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THE BYRAM CALCAREOUS MARL OF MISSISSIPPI.

By C. Wythe Cooke.

HISTORICAL INTRODUCTION.

The beautiful and well-preserved shells contained in the lower Oligocene deposits at Vicksburg, Miss., early attracted the attention of collectors. Lesueur appears to have been the first to depict them, and the set of five plates engraved by him in 1829 shows a number of the species at Vicksburg. However, as his plates were not accompanied by names or descriptions, all the Vicksburg species date from later authors. His name, although not attached to any of the species as author, is perpetuated by *Scapharca lesueuri* Dall, one of the most common and most characteristic mollusks of the Byram marl. Conrad, the Nestor of American Tertiary paleontologists, in 1848 [1] described and figured a large number of fossil mollusks from Vicksburg. Since that time many collectors have visited Vicksburg, and specimens from the marls are contained in many cabinets, but no one has attempted a systematic study of the fossils.

Nearly every student of the Vicksburg beds has recognized a twofold or a threefold division of the group. Conrad collected chiefly from the topmost marls, but that he was aware of the presence of a lower shell bed and that five of his species came from it is plainly stated on pages 207–208 of the volume cited. Hilgard, in his monumental work on the geology of Mississippi,[2] published a characteristic section of the bluff at Vicksburg but did not propose names for the various beds. Otto Meyer [3] in 1885 distinguished three members of the Vicksburg, for which he proposed the names "Higher Vicksburgian," "Middle Vicksburgian," and "Lower Vicksburgian." The middle and lower divisions of Meyer constitute but one horizon, in the opinion of Casey,[4] who says:

> At Vicksburg there are two distinct horizons. * * * The lower Vicksburgian consists of alternate thin strata of gray sands, sandy clays, and variably but usually loosely compacted white or gray limestone. The upper consists of a much thinner bed of more or less red-brown marl, often indurated into nodular masses or subindurated, and without trace of limestone, having rarely, however, thin layers of glauconitic sands and comminuted shells, in which entire specimens when found are generally much distorted by pressure. The faunas of these two beds differ very markedly.

In 1918 I proposed names for the several formations of the Vicksburg group [5] and drew up the correlation table shown on page 80. The detailed evidence upon which this correlation is based is still awaiting publication.

The present paper is designed to describe briefly the youngest formation of the Vicksburg group, the Byram marl, to give an account of its more notable exposures in Mississippi, and to enumerate some of the fossil species that have been found in it. The formation is more fully described in a manuscript by me awaiting publication by the Mississippi State Geological Survey. I hope before long to undertake the systematic description of the mollusks of the Vicksburg group.

GENERAL FEATURES.

The topmost formation of the Vicksburg group, the Byram calcareous marl, is named from the village of Byram, on Pearl River, Miss., about 9 miles below Jackson. The Byram beds were supposed by Casey [6] to constitute a "substage" intermediate in age between the Red Bluff clay and the Mint Spring marl, but more detailed study of the mollusks

[1] Conrad, T. A., Observations on the Eocene formation and descriptions of 105 new fossils of that period from the vicinity of Vicksburg, Miss.: Acad. Nat. Sci. Philadelphia Jour., 2d ser., vol. 1, pp. 111-134, 1848; Descriptions of new fossil and recent shells of the United States: Idem, pp. 207–209, 1849.

[2] Hilgard, E. W., Report on the geology and agriculture of the State of Mississippi, p. 141, 1860.

[3] Meyer, Otto, The genealogy and the age of the species in the southern Old Tertiary, pt. 2: Am. Jour. Sci., 2d ser., vol. 30, p. 71, 1885.

[4] Casey, T. L., On the probable age of the Alabama white limestone: Acad. Nat. Sci. Philadelphia Proc., vol. 53, p. 515, 1901.

[5] Cooke, C. W., Correlation of the deposits of Jackson and Vicksburg ages in Mississippi and Alabama: Washington Acad. Sci. Jour., vol. 8, p. 187, 1918.

[6] Op. cit., pp. 517–518.

and corals shows that the marl at Byram is of the same age as the upper shell bed at Vicksburg, and this correlation is entirely corroorated by the evidence of the Bryozoa and the Foraminifera.

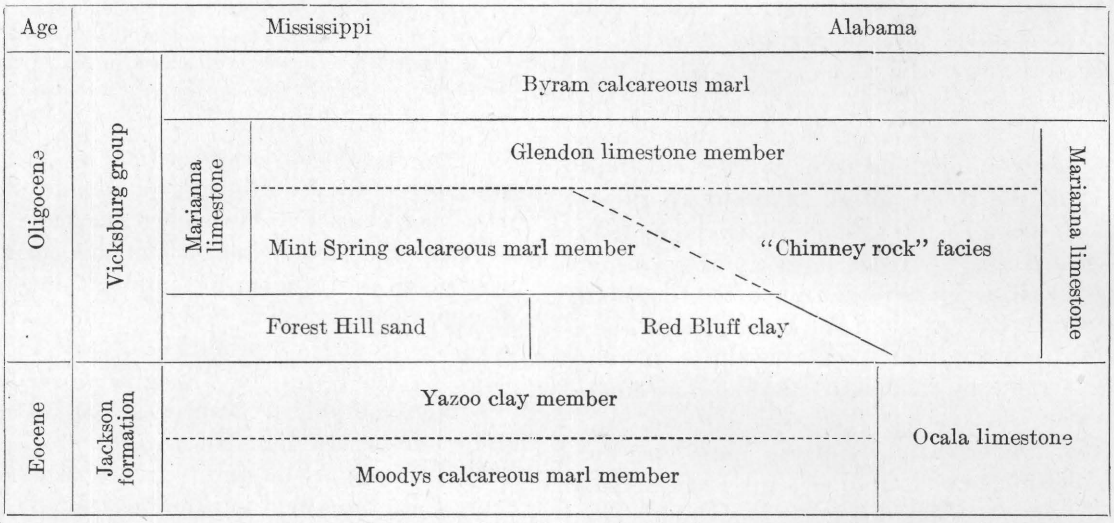
The Byram marl lies conformably upon the Glendon limestone member of the Marianna limestone. The relations of the Byram marl to the overlying Catahoula are conjectural. At Vicksburg the transition from one formation to the other is so gradual that deposition appears to have been continuous from the Vicksburg into the Catahoula, but at Waynesboro the change in lithology is so abrupt as to suggest the probability of an interruption in deposition. However, no unequivocal evidence of unconformity between the two formations has been observed.

Although the Byram marl, being the formation from which Conrad obtained most of his fossils from Vicksburg and upon which he based his description of the Vicksburg group, is the type formation of the group; it is not nearly so conspicuous as the Marianna limestone, which underlies it, and this has given rise to the erroneous impression that the Vicksburg group consists chiefly of limestone. The formation, as the name indicates, consists largely of marl, but it contains also thin beds of impure limestone, clay, and sand. The marl is generally sandy and contains considerable glauconite. On natural outcrops it is of a rusty yellowish color, but where less weathered it is gray or green.

At Vicksburg, where the entire thickness of the Byram marl is exposed, the formation is only 42½ feet thick. On Chickasawhay River, in eastern Mississippi, incomplete exposures indicate a thickness of at least 70 feet. Because of the softness of the Byram marl, exposures are few and usually incomplete, and in many places the whole formation is covered. The outcrop of the Byram marl extends entirely across the State of Mississippi. Exposures are known on Mississippi, Pearl, Leaf, and Chickasawhay rivers and at a few intermediate places, and strata of the same age have been found at several places in Alabama.

No marked physiographic features are due to the Byram marl. The soft, easily eroded strata usually form gentle slopes between the harder Glendon limestone member of the Marianna limestone, below, and the Catahoula sandstone, above. At some places the Byram marl has been eroded back from the edge of the Glendon limestone, leaving the hard ledges of the Glendon projecting as a broad platform or terrace

Correlation of the Jackson and Vicksburg deposits in Mississippi and Alabama.



LOCAL DETAILS.

VICINITY OF VICKSBURG.

Exposures of the Byram marl occur at several places near Vicksburg. The best and most complete is on the Park Road leading southward up the hill from Waltersville past the north side of the National Cemetery. Bed 1 of the following section, which shows the entire thickness of the Byram marl as well as parts of the adjacent formations, was found

in a ravine 11 feet below the wagon bridge on the east side of Waltersville.

Section between Waltersville and the National Cemetery.

	Feet.
12. Loess	25±
11. Coarse gravel, pebbles 2 inches in maximum length, in matrix of irregularly grained sand.	13
Catahoula sandstone (?):	
10. Fine gray laminated sand	25
Byram marl:	
9. Lower 10 feet consists of a shell bed with *Scapharca lesueuri*, etc., at base, overlain by 1½ feet of brownish fossiliferous clay grading upward into yellowish ferruginous, glauconitic sandy marl with shells. Upper part is prevailingly brown clay with patches of marl, with shells locally abundant. Top is yellowish-gray, sparingly glauconitic, ferruginous shell marl with *Ostrea vicksburgensis*, *Pecten poulsoni*, etc.	38
8. Gray or brown argillaceous marl and brown clay with occasional plant remains associated with mollusks. Shells especially abundant near the top. *Dentalium mississippiense*, *Pecten poulsoni*, etc	4.5
Marianna limestone (Glendon limestone member):	
7. Gray glauconitic, somewhat indurated marl with poorly preserved fossils. Nodular in upper part	4.5
6. Blue-gray or gray fossiliferous glauconitic argillaceous marl with some stiff blue clay at top. *Lepidocyclina*	4
5. Gray marl, slightly indurated at top, which forms a projecting ledge over Nos. 3 and 4. The top is level with the floor of the bridge at the south end	5
4. Stiff brown clay with thin partings of marl	1
3. Gray or yellow marl with obscure fossils; a thin band of brown clay at bottom	1.5
2. Hard pinkish-gray limestone with a little glauconite and fragments of *Pinna*, etc. A few inches at top consists of soft laminated gray marl with abundant *Lepidocyclina* and *Pecten poulsoni*	2
1. Gray or cream-colored sandy marl, with flakes of mica and small grains of glauconite. *Pecten poulsoni* and fragments of other fossils. Thickness seen	1.5

The fossil species in the following list were obtained from the Byram marl at this locality:

Station 7372. Road north of the National Cemetery, north of Vicksburg, Miss., beds 8 and 9 of section; C. W. Cooke, collector, May 16, 1915:

Lepidocyclina supera (Conrad).
Archohelia mississippiensis (Conrad).
Archohelia vicksburgensis (Conrad).
Actaeocina crassiplica (Conrad).
Terebra tantula Conrad.
Terebra divisura Conrad.
Turris (Pleuroliria) cochlearis (Conrad).
Bathytoma congesta (Conrad).
Surcula (Pleurofusia) vicksburgensis (Conrad).
Cochlespira cristata (Conrad).
Drillia abundans (Conrad).
Drillia tantula (Conrad).
Scobinella caelata Conrad.
Conus protractus Meyer.
Conus alveatus Conrad.
Olivella mississippiensis (Conrad).
Olivella affluens Casey.
Caricella demissa Conrad.
Lyria mississippiensis (Conrad).
Busycon spiniger (Conrad).
Latirus protractus (Conrad).
Xancus wilsoni (Conrad).
Phos mississippiensis (Conrad).
Rapana n. sp. (O. B. Hopkins, collector).
Murex mississippiensis Conrad.
Galeodea (Sconsia) lintea (Conrad).
Ficus mississippiensis Conrad.
Aporrhais lirata (Conrad).
Architectonica trilirata (Conrad).
Sinum mississippiense (Conrad).
Fissuridea mississippiensis (Conrad).
Dentalium mississippiense Conrad.
Scapharca lesueuri Dall.
Ostrea vicksburgensis Conrad.
Pecten poulsoni Morton.
Corbula engonata Conrad.
Protocardia diversa (Conrad).
Pitaria (Lamelliconcha) imitabilis (Conrad).
Macrocallista (Chionella) sobrina (Conrad).
Crassatellites mississippiensis (Conrad).

Less complete exposures of the Byram marl are found in the upper courses of both Mint Spring Bayou and Glass Bayou at Vicksburg. At Haynes Bluff, 14 miles north of Vicksburg, only 8½ feet of the Byram marl is exposed. It consists of yellow glauconitic sandy fossiliferous marl overlain by gray calcareous clay. The fossils obtained at Haynes Bluff are listed under station 7385.

BYRAM.

In the bank of Pearl River at Byram are the typical exposures of the Byram marl. Broad ledges of indurated glauconitic marl alternating with softer beds of green clay rise about 10 feet above low-water mark. The rock is abundantly fossiliferous, and most of the fossils are contained in pockets of softer marl. The species which have been obtained from these beds are included in the general list.

The marl beds and ledges of impure limestone extend up and down the river from Byram for several miles, but the individual exposures show thicknesses so small that it is difficult to determine just where to draw the line between the Byram marl and the Marianna limestone.

LEAF RIVER.

On Leaf River the Byram marl appears on the west bank at a fish trap half a mile below the bridge on the Taylorsville-Silvarena road near old Blakeney post office. The strata exposed consist of only 2½ feet of bluish lignitic clay and fossiliferous blue sand, which form a shelf-like bench near water level, but the sands have yielded the large and characteristic fauna which is listed under stations 5615 and 7376.

WOODWARDS.

On Chickasawhay River at Woodwards, 2 miles northwest of Waynesboro, about 5 feet of blue or gray glauconitic shell marl composed largely of Foraminifera and containing an irregularly indurated ledge of gray limestone is exposed beneath the bridge. The deposit evidently forms part of the Byram marl and is probably very near the horizon of the shell bed on Leaf River near Blakeney, which it resembles. In addition to many Foraminifera, including *Lepidocyclina supera* (Conrad), which is characteristic of the Byram marl, the following species have been collected:

Station 6648. Chickasawhay River at wagon bridge one-fourth mile west of Woodwards station, Wayne County, Miss., C. Wythe Cooke, collector:

Bryozoa (25 species representing 19 genera).
Lunatia sp.
Dentalium mississippiense Conrad.
Scapharca lesueuri Dall.
Ostrea vicksburgensis Conrad.
Pecten poulsoni Morton.
Macrocallista sp.

FAUNA OF THE BYRAM CALCAREOUS MARL.

The following list includes only the corals, mollusks, and echinoderms which are in the principal collections of the U. S. National Museum from the Byram marl. The corals were named by T. W. Vaughan. I identified the mollusks and echinoderms and prepared the lists. The list includes 5 corals, 134 mollusks, and 2 echinoderms, of which 80 occur also in the Mint Spring marl, 46 persisted from the Red Bluff clay (including 6 which have not been found in the Mint Spring marl), and 54 appear to be peculiar to the Byram marl. One of the most abundant and most widely distributed species is the little *Scapharca lesueuri* Dall, which appears to be restricted to this horizon. The recent discovery at Vicksburg of a coral which Vaughan reports from the coral reef at Bainbridge, Ga., from Tampa, Fla., and from many places in the West Indies suggests a closer relation of the Oligocene chert of Flint River to the Byram marl than had hitherto been suspected.

In addition to the corals, mollusks, and echinoderms listed here, the accompanying paper by Mr. Cushman adds to the fauna of the Byram marl 68 species and varieties of Foraminifera from Byram alone, and it is certain that study of all the material from other localities now in his hands will add greatly to this number. A monograph by Canu and Bassler[7] adds 45 Bryozoa to the fauna of the Byram marl.

Stations of the Byram marl.

3722. Vicksburg, Miss. Bluff just above second sawmill on the river. Horizon No. 2 from top. T. W. Vaughan, collector, 1900.

3724. Vicksburg, Miss. Horizon above waterfall on Mint Spring Bayou, near National Cemetery. T. W. Vaughan, collector, 1900.

3729. Vicksburg, Miss. Top of bluff opposite second sawmill, slightly above second horizon. T. W. Vaughan, collector, 1900.

5615. West bank of Leaf River three-quarters of a mile southeast of Blakeney, Smith County, Miss. No. 2 of section. Nearest town is Taylorsville, which is about 8 miles south of Blakeney. G. C. Matson, collector, 1910.

5623. Byram, Hinds County, Miss. West bank of Pearl River. Includes all fossiliferous beds of section. G. C. Matson, collector, 1910.

6449. Confederate Avenue, Vicksburg, Miss., 600 to 700 feet north of bridge over Glass Bayou. C. W. Cooke, collector, Oct. 17, 1912.

6454. Pearl River just above bridge at Byram, Miss. C. W. Cooke, collector, Oct. 23, 1912.

6455. Pearl River at bridge at Byram, Miss. E. N. Lowe, collector, September, 1912.

7376. Leaf River, Smith County, Miss., half a mile below the wagon bridge on Taylorsville-Silvarena road, near old Blakeney post office (same locality as 5615). E. N. Lowe and C. W. Cooke, collectors, May 22, 1915.

7385. Haynes Bluff, Warren County, Miss. Upper marl bed. C. W. Cooke, collector, May 17, 1915.

[7] Canu, Ferdinand, and Bassler, R. S., North American early Tertiary Bryozoa: U. S. Nat. Mus. Bull. 106, 1920.

Species of corals, mollusks, and echinoderms from the Byram calcareous marl.

	Byram marl.										Mint Spring marl.	Red Bluff clay.
	Haynes Bluff.	Vicksburg.				Byram.			Leaf River.			
	7385	3722	3724	3729	6449	5623	6454	6455	5615	7376		
Turbinolia insignifica Vaughan?	×										×	×
Archohelia mississippiensis (Conrad)		×										
Archohelia vicksburgensis (Conrad)	×	×									×	
Balanophyllia caulifera (Conrad)				×							×	
Dendrophyllia n. sp				×								
Acteocina crassiplica (Conrad)	×	×		×						×	×	
Volvula sp									×			
Cylichna sp		×		×			×	×	×	×	×	
Atys sp										×		
Ringicula mississippiensis Conrad							×					×
Ringicula n. sp									×	×	×	
Terebra divisura Conrad		×	×	×	×					×	×	×
Terebra tantula Conrad	×	×		×		×	×	×		×	×	×
Turris (Pleuroliria) cochlearis (Conrad)		×	×	×			×	×		×	×	×
Gemmula rotaedens (Conrad)		×			×		×				×	×
Gemmula tenella (Conrad)		×	×	×							×	×
Bathytoma congesta (Conrad)		×	×	×	×	×	×	×			×	×
Surcula (Pleurofusia) decliva (Conrad)				×								
Surcula (Pleurofusia) vicksburgensis (Casey)		×		×						×	×	×
Surcula (Pleurofusia) servata (Conrad)		×		×	×		?			?	×	
Surcula (Pleurofusia) clarkeana (Aldrich)						?						×
Microsurcula intacta Casey		×		×			?				×	
Microsurcula aff. M. intacta Casey										×	×	
Microdrillia infans var. vicksburgella Casey?							×		×		×	
Cochlespira cristata (Conrad)		×								×		
Cochlespira sp				×							×	×
Drillia tantula (Conrad)	×	×		×			×			×		
Drillia abundans (Conrad)		×	×	×	×					×		×
Drillia caseyi Aldrich	×	×	×	×			×			×	×	×
Mangilia? cf. M. meridianalis Meyer										×		
Borsonia sp				×								
Scobinella caelata Conrad		×	×	×		×		×		×		×
Scobinella pleuriplicata Casey			×	×							×	×
Conorbis porcellana (Conrad)		?						×	×	×		
Conus alveatus Conrad	×	×	×		×	×	×	×	×	×	×	×
Conus protractus Meyer		×		×							×	
Cancellaria mississippiensis Conrad	×	×		×						×		
Cancellaria sp. *c*		×										
Olivella mississippiensis (Conrad)		×	×	×	×		×	×	×	×	×	
Olivella affluens Casey	×	×		×	×	×	×	×	×	×	×	
Olivella n. sp		×		×							×	
Marginella sp							×					
Caricella demissa Conrad		×		×								×
Caricella demissa Conrad var						×	×	×	×	×		
Caricella sp			×									
Lyria mississippiensis (Conrad)		×	×	×		×	×	×			?	×
Mitra conquisita Conrad			×						×	×	×	×
Mitra cellulifera Conrad		×	×									
Conomitra vicksburgensis (Conrad)								×				
Conomitra staminea (Conrad)								×				
Xancus wilsoni (Conrad)		×								×		
Latirus protractus (Conrad)	×	×				×	×		×	×	×	×
Latirus perexilis (Conrad)		×		×			×			×	×	×
Busycon spiniger (Conrad)		×					×					×
Clavilithes aff. C. humerosa (Conrad)		×										
Fusinus mississippiensis (Conrad)?		×										

Species of corals, mollusks, and echinoderms from the Byram calcareous marl—Continued.

	Byram marl.											
	Haynes Bluff.	Vicksburg.				Byram.			Leaf River.		Mint Spring marl.	Red Bluff clay.
	7385	3722	3724	3729	6449	5623	6454	6455	5615	7376		
Phos mississippiensis (Conrad)	×	×	×	×			×		×	×	×	
Phos mississippiensis (Conrad) var.				×							×	
Phos vicksburgensis (Aldrich)				×							×	×
Phos sp.		×		×							×	
Columbella (Astyris) sp.		×		×						×	×	
Murex mississippiensis Conrad	×	×	×	×	×		×	×		×	×	×
Murex sp.		×										
Typhis curvirostratus Conrad				×						×	×	×
Distorsio crassidens (Conrad)		×	×	×								
Distorsio aff. D. abbreviatus (Conrad)										×		
Phalium caelatura (Conrad)		×		×		×	×		×	×		
Galeodea (Sconsia) lintea (Conrad)		×									×	×
Galeodea sp.		×										
Niso sp.							×				×	
Pyramidella (Syrnola) sp.									×	×		
Ficus mississippiensis Conrad		×	×	×			×				×	×
Cypraea sphaeroides Conrad						×		×			×	
Cypraea lintea Conrad									×			
Ovula (Simnia) sp.										×		
Aporrhais lirata (Conrad)		×		×							×	
Epitonium trigintanarium (Conrad)									×	×	×	×
Epitonium sp.										×	×	
Turritella caelatura Conrad			×	×							×	
Turritella mississippiensis Conrad		×		×							×	
Triphoris sp.										×		
Architectonica trilirata (Conrad)	×	×					×	×		×	×	
Calyptraea sp.		×	×	×				×	×		×	×
Xenophora sp.	×	×									×	
Natica sp. *a*		×					×				×	×
Natica sp. *b*		×		×	×				?	?		
Natica sp. *c*		×	×	×			×		×			×
Lunatia vicksburgensis (Conrad)						×					×	×
Lunatia sp. *g*		×					×					
Sinum mississippiense (Conrad)		×	×	×		×	×				×	×
Sinum sp.		×					×					
Sinum (Eunaticina) conradii (Dall)		×		×			×				×	
Fissuridea mississippiensis (Conrad)				×							?	?
Dentalium mississippiense Conrad	×	×		×	×	×	×	×	×		×	×
Cadulus vicksburgensis Meyer	×								×	×	×	
Nucula vicksburgensis Conrad	×			×			×	×			×	×
Leda n. sp.										×		
Yoldia serica (Conrad)?	×										×	×
Glycymeris arctata (Conrad)	×											
Scapharca lesueuri Dall	×	×		×	×	×	×	×	×	×		
Barbatia mississippiensis (Conrad)?	×	×			×						×	
Pinna (Atrina) argentea Conrad							×				×	
Pteria argentea (Conrad)		×			×		×				×	×
Ostrea vicksburgensis Conrad	×	×		×			×	×	×		×	×
Pecten poulsoni Morton	×	×		×	×	×	×	×	×	×	×	
Pecten (Pseudamusium) subminutus Aldrich										×	×	×
Modiolus mississippiensis Conrad?	×											
Modiolus sp.							×					
Panope oblongata (Conrad)		×		×								
Corbula engonata Conrad	×	×		×	×		×		×	×	×	×
Corbula laqueata Casey	×	×		×	×			×	×	×	×	×
Corbula alta Conrad			×	×							×	
Spisula funerata (Conrad)				×							×	
Donax funerata Conrad				×						?	×	
Donax cf. D. funerata Conrad										×		
Psammobia lintea Conrad						×	×				×	
Tellina vicksburgensis Conrad		×			×		×		×	×	×	
Tellina (Scissula)? sp.							×					
Tellina sp.						×						
Semele sp.									×			

Species of corals, mollusks, and echinoderms from the Byram calcareous marl—Continued.

	Byram marl.										Mint Spring marl.	Red Bluff clay.
	Haynes Bluff.	Vicksburg.				Byram.			Leaf River.			
	7385	3722	3724	3729	6449	5623	6454	6455	5615	7376		
Macrocallista (Chionella) sobrina (Conrad)	×	×	×	×	×	------	------	×	------	------	×	×
Macrocallista sp	------	------	------	------	------	------	------	------	×	------	------	------
Pitaria imitabilis (Conrad)	×	×	×	×	------	×	×	×	------	------	×	------
Pitaria astartiformis (Conrad)	------	×	------	×	------	------	------	------	------	------	------	------
Pitaria floridana Dall	------	×	------	------	------	------	------	------	------	------	------	------
Chione victoria Dall	------	------	------	×	------	------	------	------	------	------	×	------
Chione sp	------	------	×	------	------	------	------	------	------	------	------	------
Chione sp	------	------	------	------	------	------	×	×	------	------	------	------
Cardium vicksburgense Conrad ?	------	------	------	------	------	------	------	------	------	×	------	------
Cardium glebosum Conrad	------	------	------	------	------	------	------	------	------	×	×	×
Protocardia diversa (Conrad)	×	×	×	×	------	------	×	×	×	×	×	×
Lucina mississippiensis Conrad	------	------	×	------	------	------	------	------	------	------	×	------
Myrtaea sp	------	------	------	------	------	------	------	×	------	------	------	------
Phacoides (Here) cf. P. wacissana Dall	------	------	------	------	------	------	×	×	------	------	------	------
Crassatellites mississippiensis (Conrad)	×	×	------	×	------	×	×	×	×	------	×	------
Crassinella sp	------	------	------	------	------	------	------	------	×	×	×	------
Astarte cf. A. triangulata Meyer	×	------	------	------	------	------	------	------	------	------	------	------
Astarte sp	------	------	------	------	------	------	×	------	------	------	------	------
Verticordia dalliana Aldrich	×	------	------	------	------	------	------	------	×	------	×	×
Clypeaster rogersi (Morton)?	------	------	------	------	------	×	×	×	------	------	×	------
Schizaster? sp	------	------	------	------	------	------	×	×	------	------	------	------

The following list enumerates the species of Bryozoa which have been recorded by Canu and Bassler [1] from the Byram marl in Mississippi. The initials B and W indicate that the species so marked occur at Byram and Woodwards, respectively. Those marked V are from Vicksburg, but whether from the Byram marl or from the Mint Spring marl is not recorded. Material from both horizons was studied by Canu and Bassler. The letters R, C, and J signify that the species so marked occur also in deposits of Red Bluff, Claiborne, or Jackson age.

V Conopeum concavum Canu and Bassler.
JB Hinksina ocalensis Canu and Bassler.
V Membrendoecium lowei Canu and Bassler.
V Membraniporidra similis Canu and Bassler.
W Stamenocella inferaviculifera Canu and Bassler.
W Stamenocella grandis Canu and Bassler.
W Scrupocellaria cookei Canu and Bassler.
W Scrupocellaria williardi Canu and Bassler.
W Scrupocellaria clausa Canu and Bassler.
VBW Nellia oculata Busk.
JB Nellia bifaciata Canu and Bassler.
B Diplopholeos lineatum Canu and Bassler.
JB Floridina antiqua Smitt.
RVBW Lunularia (Oligotresium) vicksburgensis Conrad.
VW Lunularia tintinabula Canu and Bassler.
JB Puellina radiata anaticula Canu and Bassler.
B Gephyrotes spectabilis Canu and Bassler.
BW Arachnopusia vicksburgica Canu and Bassler.
BW Trypostega venusta Norman.
JB Hippoporina lucens Canu and Bassler.
JW Hippomenella crassicollis Canu and Bassler.
RB Hippodiplosia baccata Canu and Bassler.
VB Hippodiplosia strangulata Canu and Bassler.
BW Enoplostomella synthetica Canu and Bassler.
B Enoplostomella magniporosa Canu and Bassler.
BW Porella compacta Canu and Bassler.
W Retepora laciniosa Canu and Bassler.
VBW Tubucellaria vicksburgica Canu and Bassler.
V Metrarabdotos moniliferum Edwards and Haime.
W Meniscopora elliptica Canu and Bassler.
RB Adeonellopsis galeata Canu and Bassler.
B Adeonellopsis cyclops Canu and Bassler.
B Perigastrella plana Canu and Bassler.
V Osthimosia glomerata Gabb and Horn.
B Holoporella peristomaria Canu and Bassler.
W Fedora pusilla Canu and Bassler.
BW Oncousoecia quinqueseriata Canu and Bassler.
W Mecynoecia semota Canu and Bassler.
W Exochoecia rugosa Canu and Bassler.
W Diaperoecia clara Canu and Bassler.
CJVW Pleuronea subpertusa Canu and Bassler.
V Pleuronea fenestrata Busk.
JW Idmonea milneana D'Orbigny.
JW Idmonea petri D'Archiac.
W Idmonea triforata Canu.

[1] Canu, Ferdinand, and Bassler, R. S., North American early Tertiary Bryozoa: U. S. Nat. Mus. Bull. 106, pp. 34–38, 1920.