

MARGARITARIIDAE, NEW FAMILY (PELECYPODA) AND  
DESCRIPTION OF TWO NEW SPECIES

HAROLD E. VOKES  
PROFESSOR OF GEOLOGY  
TULANE UNIVERSITY

CONTENTS

	Page
ABSTRACT.....	135
I. INTRODUCTION.....	135
II. SYSTEMATIC DESCRIPTIONS.....	136
LITERATURE CITED.....	141
PLATE I.....	139

ABSTRACT

The new family Margaritariidae is proposed for the genus *Margaritaria* Conrad, 1849, of which the type, and previously only known species, is *Pholadomya abrupta* Conrad, 1832. This species, described from the upper Miocene deposits at Yorktown, Va., has been reported from southern Maryland to South Carolina in beds of middle and (mainly) upper Miocene age. The southern limit of its range is here extended to Collier County, Florida. Two new species are described: *M. inexpectata* from the upper Eocene Moodys Branch Marl, near Montgomery, Louisiana, and *M. gardnerae* from the Miocene Shoal River Formation of the Alum Bluff Group in Walton County, Florida.

I. INTRODUCTION

In 1832, Conrad described and figured (p. 26, pl. 12) a species from "York-town, Virginia, Upper Tertiary" which he denominated *Pholadomya abrupta*. Subsequently Deshayes (1835, p. 66), Sowerby (1840, p. 4), and others referred this species to the genus *Panopaea* [= *Panopea* Menard de la Groye, 1807]. Conrad commented upon this reassignment in 1849, and (p. 214) provisionally proposed the new generic name

*Margaritaria*. In 1863 (p. 572) he treated *Margaritaria* as a subgenus of *Pholadomya*.

In the more than 130 years that have elapsed since the original description, Conrad's species has proved to be more or less widely distributed in the middle and upper Miocene deposits from southern Maryland to South Carolina. It is, however, never abundantly represented and due to the internally nacreous shell material, is fragile and usually is poorly preserved. But, during this same interval of time, no other species has been described that is referable to the genus *Margaritaria*.

It was with some surprise, therefore, that a second species was found in the Shoal River fauna at an outcrop near the famous "Shell Bluff" locality on Shoal River in western Florida. Even more unexpected was the recovery of yet a third species in the Moodys Branch Marl (Jacksonian, upper Eocene) at Creole Bluff on Red River near Montgomery, Grant Parish, Louisiana. This locality is widely known in the literature as "Montgomery Landing." Although each of the new species is represented by a single imperfect specimen, their obvious rarity and the extension of both the known geologic and geographic range of the genus justifies

EDITORIAL COMMITTEE FOR THIS PAPER:

A. MYRA KEEN, Department of Geology, Stanford University, Stanford, California  
KATHERINE V. W. PALMER, Paleontological Research Institution, Ithaca, New York  
DRUID WILSON, United States Geological Survey, Washington, D. C.

their description. In addition, it is now possible to record the occurrence of *Margaritaria abrupta* in the Tamiami Formation of peninsular Florida. A well-preserved mould of the interior of a right valve accompanied by a broken mould of the left valve was collected by Mr. Druid Wilson of the United States Geological Survey from the lime pits at Sunniland in Collier County, Florida.

## II. SYSTEMATIC DESCRIPTIONS

Family MARGARITARIIDAE Vokes,  
new family

Genus MARGARITARIA Conrad, 1849

*Margaritaria* CONRAD, 1849, Acad. Nat. Sci., Philad., Jour., 1 (4), p. 214; (as *Margiritaria* in index). CONRAD, 1863, Acad. Nat. Sci., Philad., Proc., 14, p. 572.

*Actinomya* MAYER, 1870, Vierteljahrschr. naturf. Ges. Zürich, 15, pp. 45, 59.

Type species, by monotypy, *Pholadomya abrupta* Conrad, 1832.

Conrad's introduction of the generic name was not accompanied by a diagnosis, and so far as I am aware, the lack has not been met by any author. Since the genus previously has been monotypic, the description of the species has served also as a generic diagnosis. The two new species presently added are, on the whole, exceedingly similar to the previously known form, and we may here use the major part of Dall's description of *M. abrupta* (1903, p. 1533) as a diagnosis of the genus:

"Shell nacreous, subsolenoid in form, sparsely radially sculptured; rounded and slightly gaping in front, abruptly truncate and widely gaping behind; the beaks submedial, low, ligament external, elongate, on strong nymphs; Hingeplate continuous, edentulous, narrow; muscular impressions distinct; pallial line wide, somewhat irregular, . . . with a short angular sinus, at the posterior lower angle of which there is a rather large, strong scar, as if the mantle had had here a specialized area of attachment to the shell, . . . The surface when unworn is more or less granular and resembles that of *Thracia*; the interior is brilliantly pearly."

*Systematic Position:* There has been uncertainty regarding the systematic position of this group ever since Conrad first described the type species as *Pholadomya abrupta*. That author failed to mention the nacreous character of the shell, possibly assuming that his assignment to *Pholadomya*, a genus characterized by such structure, im-

plied the possession of the nacreous shell in his species. This implication was apparently not perceived by Deshayes and other European workers (see above) who referred the species to "*Panopaea*," a rather logical assignment in the light of the actual description and rather poor figure that accompanied it. The nacreous shell and the fact that the hinge is edentulous were first mentioned by Conrad in 1849 when he proposed the generic name *Margaritaria*. Conrad's statement follows:

"This shell which Deshayes referred to *Panopea*, has a highly perlaceous substance, and is destitute of cardinal teeth. The nacre, and different form of the muscular impressions, appear to me sufficient to exclude it from *Glycimeris*, Lam. [1801, 126 (non 1799) = *Cryptodaria* Reuss, 1801, 351], to which it approaches nearer than to *Panopea*, Aldrov."

"If this Miocene fossil is inadmissible in the genus *Pholadomya*, I propose a new generic name, *Margaritaria*."

Subsequent authors have either followed Conrad's earlier reference of his species to *Pholadomya* (Tuomey & Holmes, 1856; Emmons, 1858) or have accepted the genus *Margaritaria* (Meek, 1864; Dall, 1903; Glenn, 1904; Miller, 1912). Meek placed *Margaritaria* in the Anatinidae; both Dall and Glenn referred it to the family Pholadomyacidae, although Dall (1903, p. 1533) did so with much doubt, stating:

"Its relations are certainly most puzzling. I was strongly tempted to place it near *Lyonsia*, but the arrangement of the ligament is more like that of *Thracia* and there is nothing to suggest the presence of a lithodesma. Its sculpture and nacre are opposed to affiliation with *Panopea*, even if we disregard the pallial sinus, but there is something in the aspect of it which recalls *Allogramma*."

The reference to the pallial sinus in the above quotation is a reflection of Dall's uncertainty as to the nature of the pallial line in the posterior area. He stated:

". . . pallial line wide, somewhat irregular, sometimes apparently entire, sometimes with a short angular sinus, at the posterior lower angle of which there is a rather large, strong scar, as if the mantle had had here a specialized area of attachment to the shell. This last arrangement occurs in one specimen only, and it is possibly pathological."

I have examined the representatives of the species in the collection of the United States National Museum, including specimens from

all localities mentioned by Dall (1903, p. 1533) that had not been previously reported in the literature.<sup>1</sup>

Among those specimens apparently available to Dall is a left valve from Suffolk, Virginia, (USNM 146214) slightly broken antero-ventrally, which reveals the pallial sinus and scar described and is probably the "one specimen" referred to by him. There is, in addition, a right valve from Yorktown, Virginia, (USNM 498692) in which the interior is not as well preserved as in the Suffolk individual but in which the presence of a small pallial sinus can be noted. All other specimens in collections that were apparently available at the time when Dall prepared his description are incomplete or in some cases fragmentary (*i.e.*, those from Petersburg, Virginia). Because the posterior portion of the valve is thinner than the anterior, (a condition noted by Conrad in his original description) it is usually the posterior end of the valves that has been lost and the nature of the pallial sinus—including its presence or absence—cannot be observed with certainty. There is nothing in the collection that would serve to indicate the basis for Dall's statement that the pallial line was "sometimes apparently entire."

The specimen figured in the present report, from a locality one mile west of Suffolk, Virginia, is the best preserved interior that I have been able to study, and the pallial sinus, as well as the peculiar ventrally situated muscle scar, is well displayed. Another specimen, in the collection of Mr. William Rice of Hampton, Virginia, (from his marl pits in the outskirts of that city) also revealed well the presence of the sinus and accessory scar, as does, though somewhat indistinctly, the mould of the left valve from the Tamiami Formation, mentioned above. Thus not a single specimen, available for my examination and in which the posterior portion of the pallial line could be observed,

has lacked the sinus. It now seems clear that its presence is characteristic of the genus and is not to be construed as representing a pathologic feature.

Thus, in all essentials, including the general shell outline, the anterior and (much wider) posterior gaping of the shell, the broad and irregular pallial line, and the presence of a small pallial sinus, *Margaritaria* agrees with the deeper burrowing members of the family Hiatellidae, especially *Panopea* Menard, 1807, *Panomys* Gray, 1857, and *Cyrtodaria* Reuss, 1801. Both of the former genera are distinguished by the presence of a small conical cardinal tooth in each valve; *Cyrtodaria*, while also edentulous, differs in details of shape including the possession of slightly twisted valves, and lacks radial ornamentation. None of these, or any of the other genera referred to this family, have the nacreous shell of *Margaritaria*. I am of the opinion that the similarities between the present genus and those of the deeper burrowing hiatellids are of adaptive significance and point to a similar ecologic habit by *Margaritaria* rather than indicating systematic relationship.

It seems most probable that *Margaritaria* represents a deep burrowing genus that evolved from a nacreous-shelled ancestral form. As noted by Dall (1903, p. 1533) there is a suggestion of *Lyonsia* in the general aspect, but the valves are not subequal in size, the arrangement of the ligament differs, "and there is nothing to suggest the presence of a lithodesma." *Thracia*, also mentioned by Dall, has a non-nacreous cellulo-crystalline shell and thus seems to be eliminated as a possible ancestor. The sub-nacreous inequivalved representatives of the genus *Periploma* Schumacher, 1817, while edentulous, possess an internal ligament that is supported on well-developed chondrophores, structures that are wholly absent in *Margaritaria*.

Recent species of the genus *Pholadomya*, with which the type species of *Margaritaria* originally was associated by Conrad, agree with it in possessing a thin shell that is nacreous internally and cellulo-crystalline externally. The shell is much more produced posteriorly than anteriorly and has a granular surface (see Stenzel, Krause and Twinning, 1957, pl. 18, figs. 13-15) with radial ornamentation. Both *Pholadomya* and *Margaritaria* have shells that gape posteriorly

<sup>1</sup> Dall's faunal list is clearly a composite one based in part on specimens and in part on the literature. Thus, there are specimens from Petersburg, Yorktown, Suffolk, and Grove Wharf, Virginia; from Natural Well, near Magnolia, North Carolina, and from Darling, South Carolina. The reference to Edgecomb County, North Carolina, is from Emmons (1858, p. 300), and those to Sumter, Smith's, and Goose Creek, South Carolina, are from Tuomey and Holmes (1856, p. 101).

and anteriorly, those of *Pholadomya* being proportionately less generous than in *Margaritaria*, and both have a similar ligamental nymph. Other features, however, reveal striking differences between the two genera. *Pholadomya* has prominent, inflated umbones, an obscure, rather weakly developed lamellar tooth in each valve, and a much more ample pallial sinus, which with the pallial line is but weakly impressed in the shell structure.

However, the Tertiary and Recent species of *Pholadomya* appear to represent the surviving relics of a geologically ancient lineage that had undergone a striking evolutionary proliferation during the Mesozoic era. Many of the differing generic manifestations of this lineage are known almost solely from internal or external moulds, a circumstance that suggests a fragile, probably at least partially nacreous, shell substance. Certain of these, as for example *Myopholas* Douvillé, 1907 (type, by original designation, *Pholadomya multicostata* Agassiz) a Middle Jurassic to Lower Cretaceous genus, appear to represent somewhat more suitable progenitors for *Margaritaria* but are yet too imperfectly known to permit any certain conclusions.

At the present time, therefore, there appears no alternative but to regard the genus *Margaritaria* as the monotypic representative of a new family, Margaritariidae, which is provisionally considered a member of the superfamily Pholadomyacea.

#### MARGARITARIA ABRUPTA (Conrad)

Pl. 1, figs. 1-3

*Pholadomya abrupta* CONRAD, 1832, Foss. Shel's Tert. formatio s N. Amer., **1** (2), p. 26, pl. 12 (2 figs.); CONRAD, 1838, Foss.

Medial Tert., U. S., (1), p. 3, pl. 1, fig. 4; CONRAD, 1843, Proc. Acad. Nat. Sci., Philad., **1**, p. 329; CONRAD, 1849, Jour. Acad. Nat. Sci., Philad., **1**, errata; TUOMEY and HOLMES, 1857, Pleiocene Foss. S. Car., p. 101, pl. 22, fig. 2; EMMONS, 1858, Rept. N. Car., Geol. Surv., Agric. East. counties, p. 300, text fig. 231.

*Panopaea abrupta* Conrad. DESHAYES, 1835, Arim. sans Vert., (ed. 2), **6**; SOWERBY, 1840, Min. Conch., Gr. Brit., **7** (whole no. 107, p. 4; VALENCIENNES, 1840, Arch. du Mus. d'Hist. Nat., Paris, **1**, p. 36.

*Pholadomya (Margaritaria) abrupta* CONRAD, 1863, Proc. Acad. Nat. Sci., Philad., **14**, p. 572.

*Margaritaria abrupta* Conrad. MEEK, 1864, Smithsonian Misc. Colln., no. 183, p. 12; DALL, 1903, Trans. Wagner Free Inst. Sci., Philad., **3** (6), p. 1532; GLENN, 1904, Mollusca, Pelecypoda, in W. B. Clark, et al.: Miocene, Maryland Geol. Surv., p. 361, pl. 95, figs. 5, 6; MILLER, 1912, in W. B. Clark, et al.: North Carolina Geol. and Econ. Surv., **3**, Coastal Plain, pt. 1, pp. 205, 243.

*Actinomya abrupta* Conr. (*Pholadom.*). MAYER, 1870, Vierteljahrschr. naturf. Ges. Zürich, **15**, pp. 45, 59.

Figured Hypotype, U.S.N.M. 644667, Length (left valve), 91.5 mm; Height, 52 mm; Diameter (paired valves) 29.2 mm adjacent to umbos where shell is partially exfoliated. Apparently would have been about 31 mm near the posterior end of the valves. Upper Miocene, Yorktown Formation, Zone 2 (?), one mile west of Suffolk, Nansemond County, Virginia.

The characteristics of the type species of the genus *Margaritaria*, have been rather thoroughly considered in the preceding discussion of the systematic position of the genus.

#### PLATE 1

Figures	Page
1-3. <i>Margaritaria abrupta</i> (Conrad) (X 1).....	138
Hypotype USNM 644667, Upper Miocene, Yorktown formation, Zone 2 (?), one mile west of Suffolk, Virginia.	
4. <i>Margaritaria inexpectata</i> , n. sp. (X 1.5).....	140
Holotype USNM 644668, Upper Eocene, Jackson Group, Moodys Marl, Creole Bluff, Red River near Montgomery Landing, Louisiana.	
5. <i>Margaritaria gardnerae</i> , n. sp. (X 1.5).....	140
Holotype, USNM 644669, Miocene, Alum Bluff Group, Shoal River Formation, below small waterfall in ravine immediately east of Shell Bluff on Shoal River, Walton County, Florida.	

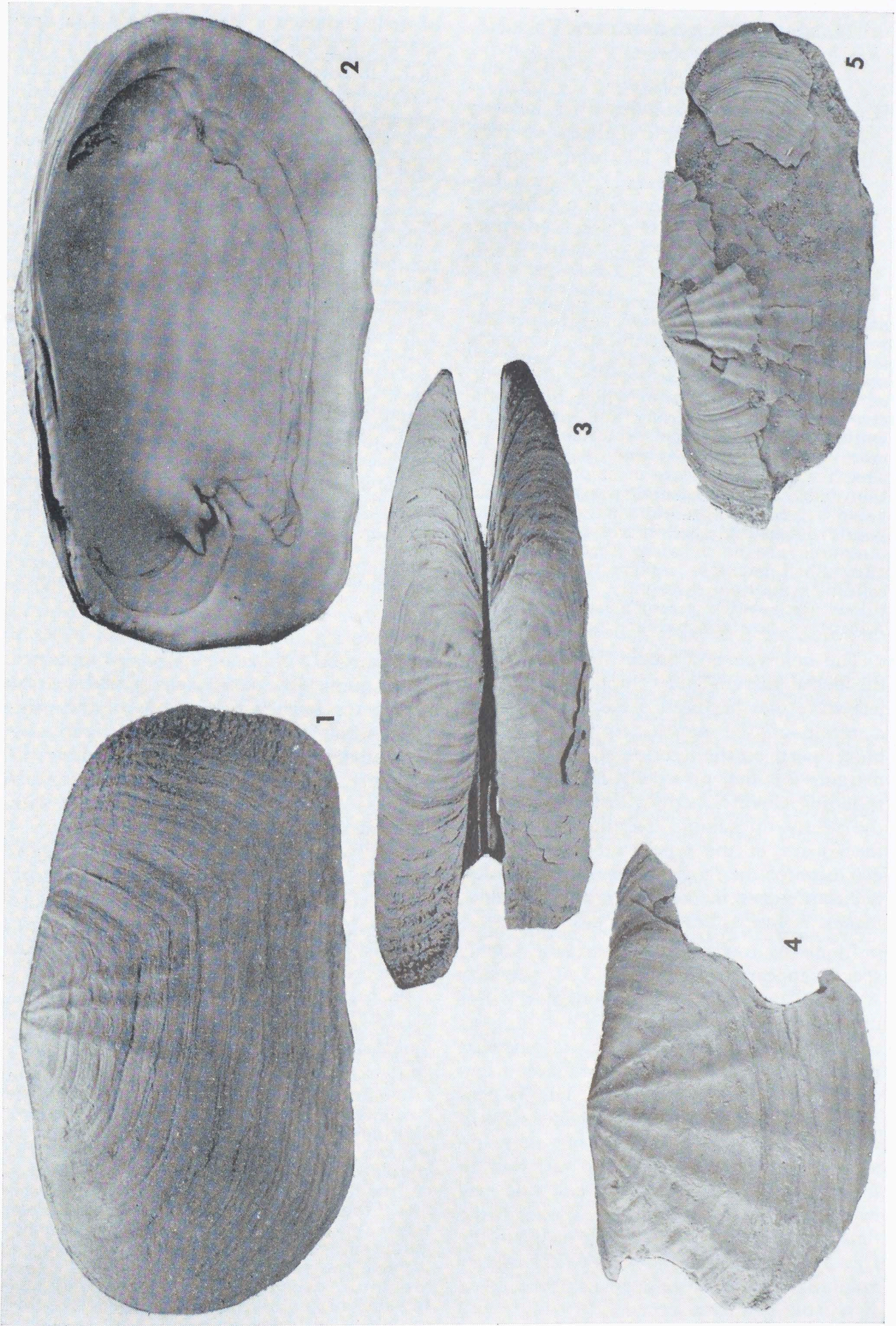


PLATE 1

MARGARITARIA INEXPECTATA Vokes,  
new species

Pl. 1, fig. 4

Holotype, U.S.N.M. 644668, a fragmentary left valve; length (incomplete) 46 mm; height, (incomplete) 28.9 mm; diameter (single valve, as preserved) 9.8 mm. Upper Eocene, Jackson Group, Moodys Branch Marl, Creole Bluff on Red River near Montgomery Landing, Grant Parish, Louisiana.

Shell elongate-ovate, approximately twice as long as high; anterior margin broadly rounded, posterior subtruncate. Umbones low and inconspicuous, situated near the mid-length of the valve. Surface ornamented by seven radial ribs of which the medial five are relatively strong and equidistant, while the anterior and posterior ones are more weakly developed and inconspicuous. The five medial ribs are most prominent on the umbonal and medial portions of the valve but tend to die out ventrally and are poorly defined at the ventral margins. Interspaces are much wider than the radial ribs. Shell nacreous internally, apparently cellulose-crystalline externally. Hinge edentulous, with rather strong posterior nymph. Adductor scars and pallial line unknown.

The holotype is a fragment representing the dorsal margin and central portion of a left valve that has been preserved mainly as a result of the animal forming a thick blister-pearl on the interior of the valve, the margins of the preserved material corresponding almost exactly with the margins of the pearly thickening. Despite the relative inadequacy of the type material the great extension of the range of the genus revealed by its presence in the upper Eocene faunas makes its formal description desirable.

In all of its general characteristics, this species appears to be similar to *Margaritaria abrupta* Conrad. A comparison of the figures of the two species on Plate 1 suggests that the radial ornamentation is somewhat more strongly developed in the Eocene species than in the Miocene one. This is generally true, insofar as the specimens available for study are concerned, but these reveal a considerable degree of variation in the strength of the ornament and this may even exceed that of the Eocene species if the drawing of *M. abrupta*, shown on plate 95, fig. 5 of the Maryland Geological Survey volume on the Miocene deposits of that state, is reliable in this respect.

There is some suggestion that the number

of radial ribs may be greater in the new species than in the Conrad form. It is difficult in view of the amount of variation revealed in the latter, to make any certain statement regarding this factor, however. The specimen of *M. abrupta* here figured (see fig. 1) has four moderately strong radials with traces suggesting two additional anterior ones. The same situation is indicated in the Maryland Miocene illustration mentioned above. The Eocene fragment has five relatively strong radials and traces of two weaker ones can be observed in favorably reflected light.

Comparison of the growth-lines preserved on the broken holotype with these representative of the same stage of development in *M. abrupta* indicated that the Eocene species was somewhat higher in proportion to its height than the Miocene form, with the posterior length relatively shorter than the anterior.

MARGARITARIA GARDNERAE Vokes,  
new species

Pl. 1, fig. 5

Holotype, U.S.N.M. 644669, a compressed and somewhat incomplete sandstone cast of a specimen with portions of the original shell adhering. Length (slightly incomplete) 50 mm; height 23 mm; diameter, (paired valves, somewhat distorted by compression) 14.5 mm, with the diameter of the right valve being 9 mm. Miocene, Alum Bluff Group, Shoal River Formation from below a small waterfall in a ravine immediately east of the type area of the formation in the NW $\frac{1}{4}$ , Sec. 4, T3N, R21W, Walton County, Florida.

Shell elongate-ovate, subtageloid, with the height of the valve approximately two-fifths of the length. Umbones moderately prominent, situated posteriorly about three-fifths of the length from the anterior end. Valve ornamented by radial ribs that are most strongly developed on the umbonal and medial portions of the surface and tend to weaken and become indistinct toward the ventral margin. Eleven radials are present on the holotype (and only known) specimen; the anterior and posterior ones are weak and difficult to discern, the intermediate ones become progressively stronger toward the subumbonal area. Here there are three strong radials with two slightly weaker ones intercalated. Shell slightly granulose at the anterior and posterior ends; growth lines moderately pronounced.

Shell substance internally nacreous, externally cellulo-crystalline. Adductor scars, hinge structures and pallial line unknown.

In contrast to the apparent general similarity of *Margaritaria inexpectata*, n. sp., to *M. abrupta*, the present new species from the Miocene of western Florida is quite different from both the other known forms. Although the type is a compressed and incomplete cast with portions of the shell adhering, it is evident that the species may be distinguished by the fact that the shell is proportionately longer, with slightly more prominent umbones that are more posterior in position than are those of either of the other known species. As may be observed in the accompanying illustrations the umbones of both *M. abrupta* and *M. inexpectata* are almost central in position with respect to the total length of the valves while those of *M. gardnerae* are approximately three-fifths of the total length of the valve from the anterior end. The most obvious difference, however, lies in the greater number of radial ribs, there being eleven such ribs on the present specimen in contrast to the six or seven on the other known species. Furthermore there is a tendency for those radials situated below the umbones to alternate in strength with a weaker one intercalated between the pairs of stronger ribs. No similar development occurs in either *M. abrupta* or *M. inexpectata*.

## LITERATURE CITED

- CONRAD, TIMOTHY ABBOTT, 1832, Fossil shells of the Tertiary formations of North America: Philadelphia, 1 (2), pp. 21-28, pls. 7-14.
- CONRAD, TIMOTHY ABBOTT, 1838, Fossils of the medial Tertiary of the United States: no. 1, pp. i-xvi, 1-32, pls. 1-17, Philadelphia.
- CONRAD, TIMOTHY ABBOTT, 1849, Notes on shells, with descriptions of new genera and species: Acad. Nat. Sci., Philadelphia, Jour. (2) 1, pp. 210-214.
- CONRAD, TIMOTHY ABBOTT, 1863, Descriptions of new, Recent and Miocene shells: Acad. Nat. Sci., Philadelphia, Proc. 14, pp. 583-586.
- DALL, WILLIAM HEALEY, 1903, Contributions to the Tertiary Fauna of Florida, etc.: Trans. Wagner Free Inst. Sci., Philadelphia, 3 (6), pp. vii-xiv, 1219-1654; pls. 48-60.
- DESHAYES, GERARD PAUL, 1835, Histoire naturelle des Animaux sans Vertèbres: [Lamarck] edition 2, 6, Histoire des mollusques (part), Paris.
- EMMONS, EBENEZER, 1858, Report of the North-Carolina Geological Survey; Agriculture of the Eastern Counties; Raleigh, pp. i-xvi, 1-314; 256 [280] figs.
- GLENN, LEONIDAS CHALMERS, 1904, Pelecypoda, in CLARK, WILLIAM BULLOCK, et al., Miocene: Md. Geol. Surv., pp. i-clv, 1-543, 135 pls., Baltimore.
- LAMARCK, JEAN BAPTISTE DE, 1801, Système des Animaux sans Vertèbres: Paris, 432 pp.
- MEEK, FIELDING BRADFORD, 1864, Check list of the invertebrate fossils of North America; Miocene: Smithsonian Misc. Colln., 7 (no. 183), 32 pp.
- MILLER, BENJAMIN L., 1912, The Tertiary formations, in CLARK, WILLIAM BULLOCK, et al., The Coastal Plain of North Carolina: N. Carolina Geol. & Econ. Surv., 3, 372 pp., 52 pls., 21 figs.
- REUSS, J. D., 1801, in Repertorium Commentationem a Societatibus Litterariis editarum Scientia Naturalis, p. 351.
- SOWERBY, JAMES DE CARLE, 1840, The Mineral Conchology of Great Britain: London, 7 [1840-1846], (whole No. 107), pp. 1-8, pls. 614-518. [for discussion of dates of publication of this work see: Sykes, E. R., 1906, Proc. Malac. Soc. London, 7, pp. 191-194]
- STENZEL, HENRYK B., E. K. KRAUSE and J. T. TWINING, 1957, Pelecypoda from the type locality of the Stone City Beds (middle Eocene) of Texas: Univ. Texas Publ. 5704, 237 pp., 22 pls., 31 text figs., 4 tables.
- TUOMEY, MICHAEL and FRANCIS SIMMONS HOLMES, 1857, Pleiocene fossils of South-Carolina, containing descriptions and figures of the Polyparia, Echinodermata and Mollusca: Charleston, pp. i-xvi, 1-152, 30 pls.

August 14, 1964