# THE STATUS OF *PLEUROBEMA CURTUM* (LEA, 1859)

## (MOLLUSCA:BIVALVIA:UNIONOIDA)

by

David H. Stansbery
The Ohio State University
Museum of Zoology
1813 North High Street
Columbus, Ohio 43210 U.S.A.

for

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

December 1983

# *PLEUROBEMA CURTUM* (LEA, 1859)

## Black Club Shell

### Synonymy

*Unio curtus* Lea, 1859.
Original Description: Descriptions of eight new species of Unionidae, from Georgia, Mississippi, and Texas. Proc. Acad. Nat. Sci. Phila. 11:113.
Redescription: (Lea, 1861) New Unionidae of the United States. J. Acad. Nat. Sci. Phila. 5(N.S.), Art. 2:103-104, pl. 17, fig. 253.
Type Locality: "Tombigbee River, Columbus, [Lowndes Co.,] Mississippi. Wm. Spillman, M.D." (Lea, 1859:113).
Type Material: "Figured holotype USNM 84737." (Johnson, 1974:41).
Etymology: Lea (1859:113) does not give his reason(s) for using the name *curtus*. The Latin *curtus* means "short" (Brown, 1956:247) and probably refers to the foreshortened anterior margin.

*Margaron (Unio) curtus* (Lea, 1859). (Lea, 1870:40)

*Pleurobema curta* (Lea, 1859). (Simpson, 1900:754)

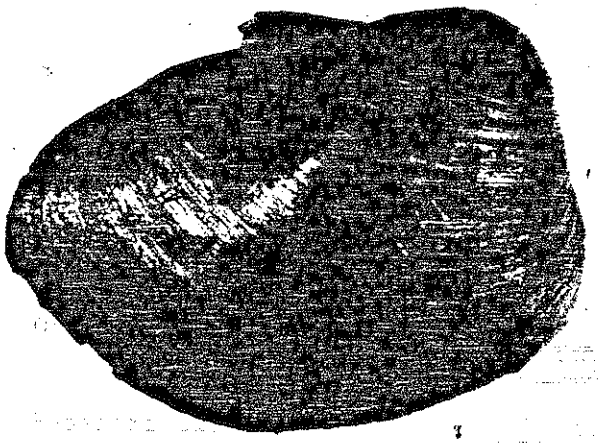
*Pleurobema curtum* (Lea, 1859). (Simpson, 1914:762-763)

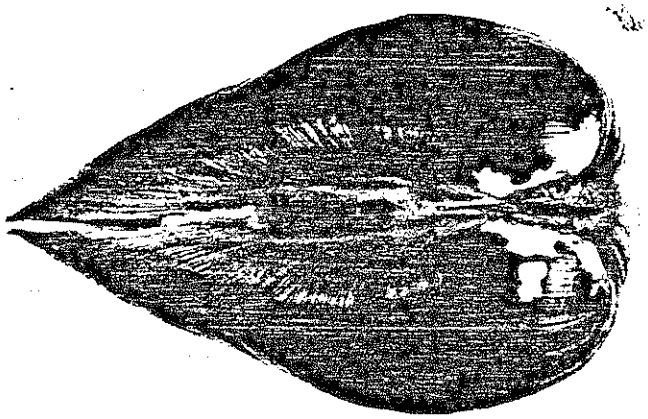
*Obovaria (Pseudoön) curta* (Lea, 1859). (Frierson, 1927:91) (Haas, 1969:424)

### Taxonomic Status

The shell characters of *P. curtum* are such that, so far as is known, it has never been confused with the other numerous forms of the Genus *Pleurobema* Rafinesque, 1820, that have been described from the Alabama drainage of the Mobile River system or elsewhere. The fact that its known range is restricted to the Tombigbee River basin and that no other dark greenish-black *Pleurobema* having the same shell form are known certainly has contributed to this stability.

There is, however, a superficial resemblance between male specimens of *Obovaria jacksoniana* (Frierson, 1912) and *Pleurobema curtum*. This is more a problem of identification than of taxonomy. An examination of the literature reveals that both Frierson (1927:91) and Haas (1969:424) list *P. curtum* as a species of the Genus *Obovaria* in the Subgenus *Pseudoön* Simpson, 1900. The females of *P. curtum* can be distinguished from those of *O. jacksoniana* by the fact that the gravid gill of *P. curtum* has a thin, sharp, ventral margin, while that of *O. jacksoniana* is thick, pad-like and rounded. The shell of female *P. curtum* is tapered to a rounded point posteriorly,



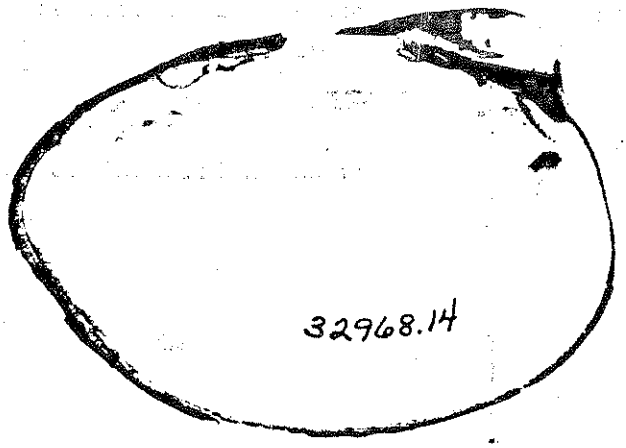


Pleurobema curtum
(Lea, 1859).

OSUM 32968.14

Tombigbee River at
Pickensville, Pickens
Co., Alabama.
23 June 1972.

Length = 53 mm
Height = 36 mm
Width = 33 mm



while the posterior margin of female *O. jacksoniana* is truncate. The shells of males of *P. curtum* are dark greenish-black with small tapered umbos, while male *O. jacksoniana* are brownish-black with medium-full rounded umbos.

The possibility of two or more taxa now being included under the name *P. curtum* seems very unlikely. The variability of the material at hand is less than that of most species. The status of *P. curtum* as a distinct species appears to be firm.

## Nomenclatorial Status

From the time of its original description until the general adoption of Simpson's synopsis (1900) this species had been listed under only two name combinations: *Unio curtus* (Lea, 1859) and *Margaron curtus* (Lea, 1859).

Simpson (1900:754) placed *U. curtus* in the Genus *Pleurobema*, using the feminine ending *P. curta*. The name *Pleurobema*, however, is neuter (Woods, 1944:35) and thus the name was later corrected by Simpson (1914:762) to *P. curtum*.

So far as is known, the name *curtum* is not preoccupied in the Genus *Pleurobema*, and the original description is perfectly valid. The only significant nomenclatorial difficulty to date has been the placing of this species by some workers (Frierson, 1927:91; Haas, 1969:424) into the Genus *Obovaria*. This is due to errors in identification, however, probably because of the scarcity of specimens of *P. curtum* in research collections. Until recently the Tombigbee River had been only casually studied for naiad mollusks and most of the recent comprehensive work has yet to be published. *Pleurobema curtum* is rare in collections.

Should it become necessary to subdivide the highly variable Genus *Pleurobema* into two or more genera, the characteristics of *P. curtum*, both shell and soft parts, are similar enough to those of *Pleurobema clava* (Lamarck, 1819), the type species of the genus, that *curtum* would very likely remain in the Genus *Pleurobema*. The name *Pleurobema curtum* (Lea, 1859) appears to possess near maximal nomenclatorial stability.

## Diagnostic Characteristics

The gross anatomy of the soft parts has been described by Lea (1861: 103-104; pl. 17, fig. 253) in his redescription of the species. Lea (op. cit.) characterizes the marsupium ("uterus") as "occupied the whole length of the outer branchiae." This character effectively removes this species from the Genus *Obovaria* and places it in that group of the Subfamily Ambleminae that uses only the outer demibranchs as marsupia. The shape of the shell (i.e. near-terminal, prominent umbos, produced posteriorly, complete heavy hinge dentition) restricts it to the *Lexingtonia-Plethobasus-Pleurobema* group. The lack of colored ova and the lack of shell sculpture effectively remove *curtum* from *Lexingtonia* and *Plethobasus* respectively, thus placing the species in the Genus *Pleurobema*. This is the only species of *Pleurobema* having the clavate shell form of *P. clava* and a dark greenish-black periostracum. There are other subtle differences in both shell char-

acteristics and those of the soft parts, but those mentioned are both obvious and diagnostic.

## Former Distribution

Lea (1870:97) in his last synopsis gave the distribution of *Margaron (Unio) curtus* as "Tombigbee river, Missi [sic]" and Simpson (1914:763) in his last unionid work, gives "Tombigbee River, Columbus, Mississippi," duplicating the locale information given in the original description (Lea, 1859:113).

Haas (1969:424) believed it to be known only from the type locality ("Anscheinend nur von der Terra Typica bekannt"), and Burch (1975:13) gives simply "Tombigbee, Mississippi" as the range of the species.

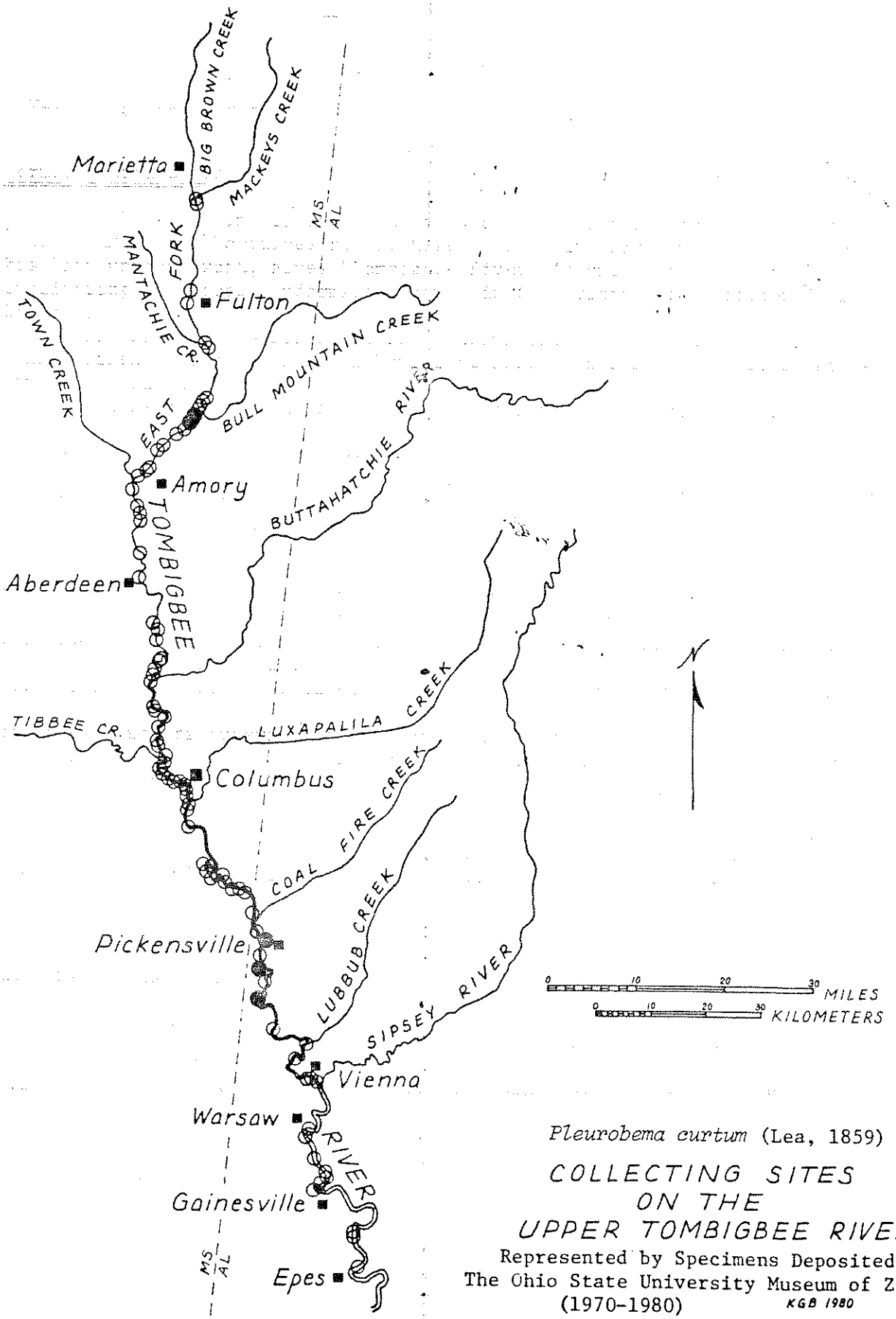
A single record (Hinkley, 1906:54) lists the "Big Black and Tombigbee rivers" as collection sites for *P. curtum*. This is the only time, to my knowledge, that *P. curtum* has been recorded outside the Tombigbee River system. Since at least some of the headwaters of both rivers have their origins in close approximation, there is the possibility that by stream capture, or other similar and effective means, the species may have come to occupy both systems. The list provided by Hinkley (1906:53-54) includes both *Obovaria castanea* (Lea), a synonym of *Obovaria jacksoniana* Frierson, and *Pleurobema curta* (Lea), indicating that the listing of *P. curtum* for the Big Black River is most probably not due to an error in identification. This record may be correct. It is possible, however, that this record is the result of a transposition of specimen labels. The unionid fauna of the Big Black River should be carefully studied to determine which species are and have been there, and what their ranges are within the system. The same is true of the tributaries of the Tombigbee River.

Other publications giving species distributions in the general range of *P. curtum* include Yokley (1975), Burch (1975), Stansbery (1976), Yokley (1978) and Williams (1982). None of these include any positive records for *P. curtum* outside the Tombigbee River proper -- not even from its tributaries. The doubtful record from the Big Black River notwithstanding, it seems safe to infer that the known historic range of this species has been restricted to the Tombigbee River main stem.

## Present Distribution

Present records place the known range of *P. curtum* in the main stem of the Tombigbee River from just below the mouth of Bull Mountain Creek near Smithville, Itawamba/Monroe Counties, Mississippi, downstream to a point 0.5 miles east of Memphis, Pickens County, Alabama. It should be noted that the East Fork Tombigbee River is clearly the principal extension of the Tombigbee River proper upstream from the confluence of the East and West Forks. This is true from a physiographic, hydrologic and biological point of view.

It is important to note that our records indicate at least a 60 mile hiatus between the upstream and downstream aggregations (populations?). The number of collections made in this length of stream (see map) indicates




*Pleurobema curtum* (Lea, 1859)

# COLLECTING SITES ON THE UPPER TOMBIGBEE RIVER

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

that this hiatus is not due to a lack of collecting effort. Yokley (1975: III-73,74) also failed to find any *P. curtum* in this 60 mile hiatus.

In the absence of recent records from anywhere except these two aggregations in the Tombigbee River, we are forced to conclude that these represent the present range of the species.

The distributional evidence presented above indicates a high probability that *P. curtum* is a very sensitive species, since there are only two known sites where the combination of factors is such that this species was living in 1972-1974. If modifications of the Tombigbee River since that time have altered any of these factors beyond the range of tolerance of this species, it may well have become extinct.

## Habitat

In June of 1972 I had the pleasure of collecting, thanks to Dr. James Williams, a fine series of fresh empty shells of *P. curtum* from several recent middens along the Tombigbee River at Pickensville, Pickens County, Alabama. In addition to the midden specimens, several empty shells were found *in situ* in the substrate, thus adding to our information on the habitat of this elusive species. Williams had collected fresh shells of this species several times and was fortunate enough to find single living specimens on at least two occasions. He (Williams, 1982:72) describes the habitat as "in the main channel of the upper Tombigbee River ... a gravel bottom mixed with sand, with moderate to swift current." Williams (1972: 72) further notes that

> "Shoals in the Memphis and Pickensville area where live specimens were collected ranged in depth from 0.3 to 1.3 m. Live specimens were taken by hand at a depth of approximately 0.5 m. In the East Fork [Tombigbee River] near Smithville, the substrate was predominantly gravel but there was more sand in this area than in the vicinity of Pickensville."

The shells I found *in situ* were in the customary position of most heavy-shelled amblemine bivalves: the anterior end, with its relatively heavy umbos, was buried deeply enough in the sandy-gravel substrate that only a few millimeters of the posterior end protruded from the substrate into the water column. The site was within 1 m of the shore and only 0.1 -0.2 m deep. I recall a noticeable deposit of silt over the sandy-gravel material beneath. Such a silt layer could cause the demise of these animals if it persisted for a long enough period of time and if the unionids were not capable of moving up far enough to make clear contact with the water column.

This seems to be a species of a stable sandy-gravel substrate in moderate to swift current in relatively shallow water in a river of medium size.

## Potential Threats

*Pleurobema curtum* is apparently restricted to the main stem of the

upper Tombigbee River. The fact that we have no records for the entire Alabama River system indicates that species closely resembling *P. curtum* are absent from this bastion of *Pleurobema* complexity. Potential threats to the survival of *P. curtum* are, for the present at least, those threats to the continued existence of the Tombigbee River as a natural or near natural habitat for unionid mollusks in general, and for this species in particular.

The greatest threat to the continued existence of any species is habitat destruction. There is an aspect of this concern, however, that is apt to escape notice. There is abundant habitat in the Tombigbee River and elsewhere, that appears to meet the more obvious requirements of these animals:

- a stable sandy-gravel substrate.
- a moderate to swift current.
- a depth of 0 to 1.5 meters.
- a river of medium size.

Less obvious requirements of the species may well be included under:

- the right amounts of the right materials in solution ("water chemistry").
- the right amounts of the right materials in suspension (organic and inorganic suspensions).
- physical characteristics of the water within the species' range of tolerance. The annual heat budget, for example, must be adequate for the life processes of individuals, including their reproduction.
- the seasonal movements of the host species of fish must be such that the glochidial-juvenile metamorphosis can occur.
- predator populations must also be within the species' range of tolerance.
- other factors comprising the ecological niche of the species in question must also be operating within the range of tolerance of the species if it is to survive.

The potential threat is a complex of factors, not all of which are known -- much less evaluated -- in describing the habitat above. Our recognition of the degree of our ignorance in identifying potential threats should not be used as an excuse to ignore the subject altogether. This condition exists because most of society is either not aware of this lack of information or, being aware, is not concerned that these species be preserved. Both of these conditions can and should be remedied through education for the long term benefit of society itself.

## Recommendations For Preservation In Nature

The best procedure to preserve species threatened with extinction is

to preserve their present habitat in as natural condition as possible while we set about the task of determining the range of tolerance to each of those factors necessary for the species' survival.

It has been known for many years that the Tombigbee River system has held a number of species of unionid and pleurocerid mollusks which were either rare or unknown in other river systems. This being the case, any environmental modification of this system that threatens to decrease this natural resource of biological diversity should be given special attention.

If *P. curtum* still survives in the Tombigbee River, steps should be taken to preserve its habitat as best we understand it. At the very least those habitat characteristics listed above as "more obvious" should be preserved. An argument can be made that any species so few in numbers with so restricted a range is on the verge of extinction regardless of human-generated impacts. While there is some truth in this statement, it should also be noted that each species, including *P. curtum*, is unique. Once extinct, it has passed the point of no return. There still remains the possibility, however improbable, that *P. curtum* may have been more numerous and more widespread in the contact period of our early history and that its present reduced status may be due to early human impact before any collections were made or observations on these animals recorded.

It is frequently recommended that the remaining individuals of a population whose habitat is about to be destroyed be transplanted to equal or better habitat elsewhere out of harm's way. This well-meant advice is, however, fraught with several difficulties. It is obviously true that every species and subspecies (other than the original population) has expanded into the habitats of its range at some time during its previous history. It is also true that very few unionid species appear to be expanding into new habitats or new range today. And it is also sobering to note that none of the unionid transplants on record have been successful on an on-going reproducing basis.

While it seems obvious that there are uninhabited suitable habitats into which endangered species can be successfully introduced, we simply do not as yet have the means to identify these sites. Current efforts to create unionid habitat may, hopefully, prove successful -- but the chances that these introduced individuals will become established as breeding populations seem slight in view of the evidence at hand.

Acknowledgements

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 and 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.

Literature Cited and Selected Bibliography

Brown, Roland Wilbur
1956. Composition of scientific words: a manual of methods and a lexicon of materials for the practice of logotechnics.
Privately publ., Baltimore, 882 pp.

Burch, J.B.
1973. Freshwater unionacean clams (Mollusca:Pelecypoda) of North America.
U.S. Environ. Prot. Agency, Biota of Freshwater Ecosystems Identification Manual No. 11, 176 pp.

1975. Freshwater unionacean clams (Mollusca:Pelecypoda) of North America.
Malacological Publications, Hamburg, Michigan, 204 pp.

Frierson, Lorraine Screven
1912. *Unio (Obovaria) jacksonianus*, new species.
Nautilus 26(2):23-24, pl. 3, fig. 1,2,3.

1927. A classified and annotated check list of the North American naiades.
Baylor University Press, Waco, Texas, 111 pp.

Haas, Fritz
1969. Superfamilia Unionacea.
Das Tierreich 88:i-x, 1-663, 5 fig.

Hinkley, Anson A.
1906. Some shells from Mississippi and Alabama.
Nautilus 20(3):34-36, (4):40-44, (5):52-55.

Johnson, Richard I.
1974. Lea's unionid types or Recent and fossil taxa of Unionacea and Mutelacea introduced by Isaac Lea, including the location of all the extant types.
Special Occ. Publ. No. 2, Dept. of Mollusks, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, 159 pp.

Lamarck, Jean Baptiste
1819. Les nayades, pages 67-89 *IN:* Histoire Naturelle des Animaux sans Vertebres.
Vol. 6, Paris.

Lea, Isaac
1859. Descriptions of eight new species of Unionidae, from Georgia, Mississippi and Texas.
Proc. Acad. Nat. Sci. Phila. 11:112-113.

1860. Check list of the shells of North America. Unionidae. 6 pp.
Smithsonian Misc. Collections, Wash., D.C.

Lea, Isaac (cont.)
1861. New Unionidae of the United States.
J. Acad. Nat. Sci. Phila. 5(N.S.), Art. 2:53-109, pl. 1-18, fig. 199-256.

1862. Observations on the Genus *Unio*. Vol. VIII.
Privately publ., Philadelphia, 115 pp., 18 pl.

1870. A synopsis of the family Unionidae.
Henry C. Lea, Philadelphia, 184 pp.

Rafinesque, Constantine S.
1820. Monographie des coquilles bivalves fluviatiles de la riviere Ohio, contenant douze genres et soixante-huit especes.
Annales Generales des Sciences Physiques 5(13):287-322, 3 pl.

Simpson, Charles Torrey
1900. Synopsis of the naiades, or pearly freshwater mussels.
Proc. United States Nat. Museum 22:501-1044, 1 map.

1914. A descriptive catalogue of the naiades or pearly fresh-water mussels.
Bryant Walker, Detroit, 3 vol., 1540 pp.

Scudder, Newton Pratt
1885. Bibliographies of American naturalists. II. The published writings of Isaac Lea, Ll.D.
U.S. Government Printing Office, Washington, D.C., 278 pp.

Stansbery, David H.
1976. Naiad Mollusks. pp. 42-52, *IN* Herbert Boschung, editor. Endangered and threatened plants and animals of Alabama.
Bull. Alabama Museum Nat. Hist. 2:1-92.

Williams, James David
1982. Distribution and habitat observations of selected Mobile basin unionid mollusks. pp. 61-85, 11 fig. *IN:* Miller, Andrew C., editor. Report of freshwater mollusks workshop, 19-20 May 1981.
U.S. Army Engineer Waterways Experiment Station Environmental Laboratory, Vicksburg, Mississippi, 184 pp.

Woods, Robert S.
1944. The naturalist's lexicon.
Abbey Garden Press, Pasadena, 282 pp.

Wright, Berlin Hart and Bryant Walker
1902. Check list of North American naiades.
Privately publ., Detroit, Michigan, 19 pp.

Yokley, Paul Jr.
1975. [Mollusk collections from the Tombigbee River in Mississippi and Alabama.]
U.S. Army Corps of Engineers Report - a draft report of 32 tables less Table 1.

1978. A survey of the bivalve mollusks of the Buttahatchie River, Alabama and Mississippi.
privately printed.

*PLEUROBEMA CURTUM* (LEA, 1859)

SPECIMENS DEPOSITED IN

THE UNITED STATES NATIONAL MUSEUM

AND

THE OHIO STATE UNIVERSITY MUSEUM OF ZOOLOGY

SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records
Specimens in the United States National Museum

SPECIES *Pleurobema curtum* (Lea, 1859).

| Drainage System | Locality: State | Locality: County | Locality: Specific | Collector / Coll. Date | Catalog No. / Coll. No. | Recorded as / Specimens | Author / Year: Page |
|---|---|---|---|---|---|---|---|
| Mobile | MS | | "Columbus, Miss." | "Spillman" 18-- | USNM 84737 | 1 specimen | HOLOTYPE |
| Mobile | MS | | "Columbus, Miss." | "Dr. Spillman" 18-- | USNM 84737 | 3 specimens | PARATYPES |
| Mobile | AL | | "Tombigbee R., Ala." | Lewis 18-- | USNM 84738 | 2 specimens | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Researched by David H. Stansbery Date 14 Feb. 1980

SPECIES DISTRIBUTION SUMMARY
Museum Specimens or Literature Records

SPECIES Pleurobema curtum (Lea, 1859).

Specimens in the Ohio State University Museum of Zoology

| Drainage System | Locality | | | Collector / Coll. Date | Catalog No. / Coll. No. | Recorded as / Specimens | Author / Year: Page |
|---|---|---|---|---|---|---|---|
| | State | County | Specific | | | | |
| Mobile River | Alabama | Pickens | Tombigbee River about 300 yards above Pickensville boat landing, about 10 mi. NW of Aliceville, Sec. 14, T21S, R17W | J.D. Williams, et al. 20 Aug. 1974 | 41323 OSUM:1974:202 | 1 w; 9 d. | |
| Mobile River | Mississippi | Itawamba | East Fork Tombigbee River about 1/4 mi.below bridge, 2.7 mi. NW of Smithville, 12.3 mi. S of Fulton, SW 1/4 Sec. 26, T11S, R8E | J.D. Williams, R.Grace 28 July 1974 | 35548 OSUM:1974:124 | 3 d. | |
| Mobile River | Mississippi | Monroe | East Fork Tombigbee River about 2 mi.WNW of Smithville, 0.5 mi.S of Itawamba Co.line, 7.9 mi.NNE of Amory, Sec.35, T11S, R8E | J.D. Williams, et al. 20 July 1974 | 35630 OSUM:1974:133 | 1 1/2 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, T21S, R17W | J.D. Williams, R.Grace 19 Aug. 1974 | 36221 OSUM:1974:204 | 1 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 | 34564 OSUM:1972:315 | 1 w; 7 d. | |
| Mobile River | Alabama | Pickens | Tombigbee River at Pickensville, 300 yards 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 | 32968 OSUM:1972:110 | 16 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 | 48554 OSUM:1972:89 | 4 d. | |
| Mobile River | [Mississippi or Alabama] | | "Tombigby Riv." | ex Henry Moores Coll. 18— | 16225 | 3 d. | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Researched by David H. Stansbery Date 14 Aug. 1980