1983

THE STATUS OF *PLEUROBEMA TAITIANUM* (LEA, 1834)

(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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PLEUROBEMA TAITIANUM (LEA, 1834)

Southern Pink Pigtoe

Synonymy

Unio taitianus Lea, 1834.
Original Description: Observations on the naiades, and descriptions of new species of that and other families. Trans. Amer. Philos. Soc. 5, Article 2:39-40, pl. 4, fig. 11.
Type Locality: "Hab. Alabama River. Judge [Charles] Tait." (Lea, 1834:40); "at Claiborne - label" (Marshall and Ruhoff, 1974: no pagin.).
Type Material: "Figured holotype USNM 84653." (Johnson, 1974: 143); "Type USNM 84653" (Marshall and Ruhoff, 1974: no pagination).
Etymology: Lea (1834:40), in his remarks on this species, writes "It is with great pleasure I name it after my friend, Judge [Charles] Tait of Claiborne, [Monroe County], Alabama, ..."

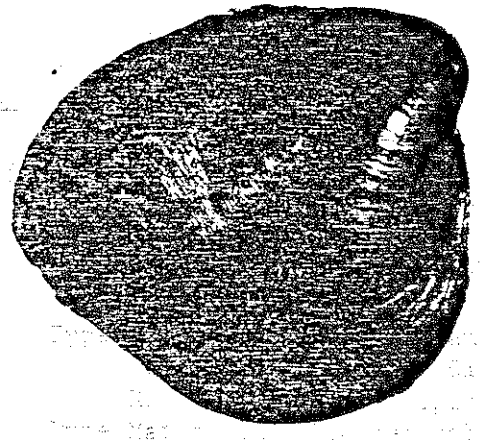
Margarita taitianus (Lea, 1834). (Lea, 1836:21; 1838:18)

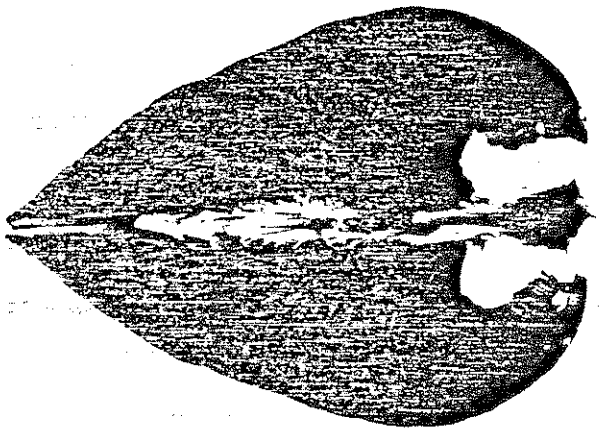
Margaron taitianus (Lea, 1834). (Lea, 1852:25; 1870:38)

Pleurobema taitiana (Lea, 1834). (Simpson, 1900:754)

Pleurobema taitianum (Lea, 1834). (Simpson, 1914:764)

Pleurobema tombigbeanum Frierson, 1908.
Original Description: Description of a new *Pleurobema*. Naut. 22(3):27-28, pl. 3, fig. 3-4.
Type Locality: "Tombigbee river [sic]. Types from Demopolis, Marengo Co., Alabama, in coll. Frierson and A.N.S. Phila. Also found at Columbus, Mississippi." (Frierson, 1908:27).
Type Material: Frierson (1908:pl. 3, fig. 3&4) did not designate a holotype of his *P. tombigbeanum*. He did, however, publish photographs of four valves, two of which (fig. 3 of Plate 3) appear to be matched and two (fig. 4 of Plate 3) are distinctly not matched. Johnson (1972:150, pl. 24, fig. 4) and Johnson and Baker (1973:172) designated Frierson's figure 4, ANSP 173339a, as lectotype and note that it is from the "[Tombigbee River,] Columbus, [Lowndes Co.] Mississippi." Frierson has specified, however, (see Type Locality above) that the "Types [are] from Demopolis, Marengo Co., Alabama." I assume that Johnson obtained his locale data for Frierson's figure 4 either from that specimen's label or written within the shell itself. In either event, this specimen apparently did not come from the type locality. Johnson (1972:150) designated Frierson's figure 3 (the matched pair), ANSP 173340, as a para-



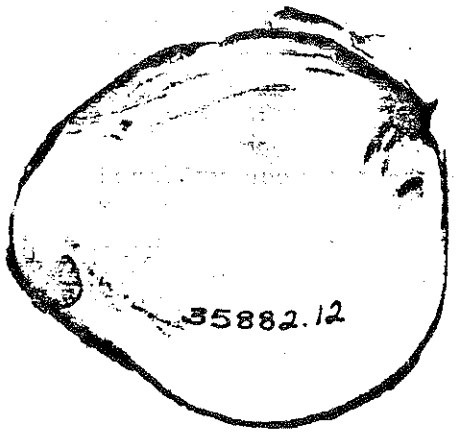


Pleurobema taitianum
(Lea, 1834).

OSUM 35882.12

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

Length = 50 mm
Height = 44 mm
Width = 34 mm



lectotype of this species. Johnson (1972:150) does not give the locality of this specimen. If, as is indicated, this is the specimen from the Demopolis site, it would be the ideal candidate for the lectotype of *P. tombigbeanum*. The above is of little import at the present time since *P. tombigbeanum* is clearly a junior synonym of *P. taitianum*. Past experience has demonstrated, however, that in systematics it is best to correct errors when their solutions become clear.

In all fairness it should be pointed out that Frierson (1927:42) noted, with reference to *P. taitianum* and *P. tombigbeanum*, that "Ample material seen since 1908 shows the essential identity of the two forms above." Thus *P. tombigbeanum* remains a junior synonym of *P. taitianum* with ANSP 173340 (Frierson, 1908:pl. 3, fig. 3) becoming its lectotype.

Taxonomic Status

Pleurobema taitianum is a distinct species in that there is a hiatus in characteristics between it and those species and forms to which it is most closely related. This species clearly belongs to the *Pleurobema rubrum* (Rafinesque, 1820) complex within the *Pleurobema cordatum* (Rafinesque, 1820) group. The *P. rubrum* complex is contained within the Mississippi and Mobile drainage basins and has only one currently recognized species in each system. The taxonomic status of several variant forms within the Mississippi system has yet to be comprehensively studied.

The most closely related species is *Pleurobema rubrum* of the Mississippi drainage system. No specimens with intermediate characteristics between these two or mixed characteristics of these two species have been found although either possibility would not be surprising in the case of sibling species as similar as these. Some workers have assumed, apparently because of their superficial similarity, that *P. taitianum* and *P. rubrum* are conspecific. The complete lack if intergrades rejects this inference and confirms the existence of two distinct sibling species. Variation exists within the present known range of *P. taitianum* but these differences appear to be related to habitat rather than genetic divergence.

Nomenclatorial Status

Unio taitianus has, over the years since its description in 1834, been placed in at least four different genera. This is not so much a reflection of unstable nomenclature, however, as it is the result of efforts to achieve a realistic allocation of species to meaningful groups then gathered under the Genus *Unio*. Once the Genus *Pleurobema* and its sibling genera were recognized by Simpson (1900), *U. taitianus* found a natural generic home where it has resided since.

The only known threat to the nomenclatorial stability of this species is the fact that the Genus *Pleurobema* has a species of a group other than *taitianum* as its type. If the Genus *Pleurobema* ever becomes two or more genera, *Unio taitianus* will, of necessity, be placed into a different genus.

Diagnostic Characteristics

The *Pleurobema rubrum* complex is characterized within the *Pleurobema cordatum* group by the presence of narrowly pointed umbos which are directed forward, sometimes to a striking degree; a brown to dark brownish-black periostracum that lacks distinct rays except rarely in juvenile individuals; a very shallow but distinct sulcus just anterior to the posterior ridge, which is present from the juvenile stage throughout life; a nacre that is typically some shade of pink or pink-tinted and only occasionally white.

Pleurobema taitianum has all of the above characteristics but differs from the more variable *P. rubrum* in being less obtusely triangulate in outline and more scalene or equilateral in shape. Neither the umbonal area nor the sulcus is as prominent as they are in *P. rubrum* and the nacre is seldom either pure pink or white but commonly pink-tinted or "flesh-colored." Perhaps the most striking difference between these sibling species is the very shallow umbonal cavity of *P. taitianum* compared with the relatively deep umbonal cavity of *P. rubrum*. This character has the advantage of persisting in specimens that are badly worn on the exterior.

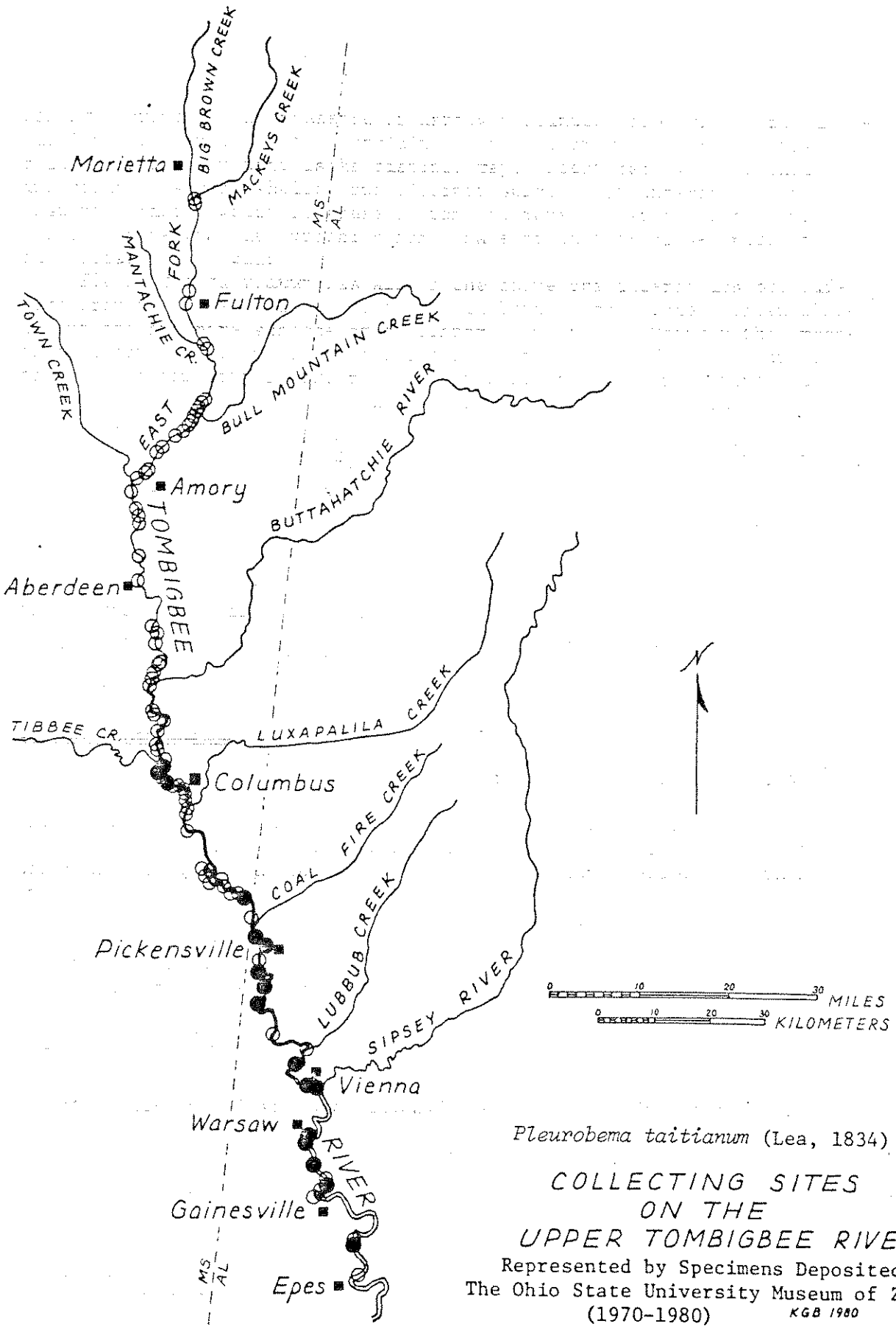
Differences of taxonomic significance have not yet been found in the gross anatomy of the soft parts of these animals nor have cytological, immunological or electrophoretic studies been made in such a search. Ortmann (1912:264) notes that *P. rubrum* (as *P. pyramidatum* (Lea)) has soft parts identical to *P. cordatum* (as *P. obliquum* (Lamarck)). If *P. rubrum* and *P. cordatum* have "absolutely identical" soft parts, one would expect that any soft part differences between *P. taitianum* and *P. rubrum* to be either very small or very obscure or both.

Former Distribution

Simpson (1900:754; 1914:764) gives only "Alabama River." as the known distribution of *P. taitianum* in his synopsis. Frierson, in redescribing this species under the name *P. tombigbeanum*, extended the range to include "Tombigbee River, Demopolis, Marengo Co., Ala. Also found at Columbus, Miss. and in the Alabama River." Museum specimens of this species include several lots from the Alabama River at both Claiborne (OSUM 37816, USNM 84653) and Selma (OSUM 38010, USNM 521324), the lower Cahaba River (UMMZ) and the Coosa River (Hurd, 1974:67-68) (UMMZ), all in Alabama and all in the Mobile River system. No valid records of this species in other river systems are known.

Present Distribution

Recent threats to the Tombigbee River system led to a concerted effort to discover just which unionids were still living there. This comprehensive collecting was initiated by Dr. James Williams and, with the help of a number of friends, continued from 1971 into 1975. Particular concern was devoted to collecting both fresh and subfossil midden from along shore. It was found that *P. taitianum* (Map 1) was living in the main stem from the mouth of Tibbee Creek just above Columbus, Lowndes County, Mississippi, downstream to a point about 4.5 miles NNE of Epes, Sumter/Greene Counties, Alabama. In general the species was living in the lower, downstream half of the free-flowing Tombigbee, becoming more abundant as the river became larger. It was not found living in the im-



Pleurobema taitianum (Lea, 1834)

COLLECTING SITES ON THE UPPER TOMBIGBEE RIVER

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

pounded river below Gainesville but was represented there in the subfossil (preimpoundment?) midden.

Efforts to find *P. taitianum* in tributaries of the Tombigbee reached their peak in Yokley's (1978) survey of the Buttahatchie River in 1977. Although 39 species of unionids were found in this relatively rich stream, no trace of *P. taitianum* was found.

Later (Williams, 1981:76) two specimens were taken from "the Buttahatchie River in the vicinity of U.S. Rt. 45 crossing north of Columbus [Mississippi] (MMNS 921 and 929)." It is typical for occasional specimens of big river species to be found in the lower reaches of tributaries so long as the primary populations(s) or "mother bed" is present in numbers and reproducing in the main stem.

Williams was successful in recovering a single weathered shell of this species from the Claiborne, Alabama site in 1973 from the discards of what had apparently been a shell harvesting operation a few years earlier.

It appears that this species is restricted to the Mobile River system and that it approached being common only in the Tombigbee and Alabama River main stems. Although not comprehensively collected in recent years the evidence indicates that the Alabama River population is either extirpated or nearly so. It appears that this species' continued existence depends upon the continued well-being of the Tombigbee River population. Modification of the Tombigbee River between Columbus, Mississippi, and Epes, Alabama might very well result in its extinction.

Habitat

The species of the Genus *Pleurobema* are found most frequently in stable substrates in water that is obviously moving. When found in very swift currents of riffles (shoals) and chutes they are typically buried to the level of the apertures or even deeper in the bottom sediments. In runs they typically protrude above the sediments but usually only a distance of a few centimeters.

Williams (1982:77) found the typical habitat of *P. taitianum* to be gravel shoals. He also notes that a large number of midden shells of this species were found "along both banks where the current was moderate but no islands or gravel bars were exposed." This latter habitat describes a run habitat as does the substrate of "a mixture of sand and gravel with some clay."

Pleurobema taitianum may then be described as a riffle-run species confined to the main stem of the lower Alabama and Tombigbee Rivers with occasional specimens being taken in the lower reaches of some of their tributaries.

Potential Threats

In the absence of an active shell harvesting industry or of any significant number of native predators, the potential threat to this species' continued existence is habitat destruction. River alteration could feasibly:

* reduce the amount of available riffle-run habitat to below that necessary for the species' minimal population size.
* seriously alter the quantity and quality of suspended organic

nutrients in the river water which are required as a continuing food source of these filter-feeding organisms.

* change the river regimen of temperature or flow or some other factor(s) that could result in the host fish not being present at breeding time.

Our present limited knowledge concerning the precise factors necessary for the continued existence of any one species of unionid would be academically embarrassing were it not that this condition prevails for the great majority of living species and is obviously not a simple static constant but a complex dynamic variable. The very best we can do at present, in the absence of this much-needed information, is to use those principles which are supported by such research as has been done and those generalizations supported by the repeated observations of those who have devoted many years of field study to one or another of the many facets of unionid biology. Common sense and logic still have a very important role to play in field biology.

Recommendations for Preservation in Nature

The almost complete absence of collection records of this species from the Alabama River in recent years added to the abandonment of commercial shelling in this river combined with our generalized knowledge of how its water quality has been altered by industrial outfalls, sewage plant effluents, agricultural runoff and other non-natural impacts leads us to consider this former habitat as presently unsuitable or nearly so.

The current transformation of the critical part of the Tombigbee River into a barge canal may effectively destroy this river as a habitat of this species. Efforts to provide riffle-run habitat may prove successful but only time will reveal how accurately we have been able to assess the requirements of this species - both qualitatively and quantitatively. Failure may well mean extinction.

The suggestion to transfer the remaining individuals of this species to an equivalent or better habitat elsewhere has been made repeatedly. The problem here has several ramifications. Obvious to the ecologist is the fact that we cannot yet identify with certainty "an equivalent or better habitat." We do not know the specific requirements of the species as individuals much less as a species. The ecologist would also raise the question of the nature of the impact this proposed introduction would have on the biota (and abiota) of the new habitat. Our generalized experience indicates that most species introduced into a new, seemingly satisfactory habitat do not survive as individuals. In the case of those few that do continue to live as individuals only a few introductions retain the ability to reproduce. If an introduced species makes it over the "individual survival" barrier and over the "population reproduction" barrier it usually becomes relatively abundant at the expense of the native biota. One or more of the native species may become extirpated or even extinct. These probabilities pose a sobering responsibility and serve to emphasize just how much we need to learn if we are to become truly responsible managers of our environment.

Our primary effort to save *P. taitianum* from extinction was quite naturally and wisely to save its habitat. This effort has, in large part, failed and so we must now either:

1) hope that the highly modified Tombigbee River will still somehow

retain the conditions necessary for the support of this species.

2) create new habitat in or adjacent to the River into which the species can be introduced and hopefully survive.

3) introduce the species into other similar stream systems in the hope that it might survive there and, if so, without having a deleterious impact on other species.

4) hope that an additional undiscovered population(s) of this species still persists in some undamaged river.

None of the above is an optimistic recommendation. From what little we know we must judge all four as most likely to fail. There is, however, much that we do not yet know concerning the ability of this species to survive. We must admit, in all honesty, that if an opportunity for continued existence for this species lies somewhere within reality, it is within the reality of our present ignorance.

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 associate and others
Construction of Map and Tables, Proof-reading Manuscript	Ms. Kathy G. Borror
Photography	Mr. A.E. Spreitzer

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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PLEUROBEMA TAITIANUM (LEA, 1834)

SPECIMENS DEPOSITED IN

THE UNITED STATES NATIONAL MUSEUM OF NATURAL HISTORY

and

THE OHIO STATE UNIVERSITY MUSEUM OF ZOOLOGY

SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records

SPECIES *Pleurobema taitianum* (Lea, 1834).

Drainage System	Locality			Collector	Catalog No.	Recorded as	Author
	State	County	Specific	Coll. Date	Coll. No.	Specimens	Year: Page
Mobile	AL		"Claiborne, Alabama R., Ala"	"Judge" "Tait" 18—	USNM 84653 HOLOTYPE	1 d.	
Mobile	AL		"Claiborne, Alabama R., (pink)"	"Judge" "Tait" 18—	USNM 84653 PARATYPES	2 d.	
Mobile	AL		"Alabama River near Selma, Ala."	"B. Shimek" "1933"	USNM 521324	2 d.	
Mobile	AL		"Alabama"	"Call Coll." 18—	USNM 25180	1 d.	

Researched by David H. Stansbery Date 14 Feb. 1960

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Drainage System	Locality: State	Locality: County	Locality: Specific	Collector / Coll. Date	Catalog No. / Coll. No.	Recorded as: Specimens	Author / Year: Page
Mobile River	Alabama	Pickens	Tombigbee River 2 mi. above Pickensville boat landing, about 12 mi. NW of Aliceville, Sec. 10, T 21 S, R 3 W	J.D. Williams, et al. 4 June 1972	43814 OSUM:1972:90	4 wd.	
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	40961 OSUM:1977:191	1 d; 3 wd.	
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	41326 OSUM:1974:202	1 d.	
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	38340 OSUM:1975:151	2/2 sf.	
Mobile River	Alabama	[Dallas]	"Alabama River, Selma, Alabama"	"Aldrich" [18—]	38010	2 d.	
Mobile River	Alabama	[Dallas]	"Alabama River, Selma, Ala."	Ex Santa Barbara Mus. [18—]	38011	1 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River just above mouth of Oak Slush Creek, 3.1 mi. W of Columbus, 3.2 mi. SW of Flynn, Sec. 24, T 19 N, R 17 E	J.D. Williams, R.Grace 27 July 1974	35316 OSUM:1974:136	1 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River 0.5 mi. 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, R.Grace 27 July 1974	35518 OSUM:1974:139	2/2 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	35862 OSUM:1974:206	14 d.	
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	35882 OSUM:1974:203	12 d.	
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, T 21 S, R 17 W	J.D. Williams, R.Grace 19 Aug. 1974	36224 OSUM:1974:204	3 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, T 24 N, R 2 W	J.D. Williams, et al. 7 June 1972	36283 OSUM:1972:94	2 sf.	

Researched by David H. Stansbery Date 14 Aug. 1980

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Museum Specimens or Literature Records

SPECIES Pleurobema taitianum (Lea, 1834).

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 2.5 mi. NW of Vienna, about 7.3 mi. SW of Aliceville, T 24 N, R 2 W	J.D. Williams, et al. 7 June 1972	36331 OSUM:1972:92	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	36360 OSUM:1972:95	35 d.	
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	36383 OSUM:1972:96	7 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	36514 OSUM:1972:88	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	JD. Williams, et al. 8 June 1972	36734 OSUM:1972:97	1 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	D.H. Stansbery, et al. 29 May 1972	37891 OSUM:1972:100	9 1/2 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	34339 OSUM:1972:112	1 w; 24 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	34953 OSUM:1973:323	3 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River at island below mouth of Tibbee Creek, 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	27397 OSUM:1971:257	1 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	34413 OSUM:1972:297	2 d.	
Mobile River	Mississippi	Lowndes	Tombigbee River, W bank, 2.7 mi. W of Columbus, 11.6 mi. NE of Artesia, Sec. 24, T 19 N, R 19 W	J.D. Williams, et al. 2 Nov. 1971	27189 OSUM:1971:246	1/2 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	32970 OSUM:1972:110	6 d.	

Researched by David H. Stansbery Date 14 Aug. 1980

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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	34567 OSUM:1972:315	11 d.	
Mobile River	Alabama	Monroe	Alabama River at Claiborne Landing, just above Rt. 84 bridge, 11.5 mi. W of Monroeville, T 7 N, R 5 E	J.D. Williams, et al. 26 Sept. 1973	37816 OSUM:1973:325	1 sf.	
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	48557 OSUM:1972:89	3 d.	
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	48314 OSUM:1972:91	2 d; 7 wd.	
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	48337 OSUM:1973:324	2 d.	
Mobile River	Alabama	Sumter	Tombigbee River just above mouth of Noxubee River, just W of Gainesville, 7.0 mi.S of Warsaw, Sec. 3, T 21 N, R 2 W	J.D. Williams, et al. 26 Oct. 1973	48497 OSUM:1973:326	1 d; 1 wd.	
Mobile River	Alabama	Sumter	Tombigbee River 0.2 mi. above mouth of Noxubee River, 11.4 mi. NW of Gainesville, Sec. 34, T 22 N, R 2 W]	D.H. Stansbery, et al. 24 June 1972	48592 OSUM:1972:111	1 d.	

Researched by David H. Stansbery Date 14 Aug. 1980