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## NOTES ON THE FAUNA OF THE CHIPOLA FORMATION—I A NEW SPECIES OF *EOMILTHA* (MOLLUSCA: BIVALVIA)

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While engaged in the study of the species of *Miltha* s.s. from the Neogene deposits of Florida I noted the presence in collections from the Chipola Formation of an undescribed species of the genus *Eomiltha*. This form, which is rather rare, represents the first record of the genus in the faunas from the type area of the formation, although Gardner described (1926, U. S. Geol. Surv. Prof. Paper 142-C, p. 112, pl. 20, figs. 1, 2), as "*Phacoides (Miltha)*" *xustris*, a form that is to be referred to *Eomiltha* from the lower beds exposed at Alum Bluff, Liberty County, Florida. At that locality (= TU 453) about ten feet of the

uppermost beds of the Chipola Formation are exposed during low water stages of the Apalachicola River. The present species is found at localities that occur approximately at the top of the basal third of the section in the type area; it thus is believed to be stratigraphically lower and hence somewhat older than *E. xustris*.

### Genus *EOMILTHA* Cossmann, 1912

*Eomiltha* COSSMANN, 1912, Act. Soc. linn. Bordeaux, vol. 65, p. 269 [issued separately as: Cossmann and Peyrot, Conch. Néog. de l'Aquitaine, v. 1, livr. 3, p. 650, 1912].

Type species, by original designation, *Lucina contorta* Defrance, Thanetian Stage, Paleo-

cene, France. [Fig'd., Cossmann and Pissarro, 1906, pl. 24, sp. 82-8.]

The genus *Eomiltha* appears to range from the Paleocene to the Recent (*Lucina voorhoevei* Deshayes, 1857, Journ. de Conchyl., vol. 6, p. 106, pl. 2, fig. 1, from the Mozambique Channel off East Africa.) It is present in the Eocene of the Gulf Coast—*Lucina pandata* Conrad from the Gosport Sand, Upper Claibornian, and casts of an undescribed species in our collections from the Inglis member of the Moodys Branch Formation from the new Florida Cross-state Barge Canal—and of California—*Dosinia gyrata* Gabb, from the Domenigine (?) Stage, at Martinez. The genus has not been recognized in post-Chipola faunas from the eastern United States.

The following discussion comparing the essential shell characters of the genus *Eomiltha* with those noted in the preceding paper for *Miltha s.s.* is based, in-so-far as the former genus is concerned, upon the 18 available specimens of *E. scolaroi*, new species, and almost 100 valves of *E. pandata* (Conrad) from the Gosport Sand at Claiborne Bluff, Monroe County (loc. TU 78), and Little Stave Creek, Clarke County (loc. TU 306), Alabama, supplemented by illustrations of the type species.

Species of *Eomiltha* may be distinguished from those referred to *Miltha s.s.* by their equally inflated valves of more elongate shape with, usually, somewhat irregular ventral outline. The surface of the valves is ornamented by irregular, raised concentric lamellae that are most strongly developed toward the anterior and posterior ends of the valves. As in *Miltha*, there is an underlying weak radial ornamentation, both the irregular radial ribbing and the sub-parallel anastomosing grooves in the inter-lamellar areas being present. However, no trace of the minute raised threads with tangential trend can be observed. Although there is a shallow round-bottomed groove extending from the umbone to the ventral end of the short and relatively straight posterior end of the shell, there is no well-defined posterior-dorsal area of the valve such as is characteristically present in *Miltha*. The lunule is small, impressed, and lanceolate in shape, and is but slightly wider in the right valve than in the left.

The hinge, as in *Miltha*, consists of two

cardinals in each valve, but the posterior cardinal, **3b**, of the right valve is much broader, more trigonal and so strongly bifid as almost to resemble two separate teeth. The anterior cardinal, **3a**, is simple, and usually somewhat truncated dorsally by an ingrowth of the lunular margin, which on some specimens also transgresses across the dorsal edge of the posterior tooth. The anterior cardinal, **2a**, of the left valve is relatively broad and is grooved at its highest ventral end, although never as markedly bifid as is the right posterior tooth. It also may be somewhat truncated by the ingrowing lunular margin. The posterior cardinal, **2b**, is thin, lamellar, and relatively straight as compared to the usual curvature of the corresponding tooth in species of *Miltha s.s.* Furthermore, the wide socket necessary for the reception of the broad right posterior cardinal has crowded it back to a position more closely adjacent to, and parallel with, the anterior end of the fibrous ligament. The latter, as in *Miltha*, is separated from and shorter than the outer lamellar ligament.

Contrary to the situation in *Miltha* where the lamellar ligament appears to have trended almost directly across from one valve to the other, being roofed over posteriorly by a thin shell lamina, which I have interpreted as a remnant of the former escutcheon, the ligament of *Eomiltha* seems rather to have had the shape of a "C-spring" or tube that was split along its ventral side. The groove for its reception is incised into the dorsal side of the nymph plate and there is a shallow, but well-defined area above it that is excavated into the inner side of the dorsal margin of the valve. Some specimens of *E. pandata* (Conrad) clearly show remnants of this ligament appressed to the excavated surface. No similar excavation was observed in species of *Miltha*.

Muscle scars, pallial line, and pallial blood vessel groove are essentially as in *Miltha* but differ in details. The anterior adductor scar is relatively narrower, more elongate, with the anterior and ventral sides almost parallel. In nearly all specimens examined its posterior ventral end lies at (e.g. *E. scolaroi*), or posterior to (e.g., *E. pandata*) the midlength of the valve. In keeping with relatively more elongate shape of the valve, it is somewhat more arcuate in shape and

its trend is much more oblique than that of *Miltha*. Most striking, perhaps, is the manner in which the anterior-dorsal end is sharply "hooked" at its junction with the pallial line until it has a distinct posterodorsal trend.

The posterior adductor scar is very similar to that of *Miltha*, agreeing, especially in thinner-shelled specimens, in shape and surface markings. In some valves in which the inner surface within the pallial line has been thickened in characteristic lucinoid manner, there is a pronounced tendency toward the restriction of the dorsal side of the inner "fast" muscle portion of the scar, until in some extreme examples it has only about half the height of the adjacent edge of the "catch" muscle portion.

The ridge that marks the site of the area where the gill demibranch was attached to the mantle is usually rather strongly developed, passing anteriorly to the inner edge of the adductor scar and continuing until it abuts against the inner side of the pallial line. The trend of this feature, on the inner side of the valve appears to be almost wholly coincident with the trend of the shallow, rounded umbonal groove on the exterior of the valve. The ridge that marks the position

of the antero-dorsal attachment of the demibranch lies in the sub-umbonal cavity under the anterior portion of the hinge-plate.

The pallial blood vessel groove is well-marked, especially in those specimens with thickened shell interior. It intersects the anterior adductor scar approximately at the posterior third of its length, and in agreement with the more oblique trend of that scar, has in its ventral portion a steeply angled to almost vertical course. Dorsally, the groove tends to turn posteriorly, either in a broadly rounded arc (fig. 9) or subangulately (fig. 8) to cross the gill attachment ridge at a position below and slightly in advance of the posterior end of the nymph plate.

It is of interest to note that although almost all of the valves show evidences of shell damage during life, especially toward the anterior ends of the valves, not one of the more than 100 valves examined had been bored by a predator.

EOMILTHA SCOLAROI H. E. Vokes, n. sp.  
Plate 1, figs. 1-7

*Description:* Shell of medium size for the genus, elongate ovate, both valves equally and moderately inflated. Umbones low, prosogyrate,

PLATE 1

*Eomiltha scolaroi* H. E. Vokes, n. sp. Chipola Fm., Miocene.

Figs. 1, 6. Paratype, USNM 646424, height 35.5 mm, length 41.0 mm, 1, exterior of left valve ( $\times 1$ ); 6, hinge ( $\times 2$ ). Locality TU 825.

Figs. 2, 5, 7. Holotype, USNM 646423, height 32.6 mm, length 37.6 mm, 2, exterior of right valve ( $\times 1$ ); 5, hinge ( $\times 2$ ); 7, portion of surface enlarged ( $\times 4$ ) to show nature of ornamentation, compare with fig. 10. Locality TU 999.

Fig. 3. Paratype, USNM 646425, height 37.3, length 46.6 mm, exterior of relatively elongate left valve ( $\times 1$ ). Locality TU 820B.

Fig. 4. Paratype, USNM 646426, height 39.0 mm, length 43.0 mm, diameter 14.9 mm, view of paired valves tilted obliquely to show small impressed lunule ( $\times 1$ ). Locality TU 999.

*Eomiltha pandata* (Conrad). Gosport Sand, Eocene.

Fig. 8. USNM 646428, height 31.3 mm, length 35.7 mm, interior of left valve ( $\times 1$ ). Locality TU 306.

Figs. 9, 10. USNM 646427, height 37.8 mm, length 42.8 mm, 9, interior of right valve ( $\times 1$ ); 10, portion of surface enlarged to show ornamentation ( $\times 4$ ), compare with fig. 7. Locality TU 306.

Figures 8 and 9 show two specimens in which interior of valve is thickened with extra shelly material, thus emphasizing internal structures. Note the "hooked" anterior end of the anterior adductor scar, the reduced height of the anterior segment of the posterior adductor scar, and the curved (fig. 9) to subangulate (fig. 8) bend in the dorsal segment of the pallial blood vessel groove.

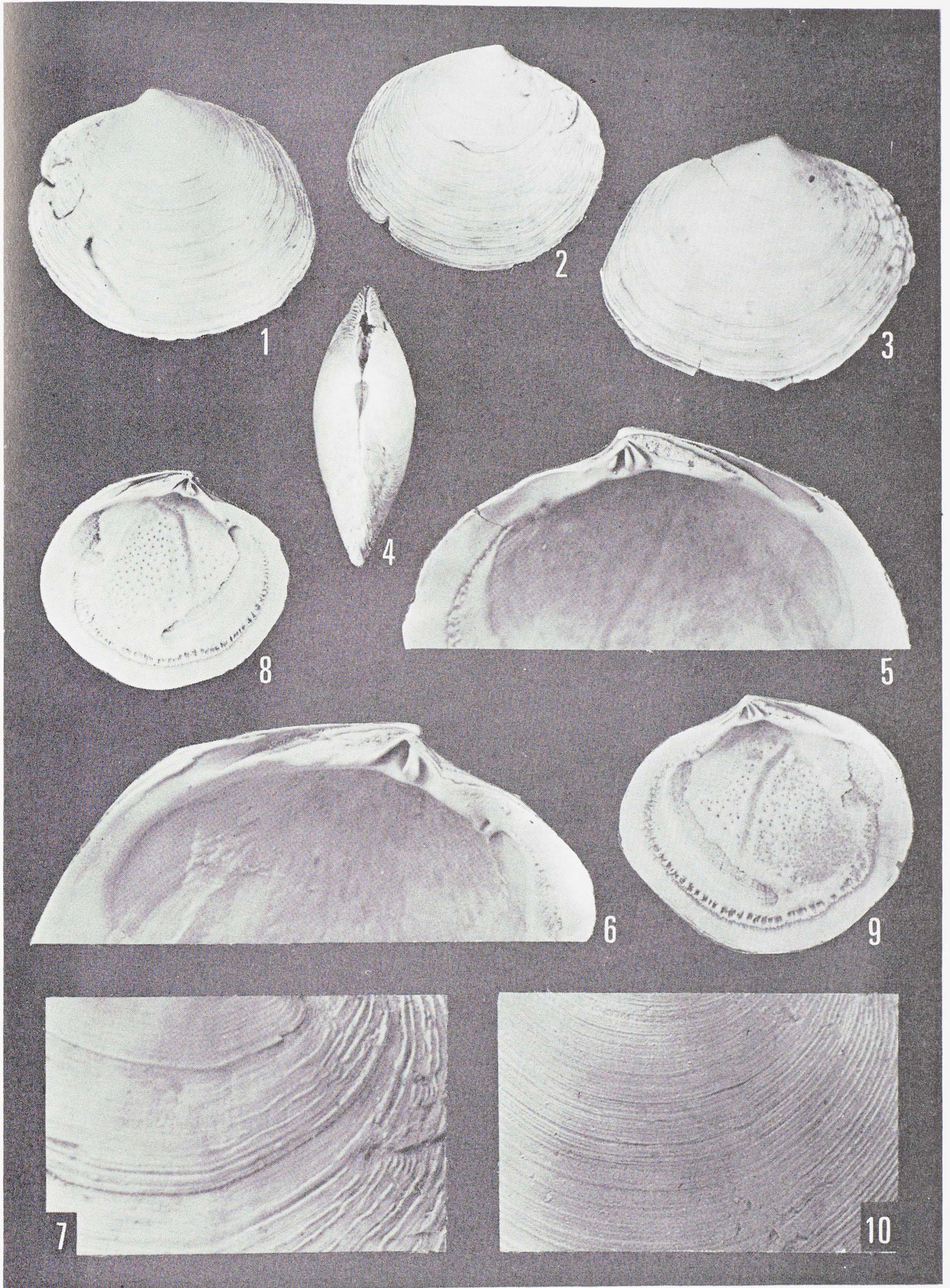


PLATE 1

situated slightly in advance of the middle and posterior to the anterior third of the total length of the valve. Anterior and ventral margins broadly and regularly rounded, the latter exhibiting little or no tendency toward the straightening of the anterior or posterior portions so characteristically found in *E. pandata*. Postero-ventral margin sharply rounded, almost subangulate to the relatively straight posterior, which slopes antero-dorsally before again bending rather sharply into the straight or very slightly convex postero-dorsal margin. Lunule relatively small, lanceolate, deeply incised in both valves and bounded by a shallow impressed line. In adult specimens the inner margin of the lunule, and occasionally also of the anterior portion of the valve immediately in front of it, grows downward onto the hinge-plate covering the dorsal ends of both cardinals in the right valve and of the anterior cardinal in the left. In no specimen examined was the left posterior cardinal covered, the shell material abutting against and stopping at its anterior dorsal side.

Surface of the valve marked by a shallow rounded posterior umbonal groove extending to the postero-ventral angulation. In some specimens a faintly developed, broad and rounded low rib parallels the posterior side of the groove, but is so weak as not to be observed on all. Ornament consisting of distant, thin, raised lamellae separated by interspaces from three to five times as wide. The lamellae are low and inconspicuous, practically absent on the median and umbonal areas of the valves, and most strongly developed toward the anterior and posterior, and to a lesser extent, the ventral margins.

Hinge as in the genus: right anterior cardinal relatively thin, lamellar, extending but slightly more than half-way across the width of the hinge-plate; right posterior cardinal strong, broadly trigonal, deeply bifid, and slightly undercut along its anterior side; left anterior cardinal relatively heavy, straight, transversing the width of the hinge plate, and grooved at its highest point, which is near its ventral termination. Left posterior cardinal thin, straight, closely adjacent to the anterior end of the fibrous segment of the ligament. The latter is seated upon a well-developed nymph that occupies approximately the lower half of the hinge-plate posterior to the cardinal tooth. The dorsal half marked by an elongate excavated area in which the outer lamellar ligament was seated. This excavation extends posteriorly beyond the end of the nymph, widening until occupying almost all of the hinge-plate. The length of this excavated area little more than one and one-half times the length of the nymph.

Muscle scars, pallial line and other internal markings as in the genus. Inner margins of the valves smooth, non-denticulated.

Holotype: USNM 646423, height 32.6 mm, length 37.6 mm, diameter (right valve) 7.0 mm. Locality TU 999.

Paratype: USNM 646424, height 35.5 mm, length 41.0 mm, diameter (left valve) 8.2 mm. Locality TU 825.

Paratype: USNM 646425, height 37.3 mm, length 46.6 mm, diameter (left valve) 8.3 mm. Locality TU 820B.

Paratype: USNM 646426, height 39.0 mm, length 43.0 mm, diameter (paired valves) 14.9 mm. Locality TU 999.

*Distribution:* Tulane University localities 459, 820B, 821, 825, 999. Complete descriptions of these localities are given in the preceding paper, as well as full references to the papers cited.

*Eomiltha scolaroi* new species, most closely resembles the Claibornian, Eocene, species *E. pandata* (Conrad) in overall aspect. It may be distinguished, however, by details of shape and surface ornamentation, especially its more regularly rounded ventral margin and straighter posterior one. The raised concentric lamellae on the surface of the valve are stronger, but more distant and irregular on the lateral portions of the valve, and much weaker on the median and umbonal areas. *Eomiltha xustris* (Gardner), known only from Alum Bluff, has a more rounded outline with less pronounced straightened posterior margin and more strongly developed concentric surface ornamentation, which is well developed on the median as well as on the lateral portions of the valves.

All but one of the specimens of *Eomiltha scolaroi* in the Tulane University collections are from a single bed of sandy, miliolid-bearing marl of a yellow-brown color, which crops out along the course of Farley Creek, a tributary of the Chipola River. The single specimen from the Chipola River section is from Tulane locality 459 where the matrix also consists of a fairly coarse quartzitic sandstone.

This species is named from Dr. Reginald J. Sclaro who, as a graduate student at Tulane University engaged in a study of the Bryozoan faunas of the Chipola Formation, first called to our attention the occurrence of fossil-bearing outcrops in the bed of Farley Creek.

The specimens of *E. scolaroi* described above were collected during the course of field studies made possible through Grant GB-6048 from the National Science Foundation. The financial assistance thus afforded is herewith gratefully acknowledged.

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