

THE MOODYS BRANCH FORMATION MOLLUSCAN FAUNA FROM A CORE  
 DRILLED ON THE SOUTHWESTERN WOOD PRESERVING SUPERFUND SITE IN  
 CANTON, MISSISSIPPI

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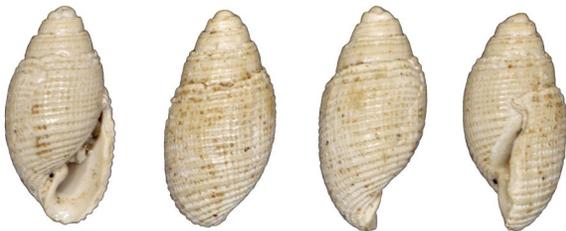
*Eulimella meyeri* (Cossmann, 1893), height 8.8 mm, width 1.8 mm, Moodys Branch Formation, MGS locality 176. MGS figured specimen 2379.



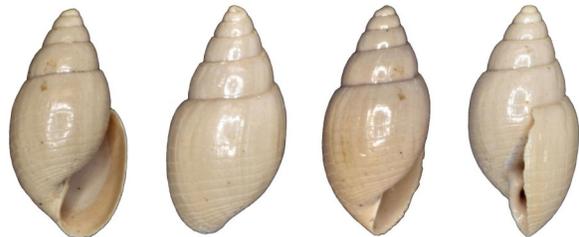
*Odostomia crassispinata* Meyer, 1886, height 1.8 mm, width 0.9 mm, Moodys Branch Formation, MGS locality 176. MGS figured specimen 2461.



*Natica permunda* Conrad in Wailes, 1854, juvenile height 2.8 mm, width 2.7 mm, Moodys Branch Formation, MGS locality 176. MGS figured specimen 2296.



*Acteon annectens* Meyer, 1885, height 4.5 mm, width 2.0 mm, Moodys Branch Formation, MGS locality 176. MGS figured specimen 2372.



*Acteon idoneus* Conrad, 1833, height 4.7 mm, width 2.2 mm, Moodys Branch Formation, MGS locality 176. MGS figured specimen 2371.

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MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF GEOLOGY

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THE MOODYS BRANCH FORMATION MOLLUSCAN FAUNA FROM A CORE  
DRILLED ON THE SOUTHWESTERN WOOD PRESERVING SUPERFUND SITE IN  
CANTON, MISSISSIPPI

Emily Welch, Mississippi State University, and David T. Dockery III, RPG, Mississippi Department of Environmental Quality, Office of Geology

**Introduction.** The type locality of the Late Eocene (38 million years old) Moodys Branch Formation is on Moodys Branch, a creek at the intersection of Peachtree Street with Poplar Boulevard in the Belhaven Subdivision of Jackson, Mississippi. This outcrop is situated near the apex of the Jackson Dome where it is some 500 feet above regional dip. The formation is usually around 7 to 12 feet thick and is the basal fossiliferous sand of the Jackson Group, which includes the overlying Yazoo Clay of some 400 feet in thickness in western Mississippi. Figure 1 shows the outcrop belt of the Jackson Group in Alabama, Mississippi, Arkansas and Louisiana. Updip exposures of the Moodys Branch Formation are best known along Techeva Creek in Yazoo County, where it outcrops for more than a mile along the creek bed. During the remediation of the Southwestern Wood Preserving Superfund Site in Canton, Mississippi, core holes were drilled to check for product (creosote) in subsurface strata. These holes penetrated the lower 40 feet of the Yazoo Clay, 30 feet of the Moodys Branch Formation, and part of the upper 100-foot clay section of the Cockfield Formation, which contains aquifer sands in its middle and lower section. The Moodys Branch section of these cores represent samples of the formation where no outcrops exist.

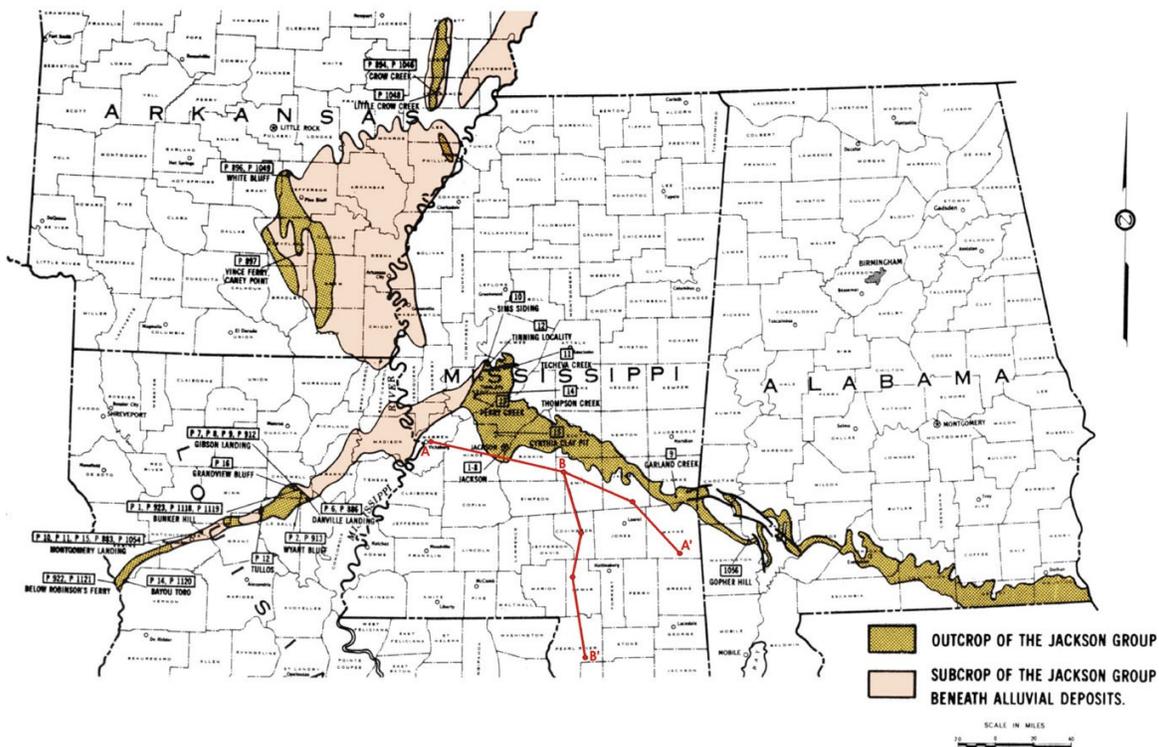


Figure 1. Outcrop belt of the Jackson Group in Alabama, Mississippi, Arkansas, and Louisiana.

Two cores were salvaged in core boxes for sedimentology and paleontological studies. In the course of these core acquisitions, the location map and cross section shown in figures 2 and 3 were published in MDEQ’s newsletter *Environmental News*, volume 10, issue 1, January 2013, p. 18-21.

On June 19, 2017, another core was drilled in preparation for the construction of a slurry wall at the site. This core was taken with a Sonic drilling rig as shown in Figure 4 and was retrieved in 5-foot lengths in a plastic sleeve. Figure 5 shows the 5-foot core length laid side by side.

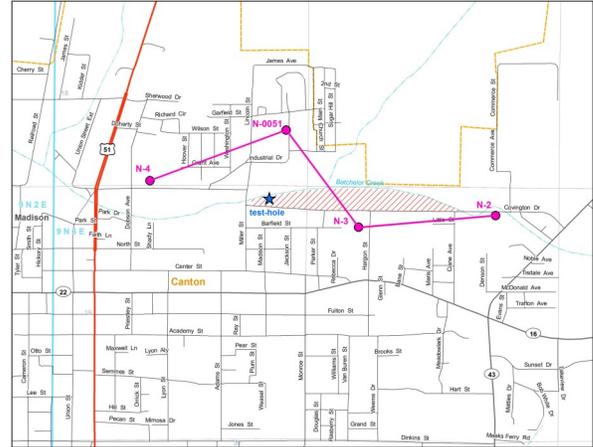


Figure 3. Location of wells and cross section at the Southeastern Wood Preserving Superfund Site at Canton, Mississippi.

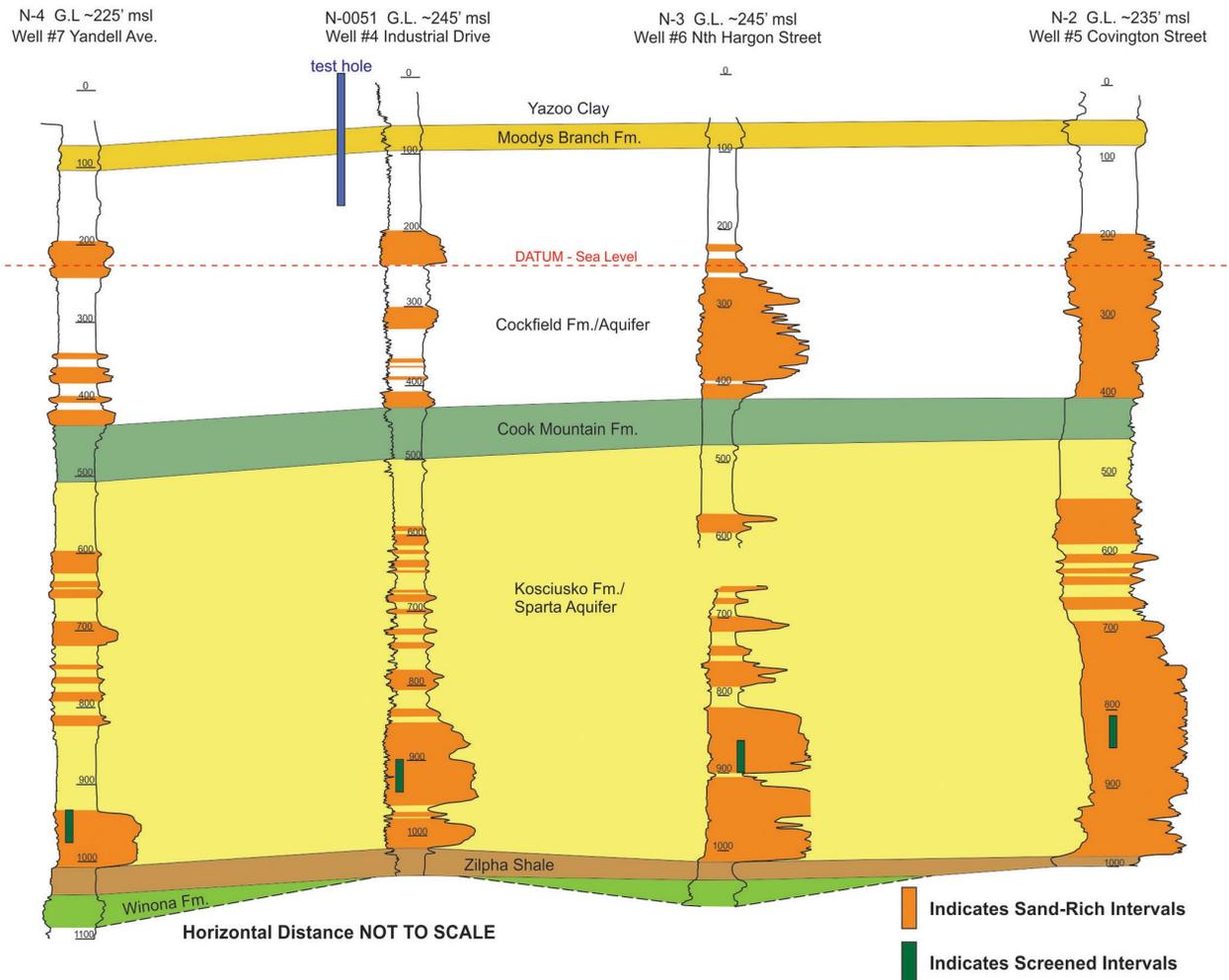


Figure 3. West to east cross section of the Southeastern Wood Preserving Superfund Site at Canton, Mississippi.



Figure 4. Sonic drilling rig coring at the Southeastern Wood Preserving Superfund Site on June 19, 2017, in stormy and fair weather.



Figure 5. The core, from left to right, penetrated the brown weathered Yazoo Clay, the gray unweathered Yazoo Clay (frame 1), the sandy Moodys Branch Formation (2-4), and the Cockfield Formation (4-5) with a lignite seam at the top (4, last core at right).



Figure 6. Emily Welch in frames 1 and 2 holding sieves with lignite from the top of the Cockfield Formation and fossil shells from the base of the Moodys Branch Formation (frame 3).

The cores containing the Moodys Branch Formation, shown in frames 2-4 of Figure 5 were stored for study in the original plastic sleeves placed in plastic bags. The dried cores were divided and weighed before sieving. Sieve fractions of coarse, medium, and fine (collected on a #35 sieve) were weighed individually. Samples were then sorted for by fossil groups, and the fossil mollusks were identified, using MDEQ Office of Geology fossil website on a smart phone. Figure 7 shows a drill rig and core taken on January 8, 2013.



Figure 7. Large Sonic drill rig (top) and core (bottom) taken at the Southeastern Wood Preserving Superfund site in Canton, Mississippi, on January 8, 2013. From left to right are core intervals 30-40, 40-50, 50-60, 60-70, 70-80, and 80-90. The top of the Moodys Branch Formation is at 57.3 feet and the bottom at 81.9 feet. Pictures from *Mississippi Environmental Geology*, 2018, p. 228.

Figures 8-11 were taken during coring at the Southeastern Wood Preserving Superfund sit in November of 2012.



Figure 8. Warning sign at the Southeastern Wood Preserving Superfund site on Bachelor Creek. Picture was taken on November 6, 2012.



Figure 9. Color contrast between the light blue-gray Moodys Branch Formation sand on left and chocolate brown Cockfield Formation clay on the right.

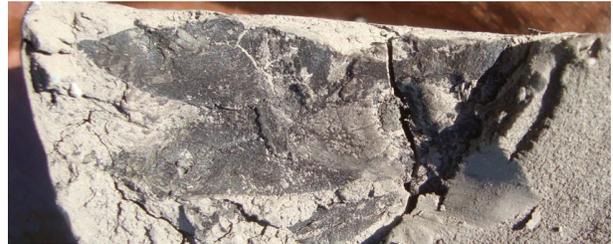


Figure 10. Fossil leaf in the upper Cockfield Formation.



Figure 11. EPA geotechnical contractors describing a core in the Cockfield Formation in the field at the Southeastern Wood Preserving Superfund site on November 8, 2012.

**Methods.** Thirteen lots composed of nine bagged sections of core were weighed, wet sieved, dried, and weighed again for the coarse, medium, and fine fractions. Fossils were identified in the coarse and medium fractions. The lots and bags were numbered as they were processed; these numbers are not in stratigraphic sequence, as the footage of the cores were not recorded. The basal bag of the section is Lot #10, Bag 7, which primarily contained lignite from the top of the Cockfield Formation and fossils from the base of the Moodys Branch Formation, including a complete specimen of the rare gastropod *Cornulina dalli*. Analyses of the bag contents follow.

**Lot #1, Bag 1, Part 1.** Initial mass: 3,064.34 grams, coarse fraction: 6.99 grams, medium fraction 21.37 grams, fine fraction 37.61 grams. Total shell mass collected: 65.97 grams. Percentage of total mass: 2.15%

Large Gastropods: *Turritella*: 0.33 grams

Unidentified Gastropods: 0.61 grams

Unidentified bivalves 9.32 grams

Corals: 2.01 grams

Shark tooth: 0.77 grams

Medium concentration: *Turritella*: 0.11 grams

**Lot #2, Bag 1, Part 2.** Initial dry mass: 3,658.2 grams, coarse fraction: 158.4 grams, medium fraction: 155.11 grams, fine fraction: 46.99 grams. Total shell mass collected: 360.50 grams. Percentage of total mass: 9.85%.

**Large gastropods:**

*Calytraphorus stamineus* (0.76 g)

*Psuedoliva vetusta perspectiva* (1.33 g)

*Turritella alveata* (1.24 g)

*Athleta symmetricus* (0.50 g)

**Large bivalves:**

*Venericor apodensata* (1.81 g)

*Caestocorbula wailesiana* (0.58 g)

**Unidentified specimens**

Gastropods (4.70 g)

Bivalves (72.37 g)

Coral fragments (1.27 g)

Fossils (5.46 g)

**Medium fraction:**

*Turritella* (0.98 g)

Corals (0.09 g)

Scaphopods (0.15 g)

**Lot #3, Bag 2.** Initial mass 5,252 grams, coarse fraction 54.20 grams, medium fraction 67.93 grams, fine fraction: 63.38 grams. Total shell mass collected: 185.51 grams. Percentage of total mass: 3.53%.

Large unidentified gastropods: 1.30 grams

*Turritella* sp. 0.43 grams.

*Pseudoliva vetusta perspectiva* : 0.88 grams

Large unidentified bivalves: 53.45 grams

*Venericor apodensata*: 3.34 grams

Corals: 1.58 grams

Medium concentration *Turritella*: 0.59 grams

Medium scaphopods: 0.04 grams.

**Lot #4. Bag 3, Part 1.** Initial mass: 3,241.4 grams, coarse fraction: 24.21 grams, medium fraction: 39.75 grams, fine fraction: 77.40 grams. Total shell mass collected: 141.36 grams. Percentage of total mass: 4.36%.

Large unidentified gastropods: 1.40 grams

Large *Turritella*: 0.46 grams

Large unidentified bivalves: 28.05 grams

Large *Caryocorbula*: 0.47 grams

Medium *Turritella*: 0.47 grams

Medium scaphopods: 0.04 grams.

**Lot #5, Bag 3, Part 2.** Initial mass, 3,256.7 grams, large fraction 33.13 grams, medium fraction: 42.49 grams, fine fraction: 55.04 grams. Total mass of shells collected: 130.66 grams. Percentage of total mass: 4.01%

Large unidentified gastropods: 1.25 grams

*Turritella*: 0.39 grams

*Pseudoliva vetusta perspectiva*: 1.49 grams

Large unidentified bivalves: 33.18 grams

Shark tooth: 0.20 grams

Medium *Turritella*: 0.43 grams

Medium Scaphopoda: 0.05 grams

**Lot #6, Bag 4:** Initial mass: 5,828.2 grams, coarse fraction 22.00 grams, medium fraction 25.79 grams, fine fraction: 48.45 grams. No significant pieces. Total mass of shells collected: 96.24 grams. Percentage of total mass: 1.65%.

Large unidentified gastropods: 1.16 grams

Large unidentified bivalves: 23.12 grams.

Medium *Turritella*: 0.21 grams

Medium Scaphopoda: - trace

**Lot #7, Bag 5:** Initial mass: 5,800 grams, coarse fraction: 22.66 grams, medium fraction: 31.05 grams, fine fraction: 60.15 grams. Total mass of shells collected: 113.86 grams. Percentage of total mass: 1.96%.

Large unidentified gastropods: 0.87 grams

Large *Turritella*: 0.36 grams

Large unidentified bivalves: 22,78 grams

*Venericor apodensata*: 1.39 grams

Large corals: 0.50 grams

Shark tooth: 0.11 grams

Medium scaphopods: 0.01 grams

Medium *Turritella*: 0.28 grams

Medium corals: 0.04 grams.

**Lot #8, Bag 6, Part 1:** Initial mass: 3,116.6 grams, coarse fraction: 19.24 grams, medium fraction: 21.01 grams, fine fraction 2.69 grams. Total mass of shells collected: 42.94 grams. Percentage of total mass: 1.38 %.

Large unidentified gastropods: 0.87 grams

Large unidentified bivalves: 23.99 grams

*Caryocorbula densata*: 0.22 grams

Medium scaphopods: 0.06 grams

Medium *Turritella*: 0.21 grams

**Lot #9, Bag 6, Part 2:** Initial mass: 3,300.3 grams, coarse fraction: 29.91 grams, medium fraction: 81.81 grams, fine fraction: 51.58 grams. Total mass of shells collected: 163.30 grams. Percentage of total mass: 4.95 %

Large unidentified gastropods: 1.02 grams

Large *Turritella*: 0.85 grams

Large unidentified bivalves: 24.41 grams

*Caryocorbula willistoni*: 0.62 grams

Large corals: 3.99 grams

Medium scaphopods: 0.01 grams

Medium *Turritella*: 0.42 grams

**Lot #10, Bag 7:** Primarily lignite, Initial mass 6,546 grams, coarse fraction 610.47 grams, medium fraction 310.41 grams.

Large unidentified gastropods: 1.74 grams

*Pseudoliva vetusta perspectiva*: 2.62 grams

*Cornulina dalli*: 1.49 grams

Large scaphopod *Dentalium vincense*:  
0.32 grams

Medium fraction, very few distinguishable  
fragments other than lignite

Medium scaphopods: 0.04 grams

Medium *Turritella*: 0.12 grams

**Lot #11, Bag 8:** Initial mass: 4,335.8 grams,  
coarse fraction 198.66 grams, medium fraction:  
170.96 grams, fine fraction: 62.28 grams. To-  
tal shell mass: 431.90 grams. Percentage of  
total mass: 9.96%.

Large unidentified gastropods: 6.27 grams

*Calyptrophorus stamineus*: 1.15 grams

*Bullia altilis*: 0.77 grams

*Mazzalina inaurata oweni*: 0.83 grams

*Turritella perdita jacksonensis*: 1.22 grams

*Turritella* species: 1.06 grams

Large unidentified bivalves: 79.52 grams

Large scaphopod *Dentalium vincense*: 0.35  
grams

Large unidentified fossils: 32.07 grams

Large coral fragments: 4.6 grams.

Medium *Turritella*: 0.70 grams

Medium scaphopods: 0.11 grams

Shark tooth: 0.04 grams.

**Lot #12, Bag 9, Part 1:** Initial mass: 3,658.2  
grams, coarse fraction 158.4 grams, medium  
fraction: 155.11 grams, fine fraction: 82.61  
grams. Total mass of shells collected: 396.12  
grams. Percentage of total mass: 10.83%.

Large unidentified gastropods: 4.70 grams

*Calyptrophorus stamineus*: 0.76 grams

*Pseudoliva vetusta perspectiva*: 1.33 grams

*Turritella alveata*: 1.24 grams

*Athleta symmetricus*: 0.50 grams

Large unidentified bivalves: 72.37 grams

*Caestocorbula wailesiana*: 0.58 grams

*Venericor apodensata*: 1.81 grams

Large coral fragments: 1.27 grams

Unidentified fossils, lignite, and others: 5.46  
grams

Medium *Turritella*: 0.98 grams

Medium scaphopods: 0.15 grams

Medium corals: 0.09 grams.

**Lot #13, Bag 9, Part 2:** Initial mass: 3,816.2  
grams, coarse fraction 221.81 grams, medium  
fraction: 184.46 grams, fine fractions: 95.50  
grams. Total mass of shells collected: 501.77  
grams. Percentage of total mass: 13.15%.

Large unidentified gastropods: 10.08 grams

*Calyptrophorus stamineus*: 1.01 grams

*Mazzalina inaurata oweni*: 5.42 grams

*Pseudoliva vetusta perspectiva*: 12.33 grams

*Turritella alveata*: 0.56 grams

*Turritella perdita*: 0.83 grams

Large unidentified bivalves: 109.32 grams

*Venericor apodensata*: 12.33 grams

*Caestocorbula wailesiana*: 1.04 grams

Large coral fragments: 1.90 grams

Shark teeth: 0.51 grams

Large unidentified fossil, lignite, others: 9.68  
grams

Mollusks in medium fraction:

Medium *Turritella*: 1.29 grams

*Sinistrella americana*: 5 specimens  
*Pyramimitra quadralirata*: 2 specimens  
*Calyptrophorus stamineus*: 2 specimens  
*Euspira jacksonensis*: 7 specimens  
*Sinum jacksonensis*: 1 specimen  
*Bullata semen jacksonensis*: 3 specimens  
*Lapparia dumosa*: 1 specimen  
*Agaronia media*: 2 specimens  
 Medium scaphopods: 0.12 grams

**Stratigraphic position in ascending order of lots based on lignite and shell percentages:**

Lot 10: Top of Cockfield and base of Moodys Branch Formation.

Lot 12: Lignite and shell content of 10.83%

Lot 11: Lignite and shell content of 9.96%

Lot 13: Shell content of 13.15%

Lot 2: Shell content of 9.85%

Lot 9: Shell content of 4.95%

Lot 4: Shell content of 4.36%

Lot 5: Shell content of 4.01%

Lot 3: Shell content of 3.53%

Lot 1: Shell content of 2.15%

Lot 7: Shell content of 1.96%

Lot 6: Shell content of 1.65%

Lot 8: Shell content of 1.38%

Compact soil has an approximate weight of 100 pounds per cubic foot. A one foot length of a 3.5 inch diameter core has a volume of 0.067 cubic feet and a weight of 6.7 pounds or 3,039 grams. The total mass of dry core sieved was 54,873 grams, which is equivalent to a core length of 18 feet. The remaining 12 feet of core from the middle of the formation has yet to be sieved.



Figure 12. This boxed 3.5-inch diameter core half is from the upper clay-rich part of the Moodys Branch Formation at the Southeastern Wood Preserving Superfund Site at Canton, Mississippi. It is stored in MDEQ Office of Geology's Core and Sample Library in Jackson, Mississippi.

Molluscan species in the fine fraction of the Canton, Mississippi, Superfund site core of the Moodys Branch Formation.												
Species List	Lot #11	Lot #13	Lot #12	Lot #9	Lot #2	Lot #4	Lot #5	Lot #3	Lot #1	Lot #7	Lot #6	Lot #8
<b>Gastropods</b>												
<i>Acamptogenotia heilprini</i>			x									
<i>Acteon annectens</i>		x		x	x	x	x	x	x	x	x	x
<i>Acteon idoneus</i>	x	x	x			x	x				x	
<i>Agaronia media</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Architectonica ornate jacksonia</i>	x		x			x	x			x		
<i>Architectonica bellistriata</i>				x								
<i>Athleta symmetricus</i>			x		x	x						
<i>Bittium koeneni</i>	x	x	x	x	x	x	x	x	x	x		
<i>Bonellitia jacksonia</i>		x					x					
<i>Bullata semen</i>				x					x		x	
<i>Bullata semen jacksonensis</i>	x	x	x					x		x		
<i>Capulus americanus</i>			x								x	x
<i>Calyptrophorus stamineus</i>	x		x	x	x	x	x	x	x	x	x	
<i>Cerithiella aldrichi</i>			x	x			x					
<i>Cirsotrema sp.</i>				x								
<i>Clathurella sp.</i>		x										
<i>Conomitra jacksonensis</i>		x		x								
<i>Creseis simplex</i>	x	x	x			x	x	x			x	
<i>Crommium jacksonense</i>		x										
<i>Cyclchnella bitruncata</i>	x	x	x	x		x						
<i>Cymatosyrina dorseyi</i>							x					
<i>Dolicholaturus leaensis</i>	x	x	x			x	x					
<i>Eulimella meyeri</i>	x	x	x	x	x	x	x	x	x	x	x	
<i>Eulimella sp.</i>			x			x		x				
<i>Euspira jacksonensis</i>		x										
<i>Hexaplex marksii</i>						x				x		
<i>Hipponix pygmaeus</i>		x	x	x	x	x	x	x	x	x	x	x
<i>Mathilda regularis</i>			x									
<i>Melanella jacksonensis</i>		x	x				x					
<i>Microdrillia ouachitae</i>	x	x			x							
<i>Mitra (Fusitmitra) millingtoni</i>		x										
<i>Mitrella parva</i>	x											
<i>Mnestia meyeri</i>	x		x									
<i>Natic permunda</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Niso umbilicata</i>				x								
<i>Odostomia crassispirata</i>	x	x	x	x	x	x	x	x			x	
<i>Odostomia jacksonensis</i>			x				x					
<i>Odostomia sp.</i>		x	x			x		x				
<i>Odostomia sp. B</i>	x			x								
<i>Pseudoliva vetusta perspectiva</i>	x	x	x	x						x		

<i>Retusa jacksonensis</i>	x	x	x		x	x	x	x	x	x	x	x
<i>Scalina sp.</i>	x											
<i>Sinistrella americana</i>	x	x	x	x	x	x	x	x	x		x	x
<i>Solariorbis subangulatus</i>	x	x	x	x	x	x	x	x		x	x	
<i>Strioturbonilla major</i>	x	x	x	x	x	x	x	x		x	x	
<i>Teinostoma verilli</i>								x				
<i>Tenuiscalia apersa</i>							x					
<i>Tritonoatractus montgomerienseis</i>	x	x	x	x	x	x	x	x		x	x	x
<i>Turritella alveata</i>	x	x	x	x	x	x		x	x	x	x	
<i>Turritella perdita jacksonensis</i>	x	x	x	x	x	x	x	x	x	x	x	
<i>Xenophora reclusa</i>	x											
<b>Bivalves</b>												
<i>Alveinus minutus</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Bathytormus clarkensis post-clarkensis</i>			x		x							
<i>Caestocorbula wailesiana</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Callista annexa</i>			x	x				x	x	x		x
<i>Caryocorbula willistoni</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Chlamys nupera</i>						x	x		x	x	x	
<i>Crassinella pygmaea</i>				x		x				x		
<i>Diplodonta unguina yazoocola</i>										x		
<i>Eburneopecten scintillates</i>			x		x		x	x		x		
<i>Glycymeris idonea</i>			x				x					
<i>Gonimyrtia curta</i>	x	x	x				x			x	x	x
<i>Gonimyrtia subcurta</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Nemocardium nicoletti</i>			x	x								
<i>Nucula spheniopsis</i>					x	x	x	x	x	x	x	x
<i>Nuculana multilineata</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Periploma equalum</i>	x	x	x	x	x	x	x			x	x	x
<i>Pleuromeris inflatior</i>				x								
<i>Pleuromeris inflatior jacksonensis</i>										x		
<i>Plicatula sp.</i>							x					
<i>Pteria limula</i>			x									x
<i>Simomactra praetenius</i>		x										x
<i>Spisula jacksonensis</i>	x	x	x	x	x	x	x	x		x	x	x
<i>Tellina eburneopsis</i>	x						x	x		x		
<i>Trinacria sp.</i>			x									
<i>Venericardia diversidentata</i>	x	x	x	x	x	x	x	x	x	x	x	
<i>Venericor apodensata</i>					x							
<i>Verticordia cossmanni</i>		x						x	x			
<i>Yoldia mater</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Yoldia reginajacksonis</i>						x	x					

**Sample Preservation:** The fine fraction from each lot was examined under a microscope and identifiable fossils were picked and sorted in three groups, gastropods, bivalves, and other fossils. Gastropods and bivalves were sorted as to species, placed in empty gelatin capsules, and labeled and placed into small self-sealing plastic bags. Labeled self-sealing bags for each lot were placed in a common quart-sized Ziploc-style bag, labeled as to formation, locality, and lot number. Lot bags are stored in the MDEQ Office of Geology fossil collections at the 2525 North West Street, Jackson, MS, office.

Most species were identified by shell fragments, which could be attributed to the species with certainty. Some were identified by the larval shells (protoconchs) of much larger species. Many species are small as adults. These were often found as whole shells. Below are pictures of the gelatin capsule enclosed fossil in a self-sealing bag (below, top) and of the twelve Ziploc-style bags with the species for each lot (below bottom). Lots in Figure 14 are arranged with the bottom of the core interval at upper left to the top of the core interval at the lower right.

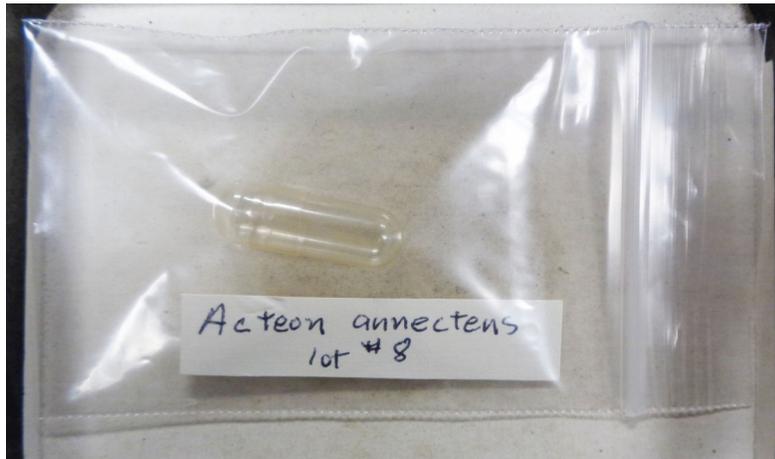


Figure 13. Self-sealing plastic bag with fossils in a gelatin capsule.



Figure 14. Quart bags containing species for each lot.