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**MIOCENE GASTROPODS AND SCAPHOPODS OF
THE CHOCTAWHATCHEE FORMATION
OF FLORIDA**

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MIOCENE GASTROPODS AND SCAPHOPODS OF THE CHOCTAWHATCHEE FORMATION OF FLORIDA¹

By WENDELL C. MANSFIELD

INTRODUCTION

The specimens studied for this report were obtained at different times during a number of years by several collectors, as shown by the list of stations on pages 18-19. Collections were made by Mr. Herman Gunter, State Geologist of Florida, and his associates, and I spent two months in the field in 1925 and obtained specimens from nearly all the fossiliferous beds. About 207 species of gastropods and 7 species of scaphopods were collected from the Choctawhatchee formation. The types of the new species are deposited in the United States National Museum. A set of named gastropods and scaphopods from the Choctawhatchee marl, representing most of the species and including topotypes insofar as practicable, has been deposited with the Florida State Geological Survey. Considerable difficulty was experienced in assigning certain peculiar forms to genera, and a few of these forms may have been misplaced. The inferences drawn as to the significance and the relations of the faunas are only tentative; they may be modified by later studies.

I desire to thank the officials of the United States National Museum for the use of the former collections.

The photographs used for the illustrations were made in the laboratory of the United States Geological Survey by Mr. W. O. Hazard and the prints were retouched by Miss Frances Wieser of that Survey. Valuable assistance was rendered by Mr. Willis P. Popenoe of the same Survey in preparing part of the collections for study.

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HISTORICAL REVIEW

In 1892¹ Dall referred to the Chesapeake group all the beds in Florida that were then considered of newer Miocene age. He recognized two subdivisions, the "Jacksonville limestone" in the eastern part of Florida and the "Ecphora bed" in the western part. He writes:² "At Alum Bluff the group is represented by what I have termed the *Ecphora* bed, of gray marl, with over 100 species of fossils, many of which are common to North Carolina, Virginia, and Maryland. It has a thickness here of 30 feet or more." Later Dall³ applied the name "aluminous clay" to a 25-foot bed of grayish clay overlying the "*Ecphora* bed." In 1909 Matson and Clapp⁴ included both the "*Ecphora* bed" and the "aluminous clay" of Dall in their Choctawhatchee formation, which takes its name from Choctawhatchee River, with type locality in the vicinity of Red Bay, a small settlement about 18 miles southeast of DeFuniak Springs, Walton County, Florida.

In 1916 Mansfield⁵ described the outcrop at Red Bay, listed the fauna, and described and illustrated the following new forms: *Arca* (*Scapharca*) *staminea rubisniana*, *Leda choctawhatcheënsis*, *Phacoides* (*Pleurolucina*) *choctawhatcheënsis*, *Astarte* (*Ashtarotha*) *vaughani*, and *Diplodonta waltonensis*. On page 603 he writes: "On account of the small collections and the unidentifiable character of some specimens it is not possible to determine the exact synchronism of the fauna with that of the upper bed at Alum Bluff; however, the species present indicate that the beds represent nearly the same if not precisely the same horizon." I now believe, as will be shown later on in this paper, that this fauna is older than that in the upper bed at Alum Bluff.

¹Dall, W. H., and Harris, G. D., Neocene of North America: U. S. Geol. Survey Bull. 84, pp. 123, 124, 1892.

²Idem, p. 124.

³Dall, W. H., and Stanley-Brown, Joseph, Cenozoic geology along the Apalachicola River: Geol. Soc. America Bull., vol. 5, pp. 168, 169, 1894.

⁴Matson, G. C., and Clapp, F. G., Florida Geol. Survey Second Ann. Rept., pp. 108, 114, 1909.

⁵Mansfield, W. C., Mollusks from the type locality of the Choctawhatchee marl: U. S. Nat. Mus. Proc., vol. 51, pp. 599-607, pl. 113, 1916.

DIVISIONS OF THE CHOCTAWHATCHEE FORMATION

For the present purpose the fossiliferous beds in the Choctawhatchee formation are separated into three zones, as follows: *Arca staminea rubisiniana* zone, referred to in this paper as the *Arca* zone; *Ecphora quadricostata umbilicata* zone, referred to in this paper as the *Ecphora* zone; and *Cancellaria propevenusta* zone, referred to in this paper as the *Cancellaria* zone.

ARCA ZONE

Typical exposure.—The *Arca* zone is exposed in two beds near Red Bay, Walton County. The lower bed consists of a very fossiliferous gray marl about 21 feet thick. Its entire thickness is unknown, as its contact with the underlying formation is concealed, but it is probably somewhat more than 21 feet thick. The upper bed, about 27 feet thick, consists of a rather plastic clay carrying impressions of *Leda*, *Lucina*, and *Corbula*.

Fauna.—The fauna contains two indeterminable species of gastropods, one species of scaphopod, and about 20 genera of pelecypods. The gastropods and scaphopod are of little value for correlation. The pelecypods are more abundant, both in number of species and individuals. The pelecypod fauna evidently lived at a time later than that of the Shoal River formation and earlier than that of the *Ecphora* zone at Alum Bluff. The fauna of the *Arca* zone is probably nearly synchronous with that of some part of the Chesapeake group of Maryland. A more definite statement of the relation of this fauna to distant faunas must be deferred until the study of the pelecypods is completed.

ECPHORA ZONE

Typical exposure.—The *Ecphora* zone is typically exposed in the upper fossiliferous bed unconformably overlying the Chipola formation at Alum Bluff, Apalachicola River. The bed ranges in thickness from 15 to 25 feet at different places along the bluff. It consists of very fossiliferous, sandy clay, which is bluish where unweathered.

Fauna.—Dall¹ listed 45 gastropods and 4 scaphopods from this bed and adjacent outcrops. Among these, *Cerithium burnsii* Dall, *Modulus compactus* Dall, and *Tuba acutissima* Dall appear to have come from the Chipola formation. In this paper I have listed 48 gastropods and 3 scaphopods collected from the *Ecphora* zone at Alum Bluff.

¹Dall, Wagner Free Inst. Sci. Trans., vol. 3, pt. 6, pp. 1596, 1597, 1903.

The following species of gastropods and scaphopods appear to be confined to the *Ecphora* zone:

<i>Aurinia mutabilis</i> (Conrad)	<i>Epitonium alumensis</i> Mansfield
<i>Fasciolaria sparrowi</i> Emmons	<i>Turritella alumensis</i> Mansfield
<i>Busycon maximum alumense</i> Mansfield	<i>Turritella alumensis gardnerae</i> Mansfield
<i>Busycon maximum tudiculatum</i> Dall	<i>Polinices internus</i> (Say)
<i>Busycon pyrum propeincile</i> Mansfield	<i>Calliostoma aluminium</i> Dall
<i>Busycon pyrum libertiense</i> Mansfield	<i>Teinostoma nanum umbilicatum</i> (H. C. Lea)
<i>Busycon pyrum aepynotum</i> Dall	<i>Fissuridea cattiliformis alumensis</i> Mansfield
<i>Ecphora quadricostata umbilicata</i> (Wagner)	<i>Cadulus floridanus</i> Dall
<i>Ptychosalpinx laqueata</i> (Conrad)	<i>Dentalium carolinense</i> Conrad (nearly confined)
<i>Alectrion alumensis</i> (Olsson)	
<i>Eupleura miocenica</i> Dall	

The fauna of the *Ecphora* zone, as pointed out by Dall, evidently lived in cold water. The presence of *Ecphora quadricostata umbilicata*, *Polinices internus*, as well as other gastropods, and the scaphopod, *Dentalium carolinense*, indicates this environment.

Distribution and correlation.—This zone is represented in a cut in an old road leading to Watsons Landing, about 2 miles north of Alum Bluff (station 1/962); near Clarksville (station 8862); Darlings Slide (station 1/672), Abes Spring (station 1/959), and below Baileys Ferry (station 3418), on Chipola River; on Choctawhatchee River near Red Head Still (station 1/951); lower upper Miocene bed at Jackson Bluff, Ochlockonee River (station 3423). The highest part of this zone is represented at the last locality. The fauna of the *Ecphora* zone is nearly related to that in the bed underlying the fragmental series of the Yorktown formation of Virginia.

CANCELLARIA ZONE

Typical exposure.—The *Cancellaria* zone is typically exposed in the highest fossiliferous beds along Harveys Creek, Leon County, Fla. The total thickness of the zone in this area is 25 to 30 feet. The sediments composing this zone consist of a fine to coarse grained clayey sand containing many fossils. The beds of this zone were probably laid down after the deposition of the "aluminous clay" of Dall, which is not found along Ochlockonee River.

Fauna.—The following list includes some of the characteristic species in the *Cancellaria* zone.

Conus floridanus Cabb	"Cerithium" harveyensis Mansfield
Cancellaria reticulata leonensis Mansfield	Modulus woodringi Mansfield
Cancellaria propevenusta Mansfield	Vermicularia spirata (Philippi)
Cancellaria tenera Philippi	Turritella etiwanensis (Tuomey and Holmes)
Marginella popenoci Mansfield	Turritella cookei Mansfield
Fasciolaria gigantea harveyensis Mansfield	Turritella cookei harveyensis Mansfield
Busycon perversum (Linnaeus)	Turritella duplinensis Gardner and Aldrich
Dorsanum? plicatilum (Böse)	Xenophora delecta floridana Mansfield
Phos sloani floridanus Mansfield	Natica canrena (Linnaeus)
Alectrion cornelliana (Olsson)	Polinices coënsis Dall
Alectrion floridana Mansfield	Turbo castaneus var. crenulatus Gmelin
Strombina gunteri Mansfield	
Strombus pugilis floridanus Mansfield	
Cerithium floridanum leonensis Mansfield	

The fauna of the *Cancellaria* zone evidently lived in rather warm water, an environment indicated by the presence of such species as *Natica canrena*, *Vermicularia spirata*, and of the genera *Caecum*, *Strombus*, *Xenophora*, and others.

At station 3421, Harveys Creek, half a mile above an abandoned mill, the gastropod fauna is represented by 123 species, nearly three times as many as in the *Ecphora* zone. From stations 3671 and 3672, near Hosford, 57 gastropods were recognized. The following species were found only near Hosford: *Acteocina coënsis*, *Mitra hosfordensis*, *Solenosteira vaughani*, and *Phos vaughani*. The deposits around Hosford are believed to carry the earliest fauna referred to this zone.

Distribution and correlation.—The fauna of the *Cancellaria* zone is represented at the following other localities: The "Deadens," Washington County (stations 8176, 1/422, 1/706); Econfina River, 1 mile below highway bridge, Bay County (station 1/953); on Mr. S. D. Johnson's place, near Woods, Liberty County (station 1/961); highest bed at Jackson Bluff, Leon County (stations 3422, 11732).

The fauna of the *Cancellaria* zone is closely allied to the fauna of the Duplin marl of the Carolinas and appears to have lived at approximately the same time.

DISTRIBUTION OF SPECIES FROM THE CHOCTAWHATCHEE
FORMATION

Those marked C are from the *Cancellaria* zone; E from *Ecphora* zone; A from *Arca* zone; D from the Duplin marl of the Carolinas. The asterisk denotes the persistence of the species to the Recent fauna of the coast.

GASTROPODA

- Acteon vaughani* Mansfield, n. sp. C, D.
Acteocina canaliculata (Say) C, E, D, *.
 coënsis Mansfield, n. sp. C.
Sulcularia suleata harveyensis Mansfield, n. subsp. C.
Cylichnella jacksonensis Mansfield, n. sp. C, E.
Volvula oxytata hosfordensis Mansfield, n. subsp. C, D.
Ringicula (*floridana* var.?) *guppyi* Dall C.
 (*floridana* var.?) *guppyi* Dall (more typical) C.
Bullaria sp. C.
Myurella binodosa Mansfield, n. sp. C.
 dislocata (Say) C, D, *.
 dislocata indenta (Conrad) C, D.
 protexta (Conrad)? C.
Conus adversarius Conrad C, E, D.
 floridanus Gabb C, *.
 testudinarius leonensis Mansfield, n. subsp. C.
 harveyensis Mansfield, n. sp. C.
Cymatosyrinx lunata (H. C. Lea) C, E, D.
 lunata aepy tuberculata Mansfield, n. subsp. C.
 lunata porrecta Mansfield, n. subsp. C.
 propeaepynota Mansfield, n. sp. C.
 propeaepynota libertiensis Mansfield, n. subsp. C, E.
 sp. aff. *C. eburnea* (Conrad) E.
Clathrodrillia? *emmonsi* (Olsson) C, E, D.
 emmonsi hosfordensis Mansfield, n. subsp. C.
 anteaphanitoma Mansfield, n. sp. C.
 gracilina (Dall ms.) Mansfield, n. sp. C, E.
 podagrina (Dall) C.
Crassispira antealesidota Mansfield, n. sp. C.
Bellaspira? n. sp.? C.
Mangilia harveyensis Mansfield, n. sp. C, D.
 coënsis Mansfield, n. sp. C.
 gardnerae Mansfield, n. sp. C, E.
 sp. aff. *M. magnoliana* Olsson C.
Brachycythara turrita Mansfield, n. sp. C.
 "Cythara" *balteata* (Reeve)? C.
Aematurris metria (Dall) C.
Glyphostoma watsoni leonensis Mansfield, n. subsp. C.
Cancellaria (*Cancellaria*) *tabulata* Gardner and Aldrich C, E, D.
 reticulata leonensis Mansfield, n. subsp. C.
 (*Cancellaria?*) *propevenusta* Mansfield, n. sp. C, D.
 (*Narona*) *agria* Mansfield, n. sp. C, E.

A single fragment from station 3421, Harveys Creek, about half a mile above abandoned mill, Leon County, Fla., may belong to this species.

Family CONIDAE

Genus CONUS Linnaeus, 1758

Conus adversarius Conrad

Plate 1, figure 15

Conus adversarius Conrad, Am. Jour. Sci., vol. 39, p. 388, 1840 [Described]: vol. 41, p. 345, pl. 2, fig. 3, 1841.

Type locality: Natural Well, Duplin County, N. C.

Occurrence: Upper Miocene: Florida, stations 3422 and 3423, upper and lower upper Miocene beds at Jackson Bluff, Leon County (rare); upper bed at Alum Bluff, Liberty County (rare); Harveys Creek, about half mile above abandoned mill, Leon County, Fla. (rare). Virginia, 3 miles west of Franklin. Southampton County. South Carolina, Mayesville, Sumter County, and Darlington, Darlington County. Pliocene: Waccamaw, S. C., Caloosahatchee River, Shell Creek, and Alligator Creek, Fla.

Conus floridanus Gabb

Plate 1, figure 13

1869. *Conus floridanus* Gabb, Am. Jour. Conchology, vol. 4, p. 195, pl. 15, fig. 4, 1868.

Habitat: Tampa Bay, Florida (Gabb).

Occurrence: Upper Miocene: Florida, station 1/946, Harveys Creek, about half a mile above abandoned mill, Leon County (rare); station 3422, uppermost bed at Jackson Bluff, Leon County (rare). Pliocene: Cronly, N. C., and Caloosahatchee River and Shell Creek, Florida. Recent: Reported from Cape Hatteras to Florida Keys but much more common along the Florida coast.

Conus testudinarius leonensis Mansfield, n. subsp.

Plate 1, figure 14

The face of the type and only specimen is broken away, but the back is entire and reveals the following characters:

Shell of medium size, subpyriform, with a moderately low spire, and consists of about 10 whorls in all. Spire very broadly conical. Suture channeled and undulating on early whorls but appressed and less undulating on later whorls. Early spire whorls ornamented with weak tubercles on the presutural margin. Body whorl rounded at the shoulder and narrow at the anterior end. Sculpture of poorly defined spiral lines.

Type and only specimen (U.S.N.M. Cat. No. 370103) measures: Altitude, 40 mm.; greatest diameter, 11 mm.

The new species differs from the Recent species, *Conus testudinarius* Reeve, in having a more rounded-shouldered body whorl and a more attenuated anterior extremity.

Occurrence: Upper Miocene: Harveys Creek, half a mile above abandoned mill, Leon County, Fla. Collected by Florida Geological Survey.

Conus harveyensis Mansfield, n. sp.

Plate 1, figure 12

Shell small, subbiconic, and consists of 3 nuclear and 8 postnuclear whorls. Spire turrited, weakly concave in outline, early part narrowly conical, later broadly conical, and constitutes about one-third shell length. Nuclear whorls smooth, porcellaneous, and rounded in outline. Early spire whorls medially carinate. Spire ornamented with arcuate growth lines and faint microscopic spiral threads. Body whorl and canal below shoulder carina marked with 17 flat, smooth, wide spiral bands, which are separated by deep grooves about one-third the width of the bands. The bands are broader above and narrower below. Lower columella nearly straight.

Type (U. S. Nat. Mus. Cat. No. 370102) measures: Altitude, 21 mm.; greatest diameter, 10.5 mm.; altitude of spire, 7 mm.

Conus simpsoni Dall, obtained in 60 fathoms off Key West, Fla., is related to the new species but differs from it in having a beaded carina on the early whorls and a more tapering body whorl.

Conus burckhardti Böse, a Miocene species from the State of Oaxaca, Mexico, is nearly related to the new species but apparently differs from my species in having a longer body whorl and spiral granules on the early spire whorls.

Occurrence: Upper Miocene, Harveys Creek, half a mile above abandoned mill, Leon County, Fla., type and only locality. Collected by Florida Geological Survey.

Family TURRITIDAE

Subfamily TURRITINAE

Genus CYMATOSYRINX Dall, 1889

Cymatosyrinx lunata (H. C. Lea)

Plate 2, figure 9

1845. *Pleurotoma lunatum* H. C. Lea, Am. Philos. Soc. Trans., new ser., vol. 9, p. 269, pl. 37, fig. 93.

1856. *Turris lunatum* (Lea), Tuomey and Holmes, Pleiocene fossils of South Carolina, p. 132, pl. 27, fig. 16.

PLATE 1

- FIGURE 1. *Acteon raughani* Mansfield, n. sp.; type; altitude, 4.2 millimeters (p. 25).
2. *Acteocina canaliculata* (Say). Figured specimen from station 3421, Harveys Creek, half a mile above abandoned mill, Leon County, Fla.; U. S. Nat. Mus. No. 369884; altitude, 3.7 millimeters (p. 26).
- 3, 4. *Acteocina coönsis* Mansfield, n. sp. (p. 26) 3, Type; altitude, 3.5 millimeters. 4, Topotype; altitude, 2.6 millimeters.
5. *Ringicula (floridana var.?) guppyi* Dall. Figured specimen from Harveys Creek, half a mile above abandoned mill, Leon County, Fla.; altitude, 2 millimeters (p. 29).
- 6, 7. *Sulcularia sulcata harveyensis* Mansfield, n. subsp. Cotypes (p. 27). 6, altitude, 2.0 millimeters; 7, altitude, 2.4 millimeters.
8. *Ringicula (floridana var.?) guppyi* Dall (more typical). Figured specimen from Gully Pond, Washington County, Fla.; altitude, 1.5 millimeters (p. 29).
9. *Volvula oxytata hosfordensis* Mansfield, n. subsp.; type; altitude, 2.7 millimeters (p. 28).
10. *Clathrodrillia? emmonsii* (Olsson). Figured specimen from cut in old road to Watsons Landing, Liberty County, Fla.; U. S. Nat. Mus. No. 369956; altitude, 11.4 millimeters (p. 36.)
11. *Cylichnella jacksonensis* Mansfield, n. sp.; type; altitude, 3.2 millimeters (p. 28).
12. *Conus harveyensis* Mansfield, n. sp.; type; altitude, 21 millimeters (p. 33). (The number was accidentally omitted from the plate.)
13. *Conus floridanus* Gabb. Figured specimen from Harveys Creek, half a mile above abandoned mill, Leon County, Fla.; U. S. Nat. Mus. No. 370104; altitude, 42 millimeters (p. 32).
14. *Conus testudinarius leonensis* Mansfield, n. subsp.; type; altitude, 40 millimeters (p. 32).
15. *Conus adversarius* Conrad. Figured specimen from Harveys Creek, half a mile above abandoned mill, Leon County, Fla.; U. S. Nat. Mus. No. 369929 (p. 32).

