1963

THE STATUS OF PLEUROBEMA MARSHALLI FRIERSON, 1927

(MOLLUSCA: BIVALVIA: UNIONOIDA)

bу

David H. Stansbery
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for

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

August 1983

PLEUROBEMA MARSHALLI FRIERSON, 1927

Southern Round Pigtoe

Synonymy

Pleurobema marshalli Frierson, 1927.

Original Description: A classified and annotated checklist of

North American naiades. Baylor Univ. Press, Waco, Texas:43
44, species no. 196.

Illustration of Holotype: *Frierson, 1928:139, pl. 3, fig. 3.

Type Locality: "Collected by the late A.A. Hinkley, from the Tombigbee River at Boligee, [Greene Co.], Alabama." (Frierson, 1927:44).

Type Material: Frierson (1928:138) notes that "The types are in my collection. Cotypes have been presented to the Academy of Natural Sciences of Philadelphia." I believe that the Frierson Collection was eventually purchased by the University of Michigan Museum of Zoology.

Etymology: Frierson (1928:44) notes, "The species has been critically examined, and compared with its near of kin, by Mr. W.A. Marshall, of the U.S. National Museum to whom I dedicate the species."

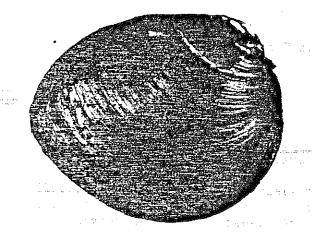
Taxonomic Status

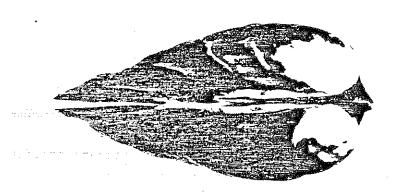
Pleurobema marshalli has as its nearest relative the highly variable sibling species Pleurobema sintoxia (Rafinesque, 1820) of the Mississippi River and lower Great Lakes drainages. It is obviously a member of the Pleurobema cordatum (Rafinesque, 1820) group which includes Pleurobema taitianum (Lea, 1834), also restricted to the Mobile River system. Also in this group are P. cordatum, P. plenum, P. rubrum and P. sintoxia, all of which are part of the Tennessee River unionid fauna across the divide to the north.

All of the above are sibling species and variable enough to induce more than a few unionid students to place them into the synonymy of a single species. There are, however, subtle but persistent character combinations in each of these described forms which will differentiate it from the others. For most malacologists, especially those new to the study of unionids, these species are very difficult to separate.

Since P. marshalli is isolated from its nearest relative, P. sintoxia, in a different river system, we do not know whether intrinsic reproductive isolation exists or not. Since the two forms are morphologically distinct,

^{*} Frierson (1927:44) suggests that it is "probable that this shell was that figured by Conrad in Silliman's Magazine in 1834, under the name mytiloides, Rafinesque." However, P. marshalli has yet to be recorded outside the Tombigbee River system. The specimen figured by Conrad (1834:343, pl.1, fig.7) is from the Alabama River. It may be an unusual Fusconcia ebena (Lea, 1831), or could be the only known record of P. marshalli outside the Tombigbee drainage.



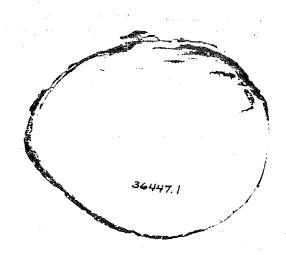


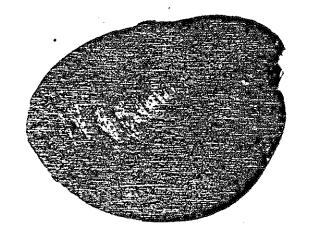
Pleurobema marshalli Frierson, 1927.

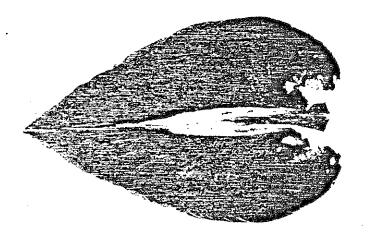
OSUM 36447.1

Tombigbee River 5.2 mi. S of Columbus, Lowndes Co., Mississippi. 5 Oct. 1974.

Length = 66 mmHeight = 53 mmWidth = 33 mm





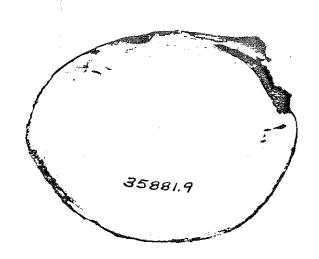


Pleurobema marshalli Frierson, 1927.

OSUM 35881.9

Tombigbee River 0.2 mi. above Warsaw, Sumter Co., Alabama. 21 Aug. 1974.

Length = 58 mm Height = 43 mm Width = 38 mm



occupy different geographic ranges (allopatric), and lack intergrades, we must then recognize them as distinct species in spite of their striking similarities.

The fact that we have no intergrades between $P.\ marshalli$ and $P.\ taiti-$ anum in the same river, the Tombigbee, lends strength to the general belief that these forms are distinct species.

Nomenclatorial Status

So far as is known *P. marshalli* has only been described once. Any valid description published before Frierson's in 1927 would have priority but none are known. Even if the specimen Conrad figured in 1834 could be established as *P. marshalli*, the name Conrad used, *Unio mytilloides* Rafinesque, 1820, is a valid synonym of *Pleurobema clava* (Lamarck, 1819) and hence unavailable for use here.

Diagnostic Characteristics

Pleurobema marshalli and P. sintoxia are distinguished from the other members of the P. cordatum complex by their rounded rather than triangulate outline. Frierson (1927:43-44) in his original description of P. marshalli describes the species as "sub-ovate or irregularly and obliquely elliptical" while P. sintoxia is best described as subrotund rather than either ovate or elliptical. Said another way, the outline of P. marshalli typically becomes produced (elongated) in the posterior or postventral direction rather early in life, resulting in an elongate (i.e. "ovate" or "elliptical") outline. Although highly variable, P. sintoxia becomes produced postventrally with age and its outline changes from subrotund to somewhat triangulate in old age.

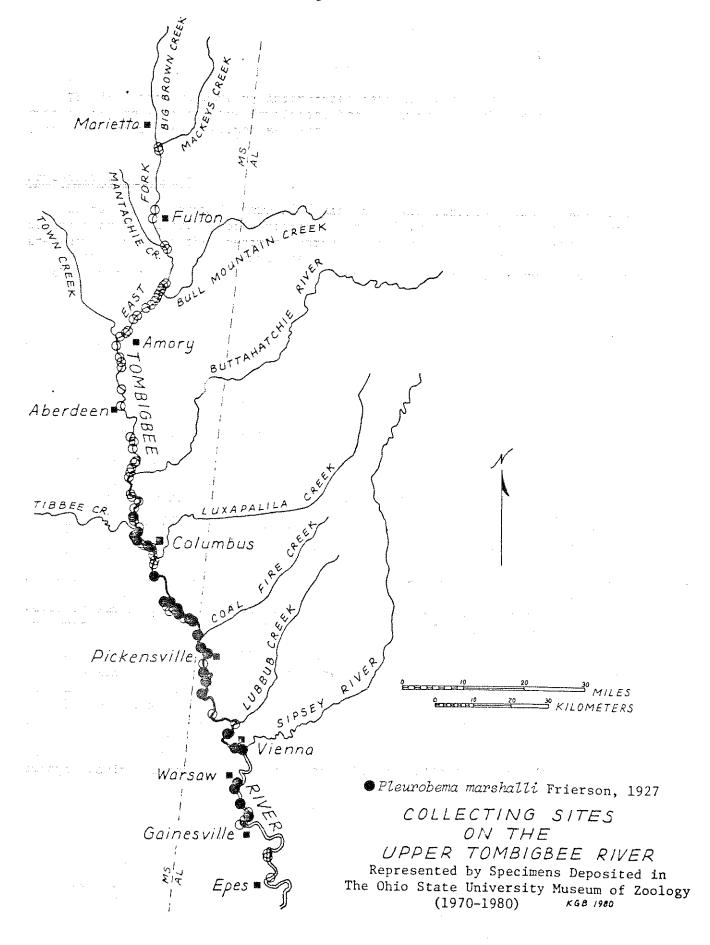
Frierson (1927:44) notes that this species has "A row of obsolete pustules down the centre, but scarcely visible in some individuals." Having had the opportunity to examine 43 lots of this species comprising 331 specimens I can report that these "obsolete pustules" are almost always present though scarcely perceptible and might better be described as very low pustules or welts or simply as irregularities. They are very rarely in rows but occupy the surface of the shell just anterior to the posterior ridge but typically posterior to the center of the disc.

The umbos of P. marshalli are distinctly anterior and nearly terminal in some individuals while those of P. sintoxia are more central, especially in young individuals.

The umbonal cavities of P. marshalli are very shallow compared with those of P. sintoxia and the nacre of the Tombigbee River species has been white in all specimens examined. The nacre of P. sintoxia may be white, pink, cream or orange. No other species of Pleurobema has such a shallow umbonal cavity, a rounded sub-ovate or obliquely elliptical outline, near terminal beaks and very low pustules or welts on the postventral shell surface.

Former Distribution

The first specimen(s) of this species was collected by Hinkley (Frierson 1927:44) from "the Tombigbee River at Boligee, Alabama." The holotype was



illustrated the following year (Frierson, 1928:138-139, pl. 3, fig. 3) but no additional sites were mentioned. Van der Schalie (1938:9) collected "Pleurobema cordatum (Rafinesque) and varieties" from three sites in his study of the Cahaba River. These specimens are associated with Pleurobema taitianum, however, rather than with P. marshalli. The following year Van der Schalie (1939:4) published on Tombigbee unionids collected in 1931 at Columbus, Mississippi and in 1933 and 1935 at Epes, Alabama. The 1935 material, collected by Ms. Winnie McGlamery, included two specimens of P. marshalli. The known range was increased to two sites on the Tombigbee River in 12 years.

The study of the unionids of the Gulf Coast rivers from the Escambia River to the Suwannee (Clench and Turner, 1956) did not reveal P. marshalli nor did a study of the unionids of Mississippi (Grantham, 1969). These latter studies effectively restricted the distribution of P. marshalli to the Mobile River system. Studies of the Cahaba (Van der Schalie, 1938) and of the Coosa (Hurd, 1974) together with a complete lack of specimens from anywhere except the Tombigbee River strongly indicates that the range of P. marshalli is restricted to that river alone.

Present Distribution

The threat of major impact on the Tombigbee River inspired Dr. James Williams to undertake the collection of unionid shell from that stream during the period 1971 through 1976. The material collected was shipped to the Ohio State University Museum of Zoology for identification and deposition. The river was comprehensively collected of midden material and some living unionids from a point just below Marietta, Itawamba County, Mississippi, downstream to within a few miles of Epes, Greene/Sumter Counties, Alabama.

Pleurobema marshalli was only found in the lowermost half of that length of river from near the mouth of Tibbee Creek (7.3 miles northwest of Columbus) Lowndes County, Mississippi, downstream to just above the mouth of the Noxubee River (1.4 miles northwest of Gainesville), Sumter County, Alabama. It was found in 42 collections from the Tombigbee River main stem and at (within?) the mouth of one unnamed tributary (6.0 miles ESE of Trinity). Yokley (1978) in his survey of the Buttahatchie River unionids did not find P. marshalli. This distribution pattern is very similar to that of Pleurobema taitianum, suggesting that their habitat requirements may be very similar. Both species are found in the lower main stem of the free-flowing part of the river and neither has any strong evidence to indicate that they are tributary species. The most striking difference is the extension of the range of P. taitianum up into the Alabama River while P. marshalli has yet to be found outside the Tombigbee proper.

<u>Habitat</u>

As would be expected, *P. marshalli* is found associated with a rifflerun habitat. Williams (1982:74) found this species in the main channel in gravel or sandy gravel in moderate to swift current. Members of the *P. cordatum* group typically do better in stable substrates in strong current, with population densities dropping sharply in both cobble-boulder and silt-sand substrates.

Potential Threats

Since this species appears to have been confined by natural factors to the Tombigbee River main stem, the obvious potential threat is not only habitat destruction but perhaps the destruction of its entire known range. I am not certain to what extent this potential threat has become a reality. We have increased cause for pessimism in the case of *P. marshalli* because 1) it has never been known as a species that could successfully sustain itself as a reproducing population in a small stream and 2) further, that it has never been known from any other stream of comparable size or larger. The same possibilities and probabilities as those expressed in the case of *P. taitianum* hold true for *P. marshalli* with this added handicap.

Recommendations For Preservation in Nature

The alteration of the upper Tombigbee River from a free-flowing stream into a barge canal may have eliminated any possibility for the preservation of this species in nature or elsewhere. We do not know its requirements for continued existence but it appears to require a river the size of the Tombigbee between Columbus, Mississippi and Gainesville, Alabama as well as whatever other factors operated to make this river segment successful habitat and render others of similar nature unsuccessful. It may be too late for P. marshalli but it should be emphasized that, for any such species, we need to know:

- 1) the conditions necessary for continued growth and development of individuals of the endangered species.
- 2) the conditions necessary for successful reproduction of populations of the endangered species.

With this information available we can then set down characteristics required of an impacted habitat area, of a different habitat area "for" the species, or, if necessary, an artificial habitat in the event no other is available. No habitat which can remain suitable only with constant maintenance by human input of time, energy and concern should be considered the solution to species preservation regardless of how noble this action may be. The only realistic solution to species preservation is the preservation of naturally-maintained habitat. What effort and cost is realistic and reasonable in such an undertaking rests upon the judgement of society, but since extinction is a point of no return in the loss of unique genetic material that cannot be regained at any cost, it should be given a relatively high priority.

<u>Acknowledgements</u>

Studies of this kind must, of necessity, be based upon collections of specimens and literature in conjunction with field observations. Even so, it is only those collections and related data that find their way into museums and libraries that are preserved and available for such use on into the future.

This paper is based almost entirely upon the collections of specimens made by Dr. James D. Williams, Mr. Randall Grace and their associates and upon the unionid library assembled over many years at the O.S.U. Museum of Zoology.

Numerous student assistants labored long hours to remove the environment from the surface of the shells so that they could be processed into the research collection.

The Curatorial Assistant of the Bivalve Division, Kathy G. Borror, prepared the map, typed the tables and proof-read the manuscript with a perfectionism that has become second nature.

The pictures of specimens were taken, developed and printed by our photographic specialist, Mr. A.E. Spreitzer, with his characteristic care and concern for correctness and quality.

The United States Fish and Wildlife Service should be commended for their interest in preserving biological diversity for the benefit of society and for making this concern felt through their support of this study.

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PLEUROBEMA MARSHALLI FRIERSON, 1927

SPECIMENS DEPOSITED IN

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and

THE OHIO STATE UNIVERSITY MUSEUM OF ZOOLOGY

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System	State	County	Specific	Coll. Date	Coll. No.	Kecorded as Specimens	Author Year: Page
Mobile	Alabama	Pickens	lombigbee River at Memphis Landing, River Mile 324.4	24 Oct. 1976	USNM 809733	And the second s	Williams 1982:73
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System	State	County	Specific	Coll. Date	Coll. No.	+ 60	Year: Page
Mobile River	Alabama	Pickens	Tombigbee River 2 mi. above Pickensville boat landing, about 12 mi. NW of Allceville	J.D. Williams, et al.	43813	and the same and t	0
			Sec. 10, I 21 S, R 3 W	4 June 1972	0StM:1972:90	4 wd.	
Mobile River	Alabama	P. c.	Tombighee River about 1 mi. below (SE of)	J.D. Williams, et al.	40960		
			The state of the s	25 May 1977	usum:1977:191	. 4 wd.	
Mobile River	40 40 40 40 40 40 40 40 40 40 40 40 40 4	- 0	Tombigbee River about 300 yards above Pick-	J.D. Williams, et al.	41325	A CONTRACTOR OF THE PROPERTY O	
		0.1940-4	Aliceville, Sec. 14, 721S, R17W	20 Aug. 1974	OSUM:1974:202	2 d.	
Mobile River	Mississippi	s a pumo	Tombigbee River 0.5 mi. below mouth of Tibbee Cr. 4.4 mi NW of Columbus 11.7 mi	J.D. Williams, R.Grace	35517		
	•		NE of Artesia, Sec. 11, 719N, R17E	27 July 1974	05:14:1974:139	2 d.	
Mobile River	Alabama		"А]врама"	"Aldrich"	38051		
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Mobile River	Mississinoi	s el sumo	Tombigbee River just above mouth of Oak	J.D. Williams, R.Grace	35315		
		000	SW of Flynn, Sec. 24, T 19 N, R 17 E	27 July 1974	0SUM:1974:136	٦ م	
Mobile River	4	s of the second	Tombigbee River about 2 mi. N of Gaines-	J.D. Williams, et al.	35800		
100400	Ataballa	L BO EIRO	Ville, about 11.7 Mi. N of Epes, Sec. 29, T 22 N, R 2 W	21 Aug. 1974	OSUM:1974:205	2 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 5 mi. NHW of Gaines-ville, Sec. 15, 7 22 N, R 2 W	J.D. Williams, et al.	35861	the carbinate forms from the second s	
				21 Aug. 1974	0SUM:1974:206	5 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 0.2 mi. above Warsaw, about 7.8 mi. NNW of Gainesville, Sec. 28,	J.D. Williams, et al.	35881		orrer errera errera en en errera errera en
				21 Aug. 1974	0SUM: 1974: 203	12 d.	
Mobile River	АІвраща	ۍ: من مو	Tombigbee River 1 mi. above mouth of Coal	J.D. Williams, et al.	36461		
			12.3 mi. W of Carrollton, Sec. 3,721S, R17W	4 June 1972	0SUM:1972:87	lsf.	
Mobile River	Mississippi	Lowndes	Tombigbee River at Buzzard's Island, 5.2 mi, S of Columbus, Sec. 9/2, I195. R18W	R. Graco, T.Whitfield	36447		
				5 Oct. 1974	0SUM:1974:298	2 d,	
2.000 0.000 0.000 0.000	© € € € € € € € € € € € € € € € € € € €		Tombigbee River 0.2 mi. below Warsaw, 7.6	J.D. Williams, et al.	36382	remoni	
			R2W	8 June 1972	0SUM: 1972: 96	21 3/2 d.	

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David H, Stansbery

Date 14 Aug. 1980

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Drainage		Locality	lity	Collector	Catalog No.	Recorded as	Author
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Mobile River	Alabama	Sumter/Greene	Tombigbee River about 5 mi. N of Gaines-ville, Sec. 15, T 22 N, R 2 W	J.D. Williams, et al.	36359		
			}	8 June 1972	0SUM:1972:95	13 3/2 d.	
Mobile River	Alntama	O X X Sec	Tombigbee River 2.5 mi. NW of Vienna, about 7.3 mi. SW of Alicaville T 24 N R 2 W	J.D. Williams, et al.	36330	And the state of t	
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0 0 0		:	Tombigbee River about 1 mi. above mouth of	J.D. Williams, et al.	36282		
noote at our	Alabama	Flckens	Sipsey River, just below Vienna, 8.3 mi. SSW of Aliceville, Sec. 34, T24N, R2W	7 June 1972	0SUM:1972:94	l sf.	
C	: 		ω	J.D.Williams, R.Grace	36223		
Janta attoni	Alabama	Flokens	mi. SSW of Pickensville, L9.3 mi.WNW of AlicevilleJ, NW 1/4 Sec. 35, T21S, R17W	19 Aug. 1974	OSUM:1974:204	5 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 1.5 mi. below Nashville Ferry, 2.0 mi. S of Foreston, 14.1 mi SF	J.D. Williams, et al.	36513		
	-	er e	. 28, T 17 N, R 19 E	4 June 1972	OSUM:1972:88	16 d.	
Mobile River	∠	, e	Tombigoce River at island about 0.2 mi.	J.D. Williams, et al.	££133	The same and the s	
		202 1100	Sec. 28, T 23 N, R 2 W	8 June 1972	06UM:1972:97	2 sf.	•
Mobile River	Missiasioni	o e p c mo	Tombigbee River at mouth of unnamed creek,	J.D. Williams, et al.	36926		
			7 20 S, R 17 W	24 July 1975	OSUM:1975:149	70	
Mobile River	Missission	e e promo	Tombigbee River about 1.5 mi. below (NE of)	J.D. Williams, et al.	37776		
*	1		umbus, NW 1/4 Sec. 12, T 20 S, R 18 W	24 July 1975	0SUM:1975;284	1 d.	
Mobile River	Mississippi	o di John C	Tombigbee River just above mouth of McCow-	J.D. Williams, et al.	37798		
	100 100 100 100 100 100 100 100 100 100	200.00	Columbus, SE 1/4 Sec. 3, 11/N, R18W	24 July 1975	0SUM:1975:285	. d.	
Mobile River	Mississippi	aebumo	Tombigbee River at island below mouth of Tibbee Cr. 4.4 mi NW of Columbus 11.7 mi	D.H. Stansbery, et al.	37890		
			NE of Artesia, Sec. 11, T 19N, R17E	29 May 1972	0SUM:1972:100	20 1/2 d.	
Mobile River	A abama	Sumter	Tombighee River about 2 mi. N of Gaines.	D.H. Stansbery, et al.	34338		
				24 June 1972	OSUM: 1972: 112	1 w; 63 d.	

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David H. Stansbery

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Drainage		Locality	lity	Collector	Catalog No.	Recorded as	Anthor
System	State	County	Specific	Coll. Date	Coll. No.	1 (0	Year: Pape
Mobile River	Alabama	Pickens	Tombigbee River about 4 mi. S of Pickens- ville, 8 mi WNW of Alicaville Sec 2	J.D. Williams, et al.	34412		1
		The state of the s	R 17 W, T 22 S	28 July 1972	0SUM:1972:297	6 1/2 d.	
Mobile River	АТареша	Pickens	Tombigbee River about 0.5 mi. E of Memphis, 8 mi. W of Aliceville, Sec. 14, T 22 S.	J.D. Williams, et al.	34566		
			R 17 W	28 July 1972	0SUN:1972:315	2 w; 5 1/2 d.	
Mobile River	Mississippi	Cowndes	Tombigbee River about 9.5 mi. S of Columbus 14 mi. ENE of Crawford, Sec. 11, I 17 N,	P. Mundy, P. Jandebeur	34729	THE PARTY AND TH	
			R 18 E	July 1972	OSUM: 1972:335	13 d.	
Mobile River	Alabama	Sumter	Tombighes River about 2 mi. N of Gaines-ville, T 22 N, R 2 W	J.D. Williams, et al.	34952		
				14 Sept. 1973	05UM:1973:323	17 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 50 yds. below U.S.Rt.82 bypass bridge 2.3 mi. W of Columbus 1) 8 mi	J.D. Williams, et al.	27279		
			ec. 30, T 19 N, R 18 E	2 Nov. 1971	OSUM:1971:244	7 1/2 d.	
Mobile River	Mississippi	Cowndes	Tembighee River, 2.8 mi. W of Columbus,	J.D. Williams, et al.	27244		
			R 19 W	2 Nov. 1971	0SUM:1971:242	5	
Mobile River	Mississippi	Lowndes	unnamed creek 50-75 yds, above mouth, 6.0 mi. FSE of Trinity 21.0 mi. SSF of	J.D. Williams, et al.	27362		
		The state of the s	Columbus, Sec. 18, T20S, R17W	16 Nov. 1971	OSUM:1971:255		
Mobile River	Mississippi	Cowndea	Tombigbee River at island below mouth of Tibbon Co. 4 4 mi W of Columbus 11 7 mi	J.D. Williams, et al.	27398		
			NE of Artesia, Sec. 11, 119N, R17E	11 Nov. 1971	0SUM:1971:257	4 1/2 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River O.7 mi. below mouth of James Greek, B.1 mi.FSF of Trinity, 13.5 mi.	J.D. Williams, et al.	27420		
			SSE of Columbus, Sec. 28/29, 117N, R19E	18 Nov. 1971	0SUM:1971:259	5 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 1.2 mi. W of mouth of Kin- caide Cr., 5.8 mi. FSE of Trinity, 11 8 mi	J.D. Willi.ms, et al.	27441	The second secon	
			SSE of Columbus, Sec. 24, T17N, R18E	16 Nov. 1971	OSJM:1971:258	6 d.	,
Mobile River	Alabama	Pickens	Tombigbee River at Pickensville, 300 yds.	D.H. Stansbery, et al.	32969		
			Aliceville, Sec. 14, T21S, R3W	23 June 1972	0SUM:1972:110	9 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River about 0.5 mi. above Ms.Rt. 50 bridge, 7.3 mi. NW of Golumbus. 11.8 mi.	R.Grace, G.Clemmer, et al	. 48428		
			SW of Caledonia, Sec. 14, T 17 S, R 19 W	5 Aug. 1976	09JM:1976:514	1 d	

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Museum Spec	clmens or L	Museum Specimens or Literature Records	ords	Pleurobema marshalli Frierson, 1927.	rierson, 1927.	. ,.	
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System	State	County	Cocaffia	Collector	Catalog No.	Recorded as	Author
Mobile Diver			Tombigbee River 1, 5 mi. S of Waverly Ferry,	D.H.Stansbery, et al.	43140	Specimens	Year: Page
TARTE NIVE	Tric Tee Tee Tu	Cowndes	about 3 mi. NW of Columbus, Sec. 35, 1 17 S, R 19 W	29 May 1972	0SJM:1972:103	1 wd.	
Mobile River	Alabama	Pickens	Tombighee River about 300 yards above Pickensville host landing about 10 mi MM	J.D. Williams, et al.	48556		
			of Aliceville, Sec. 14, T21S, R3W	4 June 1972	0SUM:1972:89	5 d.	
Mobile River	Alabama	Pickens	Tombigbee River about 1.3 mi. above mouth of Bogue Chilto Creek, 6.7 mi. WSW of	J.D. Williams, et al.	48313	THE PARTY OF THE P	
			Aliceville, Sec. 1, T 24 N, R 3 W	6 June 1972	0SUM:1972:91	15 d.	
Mobile River	Alabama	Sumter	Tombigbee River about 3 mi. N of Gainesville. 5.5 mi. SSF of Warsaw Sac	J.D. Williams, et al.	4851.5		
			2 W	26 Oct. 1973	0SUM:1973:327	1 wd.	
Mobile River	Alabama	Sumter	Tombighee River about 2 mi. 11 of Gainesville, 6.5 mi. SSE of Warsaw. Sec.	J.D. Williams, et al.	48336	The state of the s	· · · · · · · · · · · · · · · · · · ·
	The state of the s		26, T 22 N, R 2 W	26 Oct. 1973	0SUM:1973:324	19 d.	
Mobile River	Alabama	Sumter	Tombigbee River just above mouth of Noxubee J.D. Williams, et al. River, just W of Gainesville 7 0 mi S of	J.D. Williams, et al.	48496	- Parameter State Control of the Con	
				26 Oct. 1973	0SJM:1973:326	4 1/2 wd.	
Mobile River	АТарата	Sumter	Tombigbee River 0.2 mi. above mouth of Noxubee River [] 4 mi NW of Gainewille	D.H. Stansbery, et al.	48591		
			Sec. 34, T 22 N, R 2 WJ	24 June 1972	OSUM:1972:111	1 1/2 wd.	
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Date 20 March 1981

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D.H. Stansbery