barge canal would be expected to:

1) replace many riffle-runs with pools.

2) replace many coarse sand-gravel-cobble substrates with fine sand and silt.

3) change the water chemistry.

4) change the nutrient characteristics of the suspended sediments.

5) change the seasonal movements of the host fish involved.

6) reduce or replace or otherwise alter in general and to a large extent the factors required for the survival or this species.

Recommendation For Preservation In Nature

In our present state of generalized knowledge concerning unionid mollusks and our extensive ignorance of details about most species, the best way to insure the continued existence of any of these species is to preserve 1) its habitat and 2) its genetic diversity. If any one survival factor of the habitat is breached throughout the range of a species it will become extinct. If the genetic diversity of a population is reduced to the homogeneity of or even approaching a clonal culture, eventual extinction is all but assured.

Research efforts having the greatest promise to yield information effective in unionid preservation include those usually listed as 1) range of tolerance to environmental factors and 2) life history studies. The only reasonable course in the interim is habitat preservation as best we can determine the habitat.

Acknowledgements

Studies of this type are seldom accomplished by a single individual. This is emphatically true in the case of these status reports. Assisting the author on this paper were:

Field Collections	Dr. James D. Williams, Mr. Randall Grace and associates and others
Construction of Map and Tables	Ms. Kathy G. Borror
Photography	Mr. August Spreitzer
Proof-reading Manuscript and Final Typing	Ms. Kathy Newman

All specimens were carefully cleaned before being catalogued. This task, uninspiring to many, was accomplished by our student assistants who became first amazed and then fascinated by the seemingly endless variability exhibited within a single collection of unionid mollusks.

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SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records

SPECIES Quadrula stapes (Lea, 1831).

Drainage System	Locality			Collector	Catalog No.	Recorded as	Author
	State	County	Specific	Coll. Date	Coll. No.	Specimens	Year: Page
Mobile River	Alabama	Pickens	Tombigbee River at large island about 2.8 mi. SSW of Pickensville, [9.3 mi.WNW of Aliceville], NW 1/4 Sec. 35, T21S,R17W	J.D. Williams, R.Grace 19 Aug. 1974	36216 OSUM:1974:204	2 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 4 mi. S of Pickensville, 8 mi. WNW of Aliceville, Sec. 2, T 22 S, R 17 W	J.D. Williams, et al. 28 July 1972	34406 OSUM:1972:297	2 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 0.5 mi. E of Memphis, 8 mi. W of Aliceville, Sec. 14, T 22 S, R 17 W	J.D. Williams, et al. 28 July 1972	34558 OSUM:1972:315	3 w; 4 1/2 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 1 mi. above mouth of Sipsey River, just below Vienna, 8.3 mi. SSW of Aliceville, Sec. 34, T24N, R2W	J.D. Williams, et al. 7 June 1972	36279 OSUM:1972:94	4 1/2 sf.	
Mobile River	Alabama	Pickens	Tombigbee River about 1 mi. below (SE of) landing at Vienna, [8.7 mi. S of Aliceville],	J.D. Williams, et al. 25 May 1977	40957 OSUM:1977:191	1 1/2 wd.	
Mobile River	Alabama	Sumter	Tombigbee River about 0.2 mi. above Warsaw, about 7.8 mi. NNW of Gainesville, Sec.28, T 23 N, R 2 W	J.D. Williams, et al. 21 Aug. 1974	35876 OSUM:1974:203	1 d.	
Mobile River	Alabama	Sumter	Tombigbee River at island about 0.2 mi. above Warsaw, 7.8 mi. NNW of Gainesville, Sec. 28, T 23 N, R 2 W	J.D. Williams, et al. 8 June 1972	36728 OSUM:1972:97	1 sf.	
Mobile River	Alabama	Sumter	Tombigbee River 0.2 mi. below Warsaw, 7.6 mi. NNW of Gainesville, Sec. 33, T 23 N, R 2 W	J.D. Williams, et al. 8 June 1972	36377 OSUM:1972:96	2 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 5 mi. NNW of Gainesville, Sec. 15, T 22 N, R 2 W	J.D. Williams, et al. 21 Aug. 1974	35858 OSUM:1974:206	1 d.	
Mobile River	Alabama	Sumter/Greene	Tombigbee River about 5 mi. N of Gainesville, Sec. 15, T 22 N, R 2 W	J.D. Williams, et al. 8 June 1972	36354 OSUM:1972:95	1 1/2 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 2 mi. N of Gainesville, T 22 N, R 2 W	J.D. Williams, et al. 14 Sept. 1973	34948 OSUM:1973:323	2 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 2 mi. N of Gainesville, about 11.5 mi. N of Epes, Sec. 25, T 22 N, R 2 W	D.H. Stansbery, et al. 24 June 1972	34332 OSUM:1972:112	1 w; 18 d.	

Researched by David H. Stansbery Date 14 Aug. 1980

SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records

SPECIES Quadrula stapes (Lea, 1831).

Drainage System	Locality			Collector / Coll. Date	Catalog No. / Coll. No.	Recorded as Specimens	Author Year: Page
	State	County	Specific				
Mobile River	Mississippi	Lowndes	Tombigbee River about 0.5 mi. below Ms.Rt. 50 bridge, 6.4 mi.NW of Columbus, 13.8 mi. NE of Artesia, Sec 23, T 17 S, R 19 W	D.H. Stansbery, et al. 29 May 1972	36298 OSUM:1972:101	1/2 sf.	
Mobile River	Mississippi	Lowndes	Tombigbee River at island below mouth of Tibbee Cr., 4.4 mi. NW of Columbus, 11.7 mi NE of Artesia, Sec. 11, T 19 N, R 17 E	J.D. Williams, et al. 15 April 1972	28597 OSUM:1972:37	1 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River at island below mouth of Tibbee Cr., 4.4 mi. W of Columbus, 11.7 mi. NE of Artesia, Sec. 11, T 19 N, R 17 E	J.D. Williams, et al. 11 Nov. 1971	27391 OSUM:1971:257	4 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River at island below mouth of Tibbee Cr., 4.4 mi. W of Columbus, 11.7 mi. NE of Artesia, Sec. 11, T 19 N, R 17 E,	D.H. Stansbery, et al. 29 May 1972	37884 OSUM:1972:100	5 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River, E bank above mouth of Oak Slush Cr., 3.1 mi. W of Columbus, 3.2 mi. SW of Flynn, Sec. 13, T 19 N, R 19 W	J.D. Williams, et al. 11 Nov. 1971	27344 OSUM:1971:256	1 1/2 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 50 yds. below U.S. Rt.82 bypass bridge, 2.3 mi. W of Columbus, 11.8 mi. NE of Artesia, Sec. 30, T19N, R18E	J.D. Williams, et al. 2 Nov. 1971	27274 OSUM:1971:244	14 2/2 d.	
Mobile River	Mississippi	Lowndes	"Tombigbee River., Columbus, Miss."	Dr. Spillman [18—]	26382	2 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River about 9.5 mi. S of Columbus, 14 mi. ENE of Crawford, Sec. 11, T 17 N, R 18 E	P. Mundy, T. Jandebeur July 1972	34723 OSUM:1972:335	8 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River at Southern Natural Gas Line Crossing, 1.5 mi. below Nashville Ferry 14 mi. SSE of Columbus, Sec.28,T17N, R19E	P. Mundy, T. Jandebeur July 1972	33808 OSUM:1972:298	1 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 1.5 mi. below Nashville Ferry, 2.0 mi. S of Forreston, 14.1 mi. SE of Columbus, Sec. 28, T 17 N, R 19 E	J.D. Williams, et al. 4 June 1972	36509 OSUM:1972:88	1 d.	
Mobile River	Alabama	Pickens	Tombigbee River at Pickensville, 300 yds. above boat landing, about 10 mi. NW of Aliceville, Sec. 14, T 21 S, R 3 W	D.H. Stansbery, et al. 23 June 1972	32962 OSUM:1972:110	10 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 300 yds.above Pickensville boat landing, about 10 mi.NW of Aliceville, Sec. 14, T 21 S, R 17 W	J.D. Williams, et al. 20 Aug. 1974	41318 OSUM:1974:202	1/2 d; 1 wd.	

Researched by David H. Stansbery Date 14 Aug. 1980

SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records

SPECIES Quadrula stapes (Lea, 1831).

Drainage System	Locality: State	Locality: County	Locality: Specific	Collector / Coll. Date	Catalog No. / Coll. No.	Recorded as: Specimens	Author / Year: Page
Mobile River	Alabama	Sumter	Tombigbee River 1.5 mi. above I-59 bridge, [4.5 mi. NNE of Epes], Sec. 32, T 21 N, R 1 W	J.D. Williams, et al. 26 July 1975	38335 OSUM:1975:151	1/2 sf.	
Mobile River	Mississippi	Lowndes	unnamed creek 50-75 yds. above mouth, 6.0 mi. ESE of Trinity, 12.0 mi. SSE of Columbus, Sec. 18, T 20 S, R 17 W	J.D. Williams, et al. 16 Nov. 1971	27358 OSUM:1971:255	2 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 300 yards above Pickensville boat landing, about 10 mi. NW of Aliceville, Sec. 14, T21S, R3W	J.D. Williams, et al. 4 June 1972	48548 OSUM:1972:89	2 d; 2 wd.	
Mobile River	Alabama	Pickens	Tombigbee River about 1.3 mi. above mouth of Bogue Chitto Creek, 6.7 mi. WSW of Aliceville, Sec. 1, T 24 N, R 3 W	J.D. Williams, et al. 6 June 1972	48307 OSUM:1972:91	5 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 2 mi. N of Gainesville, 6.5 mi. SSE of Warsaw, Sec. 26, T 22 N, R 2 W	J.D. Williams, et al. 26 Oct. 1973	48331 OSUM:1973:324	3 d.	
Mobile River	Alabama		"Alabama R., Ala." L= 43 H= 39 W= 23	"Tait" 18—	USNM 84218	HOLOTYPE 1 d.	
Mobile River	Alabama		"Alabama R., Ala."	"Tait" 18—	USNM 84218	PARATYPE 1 d.	
Mobile River	Alabama		"Indian village site at mouth of Gaillord's Creek", 2 miles from Claiborne	"L.W.H.?" 18—	USNM 599583	1/2 sf.	
?	?	?	?	"Lea Coll." 18—	USNM 87824	1 d.	
?	?	?	"Alabama R.?" "(Very Old)"	"Wheatley" "G. White" 18—	USNM 84218a	1 d.	
?	?	?	"Mississippi or Alabama"	18—	VII 116 USNM 25808	1 d.	
Mobile	Mississippi		"Columbus, Tombigbee R., Miss."	Wm Spillmann 18—	USNM 84217	5 d.	

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Drainage System	Locality			Collector Coll. Date	Catalog No. Coll. No.	Recorded as Specimens	Author Year: Page
	State	County	Specific				
Mobile River	Mississippi	"Lowndes Co."	"Tombigbee River"	Phil Mundy and Tom Jandebeur July 1972	USNM 709577	2 d.	

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