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A NEW SPECIES OF THE TURTLE BARNACLE *CHELONIBIA* LEACH, 1817, (CIRRIPEDIA, THORACICA) FROM THE OLIGOCENE MINT SPRING AND BYRAM FORMATIONS OF MISSISSIPPI

Victor A. Zullo

Department of Earth Sciences
University of North Carolina at
Wilmington, North Carolina 28403

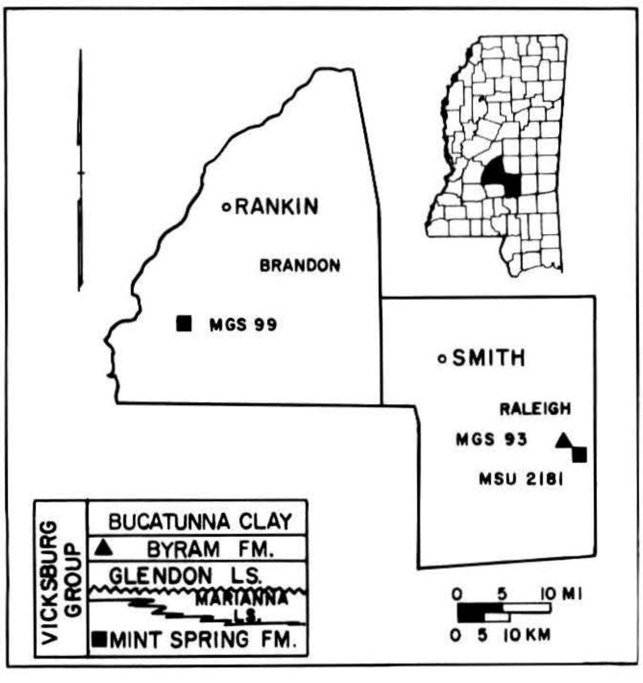

Figure 1. Approximate location of collection sites for *Chelonibia melleni* in Rankin and Smith counties, Mississippi.

ABSTRACT

Chelonibia melleni new species is known from a true rostrum and a lateral or carinolateral from the Mint Spring Formation in Smith and Rankin counties, respectively, and from a carina and two rostrolaterals from the Byram Formation in Smith County. The new species is most similar to the extant species *C. patula* (Ranzani, 1818), differing in the more peltate, thicker, and heavier shell wall, narrower parietes, the lesser development of the dependent lower margin of the sheath, the solidly filled interseptal spaces above the base of the sheath, and the apparent absence of an inner lamina. These Oligocene occurrences are the oldest records for the genus *Chelonibia* Leach, 1817, which is otherwise known from Miocene and younger rocks.

INTRODUCTION

Five shell wall plates of a new species of the turtle barnacle *Chelonibia* Leach, 1817, were collected by David T. Dockery III and Frederic F. Mellen from the Vicksburg Group in Mississippi. Two of the specimens, a true rostrum and a plate that is either a lateral or a carinolateral, are from the Mint Spring Formation in Smith and Rankin counties, respectively. The remaining plates, a carina and two rostrolaterals, are from the Byram Formation in Smith County (figure 1). These specimens are the first record of *Chelonibia* from pre-Miocene rocks.

The genus *Chelonibia* is known from four extinct and eight extant species-group taxa. Extant representatives are ectocommensals of marine and estuarine turtles, brachyuran crabs (especially portunids), horseshoe crabs, manatees, and the occasional gastropod, and it is assumed that extinct taxa occupied similar habitats (Ross, 1963; Ross and Newman, 1967; Newman and Ross, 1976). Although *Chelonibia* is a specialized barnacle, its shell retains one primitive feature, an unfused rostrum, indicating that the genus evolved directly from the basal stock group in the Balanomorpha ("acorn" barnacles). It is generally accepted that the first balanomorphs had eight plates in the shell wall, including a rostrum and a carina at either end and three lateral plates on each side. The more typical six-plated configuration is presumed to have arisen through the fusion of the rostrum with the adjacent laterals (rostrolaterals) to form a compound rostral plate. Only a few phylogenetically primitive chthamaloids and *Chelonibia* retain an unfused or partially fused rostrum.

In addition to deriving *Chelonibia* and other Coronuloidea from the chthamaloid subfamily Pachylasminae (see Newman and Ross, 1976), a case can be made for suggesting that the evolution of the primitive coronuloids occurred during the initial early Paleogene diversification of the Balanomorpha. Indeed, Ross and Newman (1967) described a highly specialized form, *Emersonius cybosyrinx* Ross, from the Jacksonian (upper Eocene) Williston Limestone of Florida, that appears to be related to *Chelonibia* and to another coronuloid barnacle, *Platylepas* Gray, 1825. The presence of *Emersonius* in the Eocene suggests that more unspecialized forms, as exemplified by *Chelonibia* and *Platylepas*, were present also. Previously, *Chelonibia* was known from rocks no older than early Miocene (Aquitanian). The discovery of a new species in two Oligocene formations in Mississippi only partially bridges the gap to *Emersonius*, but does strengthen arguments for the geological antiquity of *Chelonibia*.

EXTANT AND FOSSIL *CHELONIBIA*

The following species-group taxa are ascribed to *Chelonibia*. Those preceded by an asterisk (*) are extinct:

**Chelonibia capellini* Alessandri, 1895, 1906; Miocene (Helvetian), Pliocene (Astian), northern Italy.

C. caretta (Spengler, 1790), tropical Atlantic and Indo-West Pacific (Newman and Ross, 1976), Miocene (? upper Aquitanian), Pemba Island, Tanzania (Withers, 1928).

**C. depressa* Seguenza, 1876; Pliocene (Astian), Sicily.

**C. hemisphaerica* Rothpletz and Simonelli, 1890; Pliocene, Grand Canary Island.

C. manati Gruvel, 1903; West Africa (Newman and Ross, 1976).

C. manati crenatibasis Pilsbry, 1916; locality unknown.

C. manati lobatibasis Pilsbry, 1916; Florida.

C. patula (Ranzani, 1818); tropical Atlantic and Indo-West Pacific (Newman and Ross, 1976), Miocene (Burdigalian), France and (Tortonian), Austria (Withers, 1929), Miocene (Helvetian) and Pliocene (Astian), northern Italy (Withers, 1953), Miocene, Florida (Ross, 1963).

C. patula dentata Henry, 1943; Gulf of California.

C. ramosa Korschelt, 1933; locality unknown.

C. testudinaria (Linnaeus, 1758), cosmopolitan in temperate and tropical seas (Newman and Ross, 1976); Miocene, Cuba (Withers, 1953); Pliocene (Astian), northern Italy; Pliocene, North Carolina (reported herein); Miocene, Pleistocene, Florida (Ross, 1963; Ross and Newman, 1967).

**C. testudinaria solida* Withers, 1929; Miocene (Aquitanian), France; ? Pleistocene, Florida (Ross, 1963).

The listed species can be grouped into four morphological facies, and are presented in order from least to most specialized (see also Ross and Newman, 1967):

Chelonibia patula. The shell wall is thin, the compartmental plates are narrowly rectangular in cross-section, and the resultant shell shape is cylindric. The radii are broad. The septa between the inner and outer laminae of the shell wall are thin, rather widely-spaced, and linear, and the interseptal spaces are open to or nearly to the apex of the shell. *Chelonibia patula* and *C. patula dentata* represent this facies and are found on crustaceans, horseshoe crabs, and gastropods.

Chelonibia testudinaria. The shell wall is thick, the compartmental plates are broadly triangular in cross-section, and the resultant shell shape is peltate. The radii are moderately broad. The septa between the inner and outer laminae of the shell wall are heavy, closely spaced, and sinuous, and the interseptal spaces are either open or filled in the uppermost part of the shell. Besides *C. testudinaria*, this facies includes the extinct taxa *C. capellini, C. depressa, C. hemisphaerica, C. testudinaria solida*, and the extant taxa *C. manati crenatibasis* and *C. manati lobatibasis*. The two latter subspecies are probably morphological variants of *C. testudinaria* rather than of *C. manati*. Extant members of this facies are found attached to but not embedded in the plates and skin of marine and estuarine turtles.

Chelonibia caretta. The shell is similar to that of *C. testudinaria*, but the radii are either narrow or wanting. The septa are discontinuous, closely-spaced, and sinuous, and the interseptal spaces are solidly filled to the base of the shell. *Chelonibia caretta* is the only representative of this facies and is found partially embedded in the shell or skin of marine turtles.

Chelonibia manati. The shell morphology in this facies is quite similar to that of the *C. testudinaria* facies.

The major distinction is the development of bifurcating ribs near the base of the shell that penetrate the integument of the host. *Chelonibia manati* and *C. ramosa* represent this facies and may be synonymous. The former is found on manatees, and the latter is known from a single specimen from a carapace plate of the green turtle.

The new Oligocene species cannot definitely be assigned to any one of the four facies. As discussed below, some features suggest association with the *C. patula* facies, whereas others are characteristic of the *C. testudinaria* and *C. caretta* facies.

SYSTEMATIC ACCOUNT

Subclass CIRRIPEDIA Burmeister, 1834
Order THORACICA Darwin, 1854
Suborder BALANOMORPHA Pilsbry, 1916
Superfamily CORONULOIDEA Leach (Newman and Ross, 1967)
Family CORONULIDAE Leach, 1817
Subfamily CHELONIBIINAE Pilsbry, 1916
Genus *CHELONIBIA* Leach, 1817

Chelonibia melleni new species
Plate 1, figures 1-13

Diagnosis

Reconstructed shell subpeltate; parietes narrowly triangular, externally smooth except for fine radial striae and growth ridges or with broad, low, finely striate longitudinal ribs; radii moderately to very broad, with slightly oblique summits, alae narrow to broad with oblique summits; radial and alar sutural edges coarsely denticulate; inner lamina of shell absent, basal edge of sheath not or only slightly dependent; internal septa thin, closely-spaced, linear, continuous, and including primary, secondary, and tertiary series; base of septa denticulate; interseptal cavities solidly filled from base of sheath to apex.

Description of Plates

Rostrum, MSU locality 2181 (plate 1, figure 10), height 29 mm, greatest breadth 6.9 mm, thickness of shell at base of sheath 5.4 mm. The exterior of the paries is nearly smooth, ornamented only by fine horizontal growth ridges crossed by faint longitudinal striae. The sutural edges that join the rostrum to the adjacent rostrolaterals are broad, and the sutural articulation is formed by alternating longitudinal ridges and furrows crossed by fine, sinuous horizontal ridges. Transverse growth ridges are restricted to the upper half of the sheath. The basal edge of the sheath has two very narrow, centrally located corium apertures. The outer lamina of the paries is thick, and internally bears numerous, thin, closely-spaced, linear longitudinal septa. An inner lamina is absent. Four, equally spaced, primary septa extend from the outer lamina to the inner surface of the sheath, and two of these bifurcate near their inner margins. One or two secondary septa, extending from the outer lamina at least halfway to the sheath are interspersed between primaries. At least one of these secondary septa bifurcates near its inner margin. Short tertiary septa, restricted to the basal inner margin of the outer lamina, are present between the larger septa. The basal margins of the septa are finely denticulate, and these denticulae are continued as fine ridges on the sides of the septa. Interseptal spaces extend upwards slightly beyond the basal margin of the sheath, but from that point the spaces are solidly filled to the apex.

Left and right rostrolaterals, MGS locality 93 (plate 1, figures 1-3, 8-9). The left rostrolateral is 18 mm high (the apex is slightly broken), has a greatest breadth of 10 mm, and is 3.1 mm thick at the base of the sheath. The exterior of the paries is ornamented as in the rostrum, but the basal one-fourth of the shell wall is reflexed sharply inward, and consists of several irregular ribs, two of which bifurcate distally. The rostral sutural edge is similar to that of the rostrolateral, but bears fewer ridges and furrows. The radius is rather narrow, deeply sunken, and its sutural edge is coarsely denticulate. Transverse growth ridges are restricted to the upper half of the sheath. The lower edge of the sheath is not dependent, although two rods, one on either side of the plate, extend basally a short distance. As a consequence, no corium apertures are formed. The internal septa are similar to those of the rostrum. Interseptal spaces are solidly filled from slightly below the base of the sheath to the apex. The right rostrolateral is 13.6 mm high, 7.2 mm broad, and 1.3 mm thick at the base of the sheath. The outer lamina is thin and the paries exterior has stronger radial striae than the previously described plates. The radius is very broad, its greatest width nearly equal to the basal width of the paries, its summit is horizontal, and the sutural edge is coarsely crenate. The rostral sutural edge is narrow, and consists of two marginal ridges bordering a broad, shallow furrow that is crossed by inverted, broadly V-shaped, transverse ridges. Only the upper half of the sheath has transverse growth ridges, and its basal margin is not dependent, but rather, merges with the interior of the shell wall. The internal septa are atypical, distinct only in the lower fifth of the wall, and not reaching the base of the sheath.

Carina, MGS locality 93 (plate 1, figures 11-13). Height 14.0, greatest breadth 6.5 mm, thickness at sheath base 3.7 mm. The paries is narrowly triangular, recurved outwards towards the apex, and externally ornamented as in the rostrum. The alae are asymmetrical (although the left ala is slightly broken), the summits appear to have been oblique, and the sutural edges are coarsely crenate. Transverse growth ridges cover the upper two-thirds of the sheath. The basal margin of the sheath is dependent and has a large, nearly centrally located corium aperture. The outer lamina of the paries is thick, and the internal primary, secondary, and tertiary septa are developed as in the rostrum. Interseptal spaces extend apically slightly beyond the basal margin of the sheath, but are solidly filled from that point to the apex.

Left lateral or carinolateral, MGS locality 99 (plate 1, figures 4-7). Height 17.2 mm, greatest breadth of paries 6.4 mm, thickness at base of sheath 3.2 mm. The paries is narrowly triangular and is ornamented externally by low, broad, confluent ribs bearing fine, longitudinal striae. The radius is moderately broad, thin, and with a crenate sutural edge. The summit of the radius is slightly oblique. The alar region of this plate is unusual. It is reflexed at right angles to the paries and consists of a triangular uncovered part that is broad as the paries, and a small, narrow, marginal part that was overlapped by the radius of the adjacent compartmental plate. In other respects, this plate is typical for the species. The outer lamina is thick, primary through tertiary septal series are developed, and interseptal spaces are filled above the base of the sheath. The sheath extends basally on the radial and alar margins forming a fairly broad corium aperture.

Disposition of Specimens

The holotype carina (MSU no. 3260) from MGS locality 93, and the paratypes (2 rostrolaterals, MSU nos. 3261 and 3262 from MGS locality 93; 1 lateral or carinolateral, MSU no. 3263 from MGS locality 99; and 1 rostrum, MSU no. 3264 from MSU locality 2181) are deposited in the paleontological type collection of the Department of Geology, Mississippi State University.

Etymology

This species is named for Frederic F. Mellen, student of fossil Cirripedia and discoverer of the original specimen of *C. melleni.*

Discussion

Chelonibia melleni can be distinguished from all described species of the genus by its narrowly, rather than broadly, triangular parietes. The new species most closely resembles extant and fossil specimens of the *C. patula* facies (plate 1, figures 14-15), but differs in its more peltate shape, thicker outer lamina of the parietes, lesser degree of development of the basal extension of the sheath and corium apertures, lack of an inner lamina, and in the filling of interseptal spaces above the base of the sheath. *Chelonibia melleni* differs from members of the *C. testudinaria* facies in possessing thinner, somewhat more widely-spaced internal septa and less complex radial and alar sutural edges (plate 1, figures 16-18), and from *C. caretta* by the partially, rather than completely, solid shell and the continuous, linear rather than discontinuous, sinuous internal septa. The basal margin of the left rostrolateral of *C. melleni* with its short, bifurcating ribs approaches the condition seen in members of the *C. manati* facies, but this plate as well as the others can be distinguished by the same characters that differentiate *C. melleni* from *C. testudinaria.*

Chelonibia melleni appears to be more variable in its morphology than other species in the genus. The right rostrolateral, although clearly assignable to the new species, bears marked resemblance internally to compartmental plates of archaeobalanid barnacles. If this Oligocene *Chelonibia* can be construed as somewhat more representative of the ancestral stock than are the Neogene species, then it is tempting to suggest that the open interseptal cavities, and the lightweight and much less variable shell of the unspecialized and presumably primitive *C. patula* facies are derived from a solid, monolamellar-walled ancestor. *Chelonibia melleni* probably was an epizoic species, but

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Plate Legend

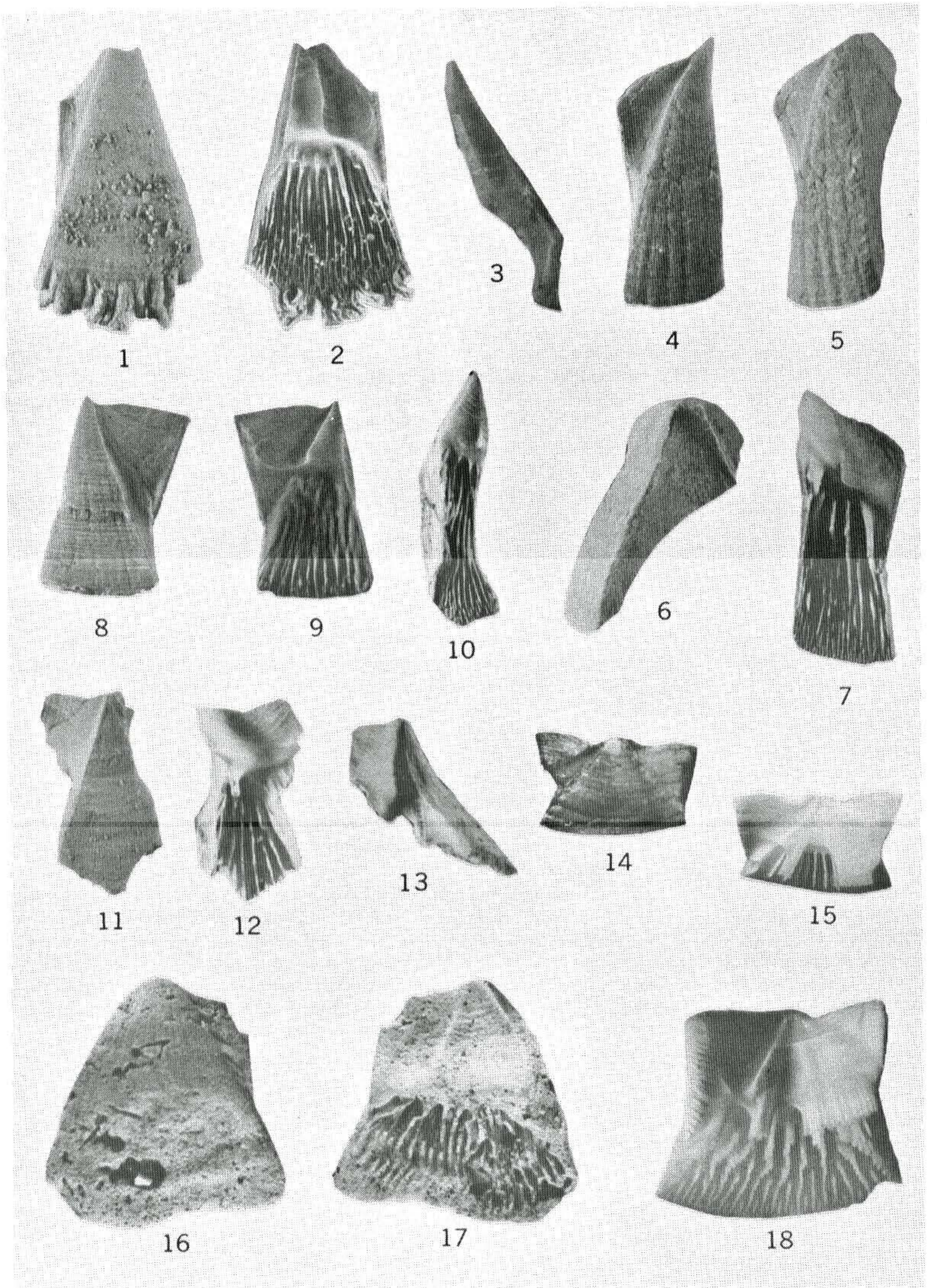
Figures 1-13, *Chelonibia melleni* new species. (1-3), external, internal, and side views of left rostrolateral, paratype MSU no. 3261, MGS locality 93; (4-7), parietal, external, alar, and internal views of left lateral or carinolateral, paratype MSU no. 3263, MGS locality 99; (8-9), external and internal views of right rostrolateral, paratype MSU no. 3262, MGS locality 93; (10) interior of rostrum, paratype MSU no. 3264, MSU locality 2181; (11-13), exterior, interior, and alar views of carina, holotype MSU no. 3260, MGS locality 93.

Figures 14-15, external and internal views of right lateral of *Chelonibia patula*, Recent, Georgetown, South Carolina.

Figures 16-17, external and internal views of left lateral or carinolateral of *Chelonibia testudinaria*, Pliocene, Yorktown Fm., UNCW locality 1.

Figure 18, internal view of right lateral plate of *Chelonibia testudinaria*, Recent, lower Chesapeake Bay, Virginia.

Magnification of figure 10, 1.5 x, all others, 2.5 x.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there is nothing in the associated faunas to suggest a host.

ACKNOWLEDGMENTS

I thank David T. Dockery III, Mississippi Bureau of Geology, and Ernest E. Russell, Department of Geology, Mississippi State University, for providing the specimens described herein, and for their advice concerning the localities. This research was funded by the Marine Sciences Program of the University of North Carolina at Wilmington.

LOCALITY DESCRIPTIONS

MGS localities (Mississippi Bureau of Geology)

93 - Byram Formation, Vicksburg Group, northwest bank of Tallahala Creek, NW 1/4 of the SW 1/4 of Section 33, T.2 N., R.9 E., Smith County, Mississippi; David T. Dockery III, collector.

99 - Mint Spring Formation, Vicksburg Group, just west of Cleary, SE 1/4 of the SW 1/4 of the NW 1/4 of Section 22, T.4 N., R.1 E., Rankin County, Mississippi, David T. Dockery III, collector.

MSU locality (Mississippi State University)

2181 - Mint Spring Formation, Vicksburg Group, Smith County Lime Plant on NE side of Highway 18, immediately SE of Tallahala Creek, SE 1/4 of the NE 1/4 of Section 22, T.2 N., R.9 E., Smith County, Mississippi; Frederic F. Mellen, collector, 22 July 1967.

UNCW locality (University of North Carolina at Wilmington)

1 - Yorktown Formation, Martin Marietta New Bern quarry, New Bern, Craven County, North Carolina; Victor A. Zullo, collector, May 1971.

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These rocks, these bones, these fossil ferns and shells,
Shall yet be touched with beauty, and reveal
The secrets of the book of earth to man.

ALFRED NOYES

LESUEUR'S WALNUT HILLS FOSSIL SHELLS

David T. Dockery III
Mississippi Bureau of Geology

Introduction

While studying the Lower Oligocene molluscan collections at the U. S. National Museum, Druid Wilson brought to my attention five unpublished plates drawn by the French naturalist Charles A. Lesueur that illustrated fossils from Vicksburg, Mississippi. These plates are numbered one through four with two plates numbered as two. They are bound with other miscellaneous publications in the Dall collection at the National Museum. The first plate shows a measured section at Vicksburg and is dated 1829. This work is one of the earliest geological investigations made in Mississippi. It precedes the published work of Timothy A. Conrad (1848a,b) on the Vicksburg fauna by nineteen years. Though Conrad was aware of Lesueur's collection from Vicksburg (Conrad, 1848a, p. 294), he was not aware of Lesueur's plates or manuscript. A brief note on Lesueur's five plates at the National Museum was published by Julia Gardner (1938).

An account of Lesueur's travels in North America was published by E.-T. Hamy as volume 5 (old series) of the Journal de la Societe des Americanistes de Paris in 1904. In this account Hamy makes reference to twelve plates by Lesueur on the Walnut Hill fossils rather than five. An English translation of Hamy's work was made by Milton Haber, translator, and H. F. Raup, editor, and is available through The Kent State University Press. This translation gives the following discussion of Lesueur's trip down the Mississippi River to Walnut Hills which today is Vicksburg, Mississippi.

"They went slowly down between the low and monotonous banks, letting themselves drift with the current. They touched at Point Chicaut [Chicot, Ark.], also called Villemont in memory of the last Spanish governor of Arkansas. They finally reached Vicksburg or Walnut Hill, the eighth bluff. It held the interest of Lesueur for several days, occupying his keen and alert pencil and heavy and diffident pen afterwards for several weeks.

"Walnut Hills was an elevation 2 1/2 miles long on the bank of the river. It was 250 or 300 feet high and crowned by the ruins of old Fort MacHenry. At the base of the hill was hidden a valuable deposit of bones, teeth and above all, shells which had escaped Nuttall and other naturalists who had visited this region earlier. There was a very abundant fauna and some were new to science. Lesueur gathered all that was possible there and he printed a wonderful book of sketches with twelve cuts of an astonishingly fine engraving. There was an artistic frontispiece .... At the time of editing his manuscript it resulted once again in simply putting in order several labored pages that could not be printed in the *Annales du Museum.*

"This work at Walnut Hills deserved a better fate. Begun by a sufficiently competent editor, it would have had a very well deserved success. Even today the figures in his excellent drawings have retained their artistic and scientific value and I haven't lost hope of finding a way to make them known some day to the world of science. The deposits at Walnut Hills go back to the Zeuglodon strata of the Eocene age, studied by T. A. Conrad in 1846 and by Ch. Lyell in 1847. Lesueur gathered some specimens, more or less well preserved, of numerous and characteristic species of which the Paris Museum has kept several types."

Lesueur's Plates and Manuscript

Prints of Lesueur's twelve plates of the Walnut Hills fossils are in the library of the Academy of Natural Sciences of Philadelphia and are catalogued as no. 136 in the Manuscript Collection. Photographs of these plates were made with the assistance of Librarian Carol M. Spawn. These photographs are figured here at a reduction of about one half their actual size and are modified only by the addition of larger plate numbers in the upper right hand corners.

Lesueur's plates show that he had made an excellent collection from the Vicksburg (Walnut Hills) area. Fossils illustrated in these plates include foraminifers (plates 1, 2, 9, and 12), corals (plates 1 and 4), bryozoans (plates 1 and 4), gastropods (plates 5-9), bivalves (plates 8, 10-12), a crab claw (plate 4), echinoids (plates 1 and 4), shark teeth (plates 2 and 3), ray teeth (plate 2), fish vertebrae (plate 3), otoliths (plate 2), and manatee? ribs (plates 2 and 3). Lesueur's illustrations are far superior to those of Conrad (1848b) and are easily indentifiable as to their species. A large proportion of these illustrations figure species in multiple views. Bivalves generally are drawn to show the hinge as well as the exterior of the shell and are sometimes drawn in cross-section to show the inflation of the valves. Enlargements of corals and bryozoans depict the microstructure respectively of their septa and zooecia. A large number of small species including the foraminifers, byrozoans, enlargements of the corals, some gastropods, and some bivalves were drawn with the use of a magnifying device. The fauna illustrated by Lesueur was collected largely from the Mint Spring and Byram Formations of the Vicksburg Group (Lower Oligocene). The measured section of plate 1 probably represents the earliest detailed geological investigation in Mississippi. Lesueur's description of this section will be the topic of a future article in *Mississippi Geology*.

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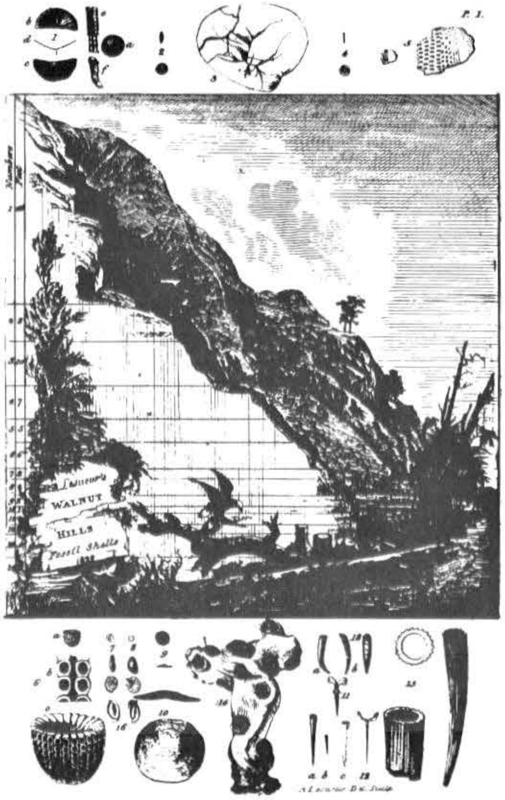

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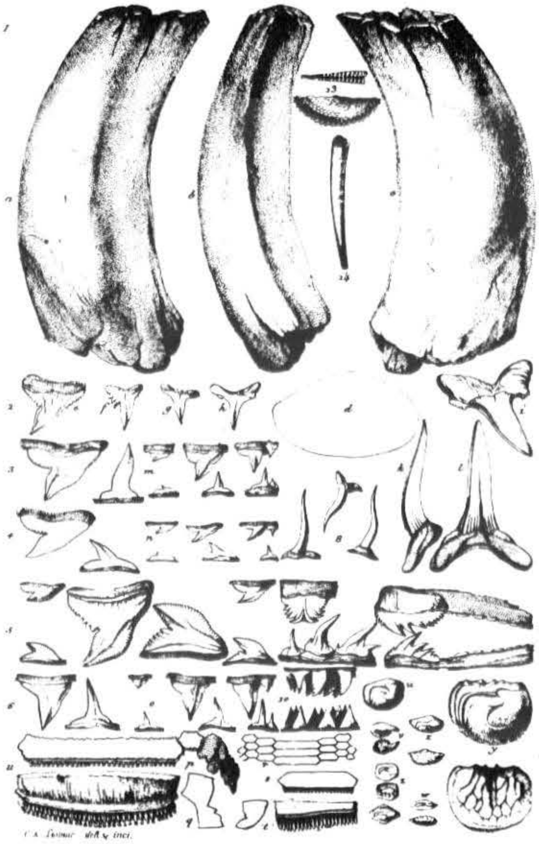

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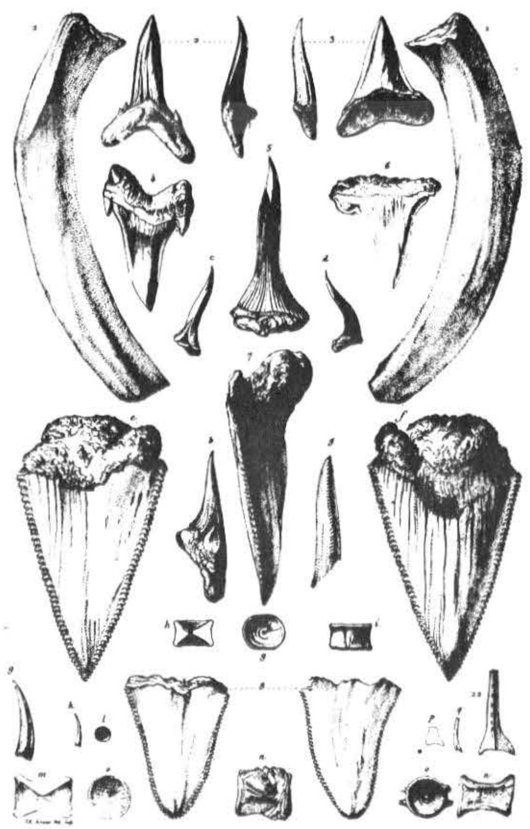

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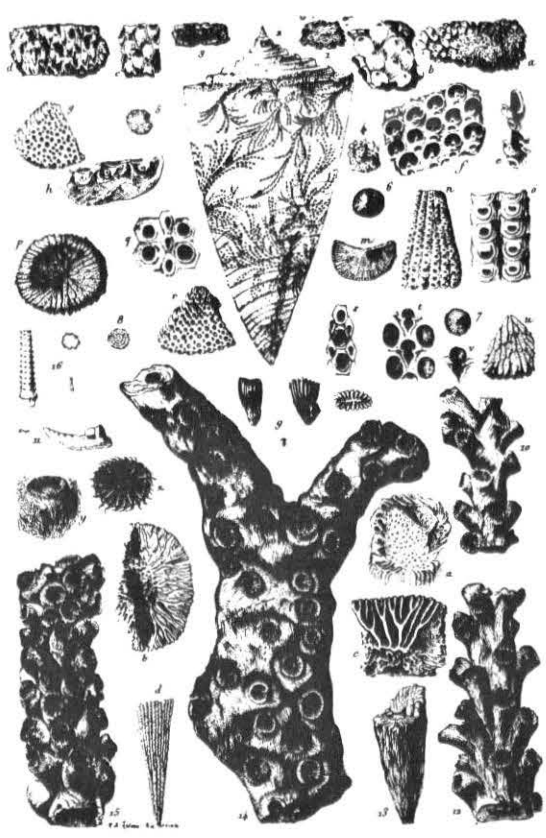

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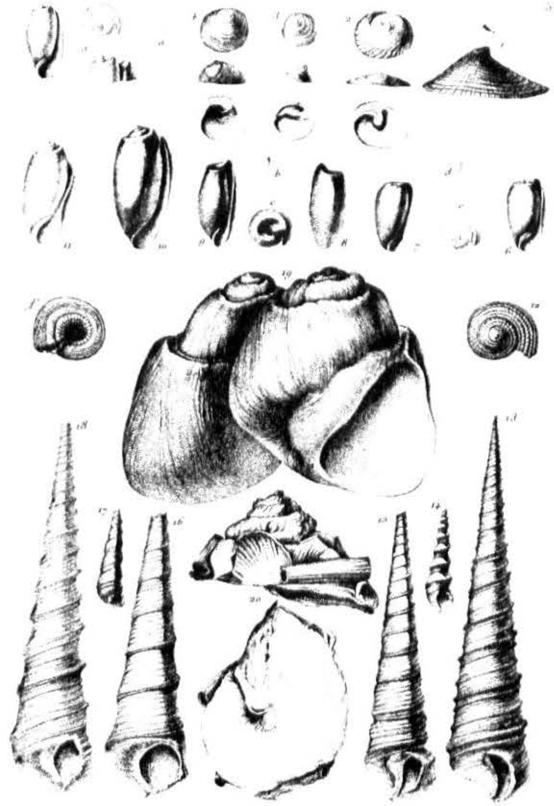

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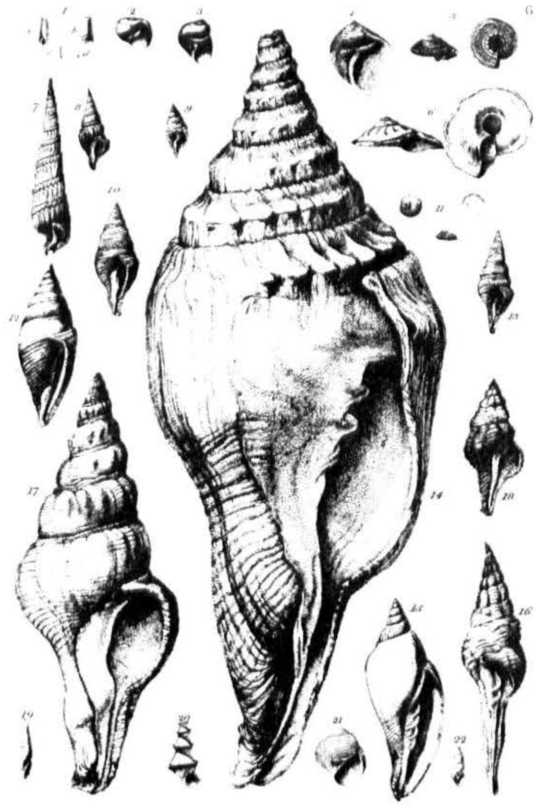

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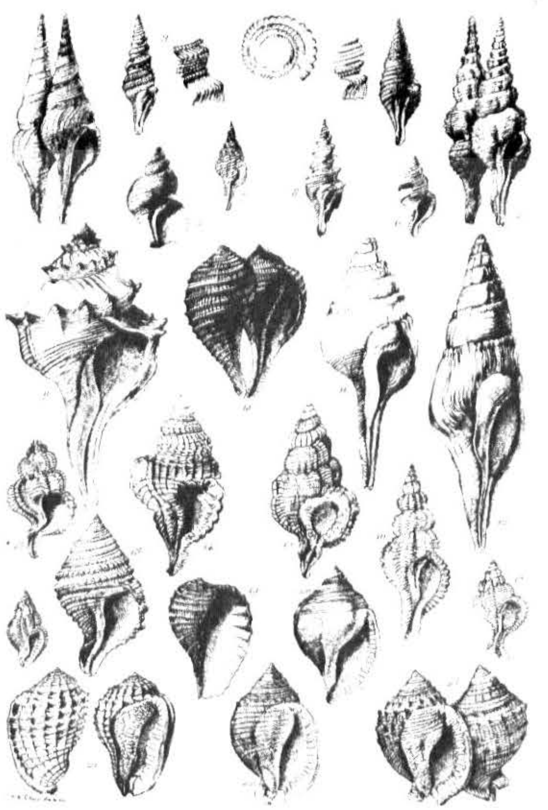

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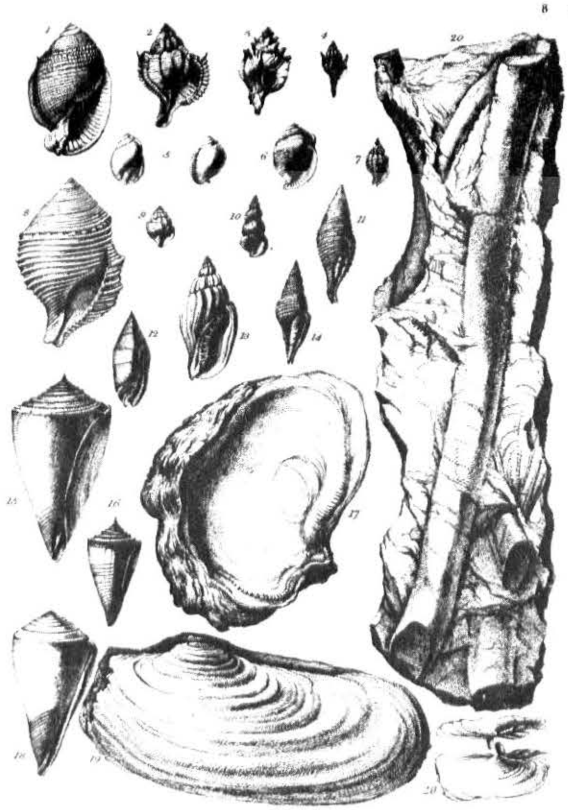

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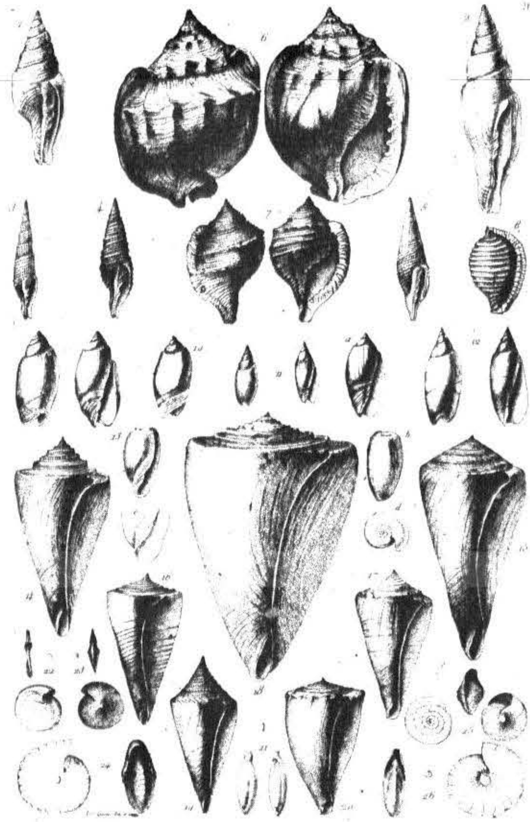

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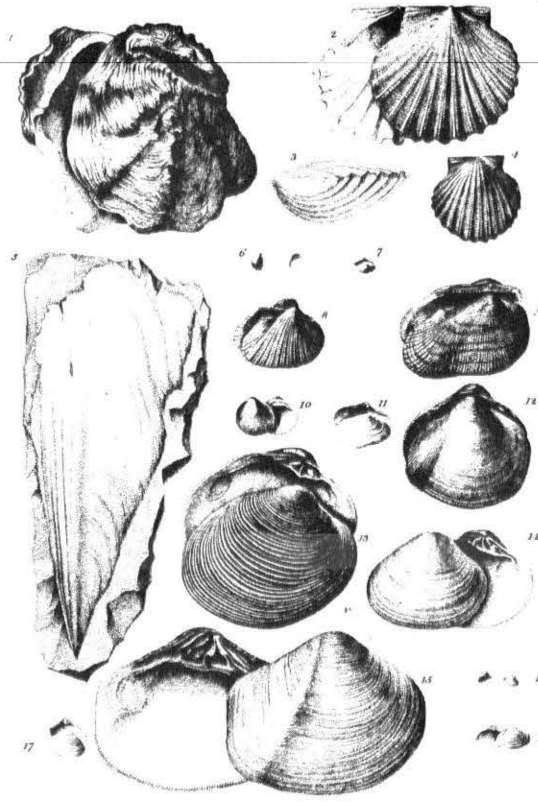

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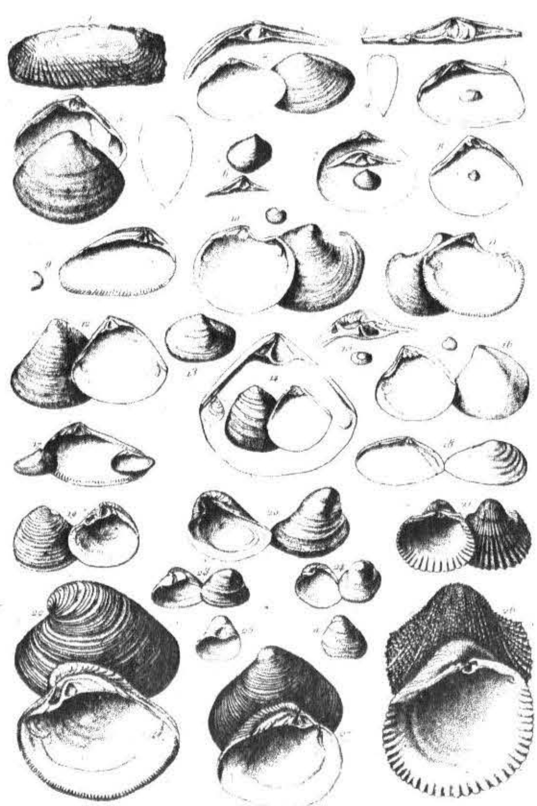

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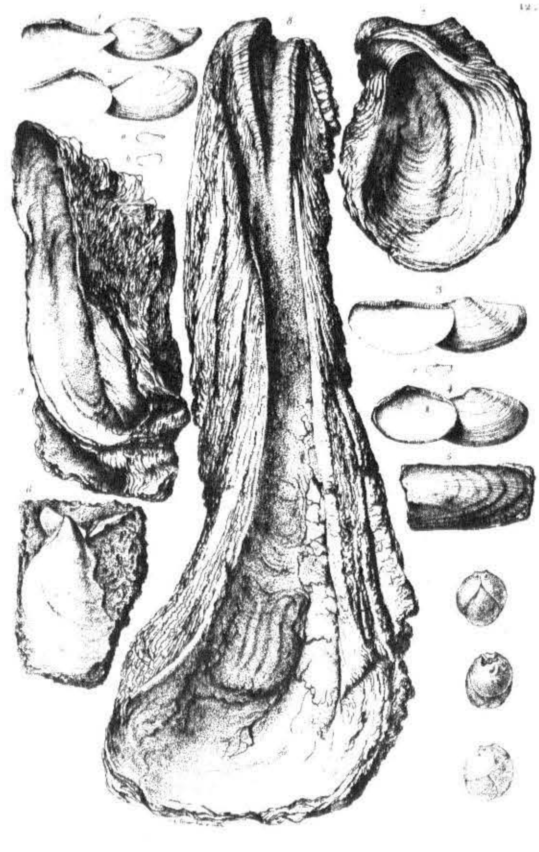

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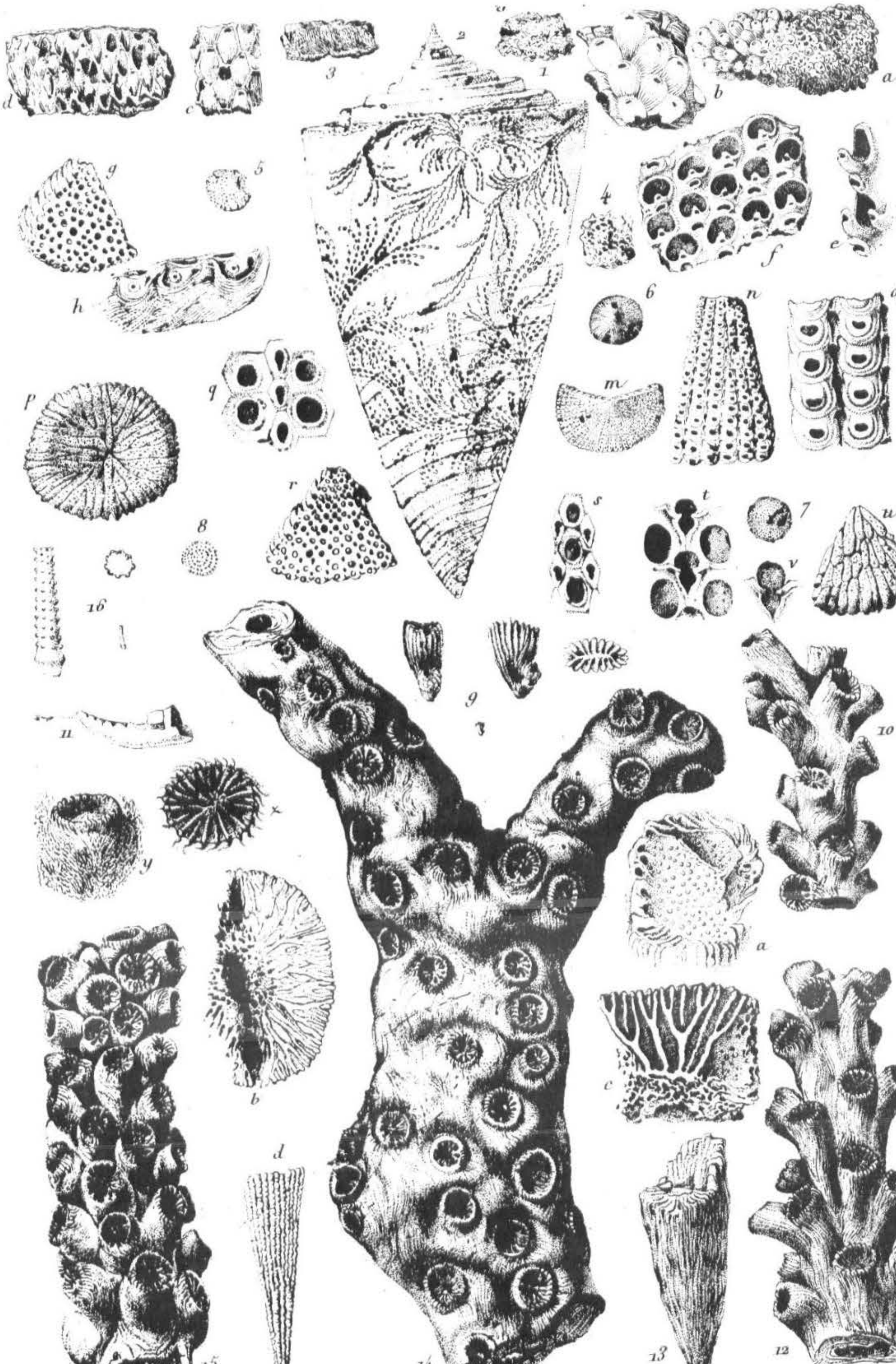

Lesueur's manuscripts on the Walnut Hills fossils are in the library of the Museum of Natural History in Le Havre, France. These manuscripts and Lesueur's plates are catalogued in the Lesueur Collection under "The Geology and Paleontology of Walnut Hills, Missiśsippi" and are numbered as 45120 to 45178. One of the earlier manuscripts (no. 45140) is 46 pages long and includes a description of the measured section in plate 1 and a systematic description of fossils in the original four plates. The numbering of these plates was changed when additional plates were added. Plates one through four of the original series correspond respectively to plates 1, 10, 6, and 8 in the latter series. Two additional plates, plates 2 and 3, are described in manuscript no. 45136 which is 16 pages in length. No explanations were given in Lesueur's manuscripts for plates 4, 5, 7, 9, 11, and 12. Species described in manuscripts nos. 45140 and 45136 are listed below with their plate and figure numbers. Plate numbers for plates one through four of the original series are corrected to the present arrangement. Where Lesueur's spelling of species names is not clear, the name is followed by a question mark. The origin of some of Lesueur's generic names is uncertain.

Foraminifera

Lenticulina dorbignya pl. 1, fig. 4
Lenticulina ferrussi pl. 1, fig. 2
Discorbis subglobulosa pl. 1, fig. 8
Orbulites scutella pl. 1, fig. 10
Orbulites mamila pl. 1, fig. 9
Cruciolaria orbicularia pl. 1, fig. 7
Cruciolaria elliptica pl. 1, fig. 16

Anthozoa

Oculina virginea pl. 1, fig. 14

Bryozoa

Cellepora incideus pl. 1, fig. 3
Cupuloporites digitalis pl. 1, fig. 6
Cupuloporites discoides pl. 1, fig. 1

Echinoidea

Echinites fragilis pl. 1, fig. 5

Annelida

Emphitrites dubia pl. 8, fig. 20
(probably the bivalve *Kuphus*)

Scaphopoda

Dentalium prolifera pl. 1, fig. 13
Dentalium fragilis pl. 1, fig. 18

Bivalvia

Panopea elongata pl. 8, fig. 19, 20
Crassatella tellinoides (probably pl. 10, fig. 15)
Corbula distorta pl. 10, fig. 16
Corbula rostrata pl. 10, fig. 18
Tellina minutiffima pl. 10, fig. 11
Lucina lenticularia
Cytherea mortonia pl. 10, fig. 14
Cytherea circulifera pl. 10, fig. 13
Cardita semiradiata pl. 10, fig. 12
Arca bifasciata pl. 10, fig. 8
Arca fragilis pl. 10, fig. 9
Pectunculus minutus pl. 10, fig. 10
Nucula concentrica Say? pl. 10, fig. 7
Pinna radiata pl. 10, fig. 5
Lima parvula pl. 10, fig. 6
Pecten limatula pl. 10, fig. 2, 3
Pecten unicarinata pl. 10, fig. 4
Ostrea pseudofoliata pl. 10, fig. 1
Ostrea paroxis pl. 8, fig. 17

Pteropoda

Hyalites daudin pl. 1, fig. 12

Gastropoda

Calyptrocrepidula pl. 6, fig. 11
Bulla oviformis elongata pl. 6, fig. 1
Ampullaria depressa pl. 6, fig. 2
Natica obovata pl. 6, fig. 3
Sigareta striata pl. 6, fig. 4
Naticoides sigarettoides pl. 6, fig. 21
Trochus compressa pl. 6, fig. 6
Solarium denticulata pl. 6, fig. 5
Cerithium undulatum pl. 6, fig. 7
Potamida (=Potamides) cruciata pl. 8, fig. 10
Phasianellide (=Phasianella) elongata pl. 6, fig. 19
Pleurotoma costata pl. 6, fig. 8
Pleurotoma undulata pl. 6, fig. 10
Pleurotoma fusiformis pl. 6, fig. 13
Pleurotoma semserricta? pl. 6, fig. 12
Turbinella cliffordia pl. 6, fig. 14
Turbinella eburnea pl. 6, fig. 15
Turbinella rostrata pl. 6, fig. 16
Turbinella obsoleta pl. 6, fig. 18
Buccinum minutissma pl. 8, fig. 9
Fusus brogniartii pl. 6, fig. 17
Ranella ventricofa? pl. 8, fig. 2
Murex coringera pl. 8, fig. 4
Murex tubifera pl. 8, fig. 3
Cassidaria granulata pl. 8, fig. 1
Cassidaria polita pl. 8, fig. 5
Cassidaria bicostata pl. 8, fig. 6
Cassidaria minutiffima
Buccinum circumscripta? pl. 8, fig. 8
Buccinum reticulatum pl. 8, fig. 7
Buccinum? unidentata pl. 6, fig. 22
Mitra sulcofus pl. 8, fig. 11

Mitra pleurotomia
Voluta harpoides pl. 8, fig. 13
Oliva saya pl. 8, fig. 12
Conus nonperditus pl. 8, fig. 16
Conus defrancii pl. 8, fig. 18
Conus peronii pl. 8, fig. 15

Chondrichthyes

Squalus littoralis pl. 2, fig. 8
Squalus rissoi pl. 2, fig. 10
Squalus obscurus pl. 2, fig. 3
Squalus spalanzani pl. 2, fig. 4
Squalus cuvierii pl. 2, fig. 5
Squalus africanus pl. 2, fig. 6
Squalus perlon pl. 2, fig. 9
Raia quadrilobata pl. 2, fig. 11

Acknowledgments

I thank Druid Wilson, U. S. National Museum, for first bringing Lesueur's plates on the Walnut Hills fossils to my attention. I also thank Librarians Jacqueline Bonnemains, Museum of Natural History, Le Havre, France, for providing photocopies of Lesueur's manuscripts, and Carol M. Spawn, Academy of Natural Sciences of Philadelphia, for providing photographic prints of Lesueur's plates.

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CALENDAR OF EVENTS
1982 March - June

March 25-27 - Northeastern and southeastern sections, Geological Society of America, joint annual meeting, Washington, D. C. (Jean M. Latulippe, GSA headquarters, Box 9140, Boulder, Colorado 80301, 303/447-2020)

March 29-30 - South-central section, Geological Society of America, annual meeting, Norman, Oklahoma. (Kenneth S. Johnson, Oklahoma Geological Survey, Norman, 73019, 405/325-6541)

April 10-11 - Depositional environments of the central Louisiana coast, New Orleans and Morgan City, annual field trip, by Gulf Coast Section, SEPM. (William Ventress, Chevron USA, 935 Gravier St., New Orleans, Louisiana 70112, 504/521-6761)

May 23-28 - Tectonic history of the Ouachita orogen, a GSA Penrose Conference, Arkadelphia, Arkansas. (William A. Thomas, Dept. of Geology, University of Alabama, University, Alabama 35486)

May 31-June 4 - American Geophysical Union, spring meeting, Philadelphia. (AGU headquarters, 2000 Florida Ave. NW, Washington, D. C. 20009) Symposium on role of unsaturated zone in radioactive-and hazardous-waste disposal. (James W. Mercer, Geo-Trans Inc., Box 2550, Reston, Virginia 22090, 703/437-4400)

MISSISSIPPI OIL AND GAS STATISTICS, THIRD QUARTER 1981

Oil

	Bbls. Produced	Severance Tax	Average Price Per Bbl.
July	2,450,704	$ 4,651,474.31	$ 31.63
August	3,125,478	5,911,435.18	31.52
September	2,384,945	4,581,921.68	32.02
Totals	7,961,127	$ 15,144,831.17	$ 31.70

Gas

	MCF Produced	Severance Tax	Average Price Per MCF
July	16,066,522	$ 3,067,915.66	$ 3.18
August	17,910,163	4,098,408.36	3.81
September	21,091,103	3,999,405.06	3.16
Totals	55,067,788	$ 11,165,729.08	$ 3.38

source: State Tax Commission

HIGHLIGHTS OF 1981 OIL AND GAS EXPLORATION IN MISSISSIPPI

Dora M. Devery
Placid Oil Company
Jackson, Mississippi

Petroleum exploration in the Mississippi Interior Salt Basin was brisk during 1981. The largest gas discoveries were made in the southern part of the Basin, in Lawrence, Lamar and Hancock counties. At the outset of 1981, Mobil Oil Exploration and Producing Southeast, Inc., had a discovery well, No. 1 John H. Hauberg, located in NE 1/4, SW 1/4, Section 1, T.5 N., R.10 E., Lawrence County. The well tested 4.0 MMCF gas per day from the Hosston (see *Mississippi Geology*, June 1981) and then later was tested in the Paluxy. Production from the Paluxy was an impressive 10.2 MMCF gas per day and 24 barrels of condensate per day through a 20/64" choke with tubing pressure of 3558 pounds. Marion Corporation had a Hosston gas discovery in Lamar County. The well, No. 1-A Amoco Sabine, located in NE 1/4, SW 1/4, Section 19, T.5 N., R.16 W., flowed 8.1 MMCF gas per day, 144 barrels of 46 gravity condensate per day, and 48 barrels of water through a 31/64" choke with tubing pressure of 1855 pounds. Hunt Energy opened Cotton Valley production at Catahoula Creek Field in Hancock County. The No. 1 Brown, located in NE 1/4, SW 1/4, Section 28, T.6 S., R.15 W., flowed 7 MMCF gas per day and 48 barrels of water per day through a 30/64" choke with tubing pressure of 6549 pounds.

The largest oil discoveries in the Interior Salt Basin during 1981 were found in Jasper, Smith and Pike counties. McCormick Operating Company found Cotton Valley production in the No. 1 Board of Education located in NE 1/4, SE 1/4, Section 16, T.10 N., R.11 W., Jasper County. The discovery flowed 406 barrels of 46.7 gravity oil per day and 402 MCF gas per day through a 12/64" choke with tubing pressure of 1324 pounds. Midroc Operating Company and H. Vaughan Watkins, Jr., found Hosston oil production in the No. 1 Yelverton, located in SE 1/4, NE 1/4, Section 5, T.10 N., R.16 W., Smith County. The discovery flowed 337 barrels of 41.9 gravity oil per day, 129 MCF gas per day, and no water, through a 12/64" choke with tubing pressure of 885 pounds. Olive Field in Pike County was opened with Tuscaloosa production in the Shell Oil Company, No. 1 Hutto et al., located in NE 1/4, NW 1/4, Section 18, T.4 N., R.7 E. The well flowed 414 barrels of 40.9 gravity oil per day through an 11/64" choke with tubing pressure of 1215 pounds.

The Black Warrior Basin also had interesting new discoveries during 1981. Louisiana Land & Exploration Company, No. 1 J. R. Faulkner was the discovery well of a new field, Troy, in Pontotoc County. The well is situated in NW 1/4, Section 28, T.11 S., R.4 E., with production in the Mississippian Evans and Lewis sands. The Evans tested for 150 MCF gas per day and 2 barrels of water per day through a 16/64" choke with tubing pressure of 460 pounds. Production from the Lewis was gauged at 550 MCF gas per day through a 14/64" choke with tubing pressure of 450 pounds. Charles L. Cherry, No. 1 Holliman 7-11, in Maple Branch Field, located in NE 1/4, SW 1/4, Section 7, T.16 S., R.17 W., Monroe County, flowed 75 barrels of 42 gravity oil per day from the Lewis Sand and 110 MCF gas per day through a 3/4" choke with tubing pressure of 200 pounds. This production is significant because sizeable oil production is generally uncommon in the Black Warrior Basin, which to date is primarily a gas producing province.

RECENT ACQUISITIONS, BUREAU OF GEOLOGY LIBRARY

Compiled by Carolyn Woodley, Librarian
Mississippi Bureau of Geology

Aguilera, R., 1980, Naturally fractured reservoirs: Tulsa, Okla., Petroleum Pub. Co., 703 p.

Bouma, A., et al., 1981, Offshore geologic hazards: a short course presented at Rice University, May 2-3, 1981, for the Offshore Technology Conference: Tulsa, Okla., American Association of Petroleum Geologists, 486 p.

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Coates, D. R., 1981, Environmental geology: New York, Wiley, 735 p.

Colbert, E. H., and E. Anderson, 1980, Evolution of the vertebrates, 3rd ed.: New York, Wiley, 510 p.

Coleman, J. M., 1981, Deltas: processes of deposition & models for exploration, 2nd ed.: Minneapolis, Burgess, 124 p.

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Dickey, P. A., 1979, Petroleum development geology: Tulsa, Okla., Pennwell, 398 p.

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Fisher, J. S., and R. Dolan, eds., 1977, Beach processes and coastal hydrodynamics: Stroudsburg, Pa., Dowden, Hutchinson & Ross, 382 p.

Fung, R., ed., 1980, Protective barriers for containment of toxic materials. Park Ridge, N. J., Noyes Data Corp., 288 p.

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Halley, R. B., and R. G. Louks, 1980, Notes for SEPM core workshop no. 1: Carbonate reservoir rocks: Denver, Colo., Society of Economic Paleontologists and Mineralogists, 183 p.

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Taylor, T. N., 1981, Paleobotany: an introduction to fossil plant biology: New York, McGraw-Hill, 589 p.

Todd, D. K., 1980, Groundwater hydrology, 2nd ed.: New York, Wiley, 535 p.

Van Poollen, H. K., and Associates, 1980, Fundamentals of enhanced oil recovery: Tulsa, Okla., Pennwell, 155 p.

Waples, D., 1981, Organic geochemistry for exploration geologists: Minneapolis, Burgess, 151 p.

Zenger, D. H., et al., eds., 1980, Concepts and models of dolomitization: Tulsa, Okla., Society of Economic Paleontologists and Mineralogists, SEPM special publication no. 28, 320 p.

NEW BUREAU OF GEOLOGY PUBLICATION

Map GQ 95-SW, General Geology and Mineral Resources of the Braxton Quadrangle, Mississippi

This publication consists of a geologic map of the Braxton Quadrangle and a 54-page booklet, both in an envelope. The geologic map is printed in color at a scale of 1:24,000; it includes two cross sections and structure contours of the top of the Glendon Formation. The booklet contains a discussion of the general geology and mineral resources of the Braxton Quadrangle, with records from the twenty-three test holes (ranging in depth from 130 to 490 feet) drilled during the investigation, by William A. Gilliland, and a water resources summary (surface and ground water) by Danny W. Harrelson.

Braxton Quadrangle is located in Rankin and Simpson counties, and includes the communities of Braxton, Cato, and Piney Woods. It adjoins on the north the previously published geologic map of Mendenhall West Quadrangle.

Copies of Map GQ 95-SW, General Geology and Mineral Resources of the Braxton Quadrangle, Mississippi, may be purchased for $4.00 each (plus $1.00 for postage and handling on mail orders) from the Mississippi Bureau of Geology, 2525 North West Street, Jackson. Address mail orders to Publication Sales, Mississippi Bureau of Geology, P. O. Box 5348, Jackson, Mississippi 39216. Prepayment is required, make checks payable to Bureau of Geology.

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Editor, Mississippi Geology
Bureau of Geology
P. O. Box 5348
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