

THE GENUS *PHALIUM* (GASTROPODA: CASSIDAE) FROM THE ALUM BLUFF
GROUP OF NORTHWESTERN FLORIDA

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The purpose of this paper is to reexamine the genus *Phalium* from the Alum Bluff Group of northwestern Florida. Over a century has elapsed since Dall first described a single specimen of this genus from Chipola Formation deposits. His new species was collected from Ten Mile Creek in Calhoun County, Florida, and given the name *Phalium aldrichi* to honor Mr. T.H. Aldrich, who was instrumental in furthering our knowledge of the Eocene fauna of the southern United States (Gardner, 1947, p. 537). Since this initial discovery, numerous specimens of *Phalium* have been collected by professional and amateur fossil hunters from the late Early Miocene Chipola deposits along Farley Creek, the Chipola River, and Tenmile Creek. In addition, one complete, as well as many partial specimens of *Phalium* have been unearthed from the Middle Miocene Shoal River Formation.

The newly collected Chipola Formation examples of *Phalium* exhibit a wide range of morphological forms and the single complete *Phalium* from the Shoal River deposit bears a strong resemblance to one of the Chipola varieties. These discoveries posed two questions to the investigator. First, does the Chipola Formation possess more than one species of *Phalium*, or do the different varieties of *Phalium* simply represent different forms of *Phalium aldrichi*? Second, does the *Phalium* from the Shoal River deposit represent a new species, or is it a form of *Phalium aldrichi* that survived into the Middle Miocene?

To answer the first question the investigator examined 30 specimens of *Phalium* collected from eight different Chipola Formation localities. Pictures were taken of the different morphological types (pl. 1, figs. 1-5), and the protoconchs of three different forms were examined with the help of SEM photographs (pl. 2). Although none of the specimens examined look exactly like the holotype described by Dall (1890, p. 162), the specimen illustrated in plate 1, fig. 1, has all of its morphological characteristics with the exception of the two prominent transverse varices. An

examination of the pictured specimens of Chipola *Phalium* illustrates a gradual transition in form from Dall's shouldered variety, with distinct nodes on the periphery of the body and penultimate whorls, to a rounded, more cancellate form. In addition, a comparison of the SEM photographs of the protoconchs and early teleoconch whorls of the shouldered forms (pl. 2, figs. 1 and 2) with the rounded, more cancellate variety (pl. 2, fig. 3) reveals that the protoconchs and early sculpturing on the teleoconch whorls are exactly the same for all varieties. This evidence strongly suggests that *Phalium aldrichi* is the only species of *Phalium* present in Chipola Formation deposits, and that like other members of its genus, *Phalium aldrichi* reflects a high degree of morphological variability.

The complete *Phalium* collected from Shoal River deposits (pl. 3, fig. 1) may be compared visually to its closest Chipola counterpart in plate 3, fig. 2. Although the two specimens appear to be the same, the Shoal River species is a much larger and more globose shell, which possesses different sculpturing on the body and teleoconch whorls. These differences have led the investigator to conclude that the Shoal River specimen represents a new species that evolved from *Phalium aldrichi*.

SYSTEMATIC PALEONTOLOGY

Family CASSIDAE Swainson, 1832
Genus PHALIUM Link

Phalium LINK, 1807, Beschr. Natur.-Samm. Univ. Rostock, p. 112.

Type species: *Buccinum glaucum* Linné, 1758, by subsequent designation, Dall (1909, U.S. Geol. Survey, Prof. Paper 59, p. 62).

Subgenus TYLOCASSIS Woodring

Tylocassis WOODRING, 1928, Carnegie Inst. Washington, Publ. 385, p. 306.

Type species: *Buccinum granulatum* Born, 1780, by original designation.

PHALIMUM (TYLOCASSIS) MURRAYI

Schmelz, n. sp.

Plate 3, figure 1

Description: Shell medium-sized, thin, globose. Protoconch smooth, glossy, about three whorls, becoming abruptly sculptured with faint spiral cords and axial ridges. Four and one-half teleoconch whorls. Early whorls strongly convex, last two whorls more flattened. Suture distinct. Penultimate whorl sculptured with four alternating narrow and wide spiral cords, intersected by faint axial ridges. Intersected cords faintly crenulate. Crenulations best developed along the shoulder where they give the shell a weakly tuberculate appearance. Body whorl with 13 broad, slightly raised cords separated by narrow, smooth spaces. Outer lip thickened, reflected, with outer edge coarsely crenulated. Nineteen, well-developed, unpaired lirae situated along the inside edge of the outer lip. Inner lip heavily calloused, reflected, pustular, lirate along the inside edge. Siphonal canal short, strongly recurved; siphonal fasciole well-developed and situated next to a deep groove.

Holotype: UF 67410; height 45.5 mm, maximum diameter 33.5 mm.

Type locality: WL004, Shoal River Formation, New Harmony Quadrangle USGS 1987, (Sec. 4, T3N, R21W), Walton County, Florida.

Etymology: Named for Andrew Murray, who collected the type specimen, now in the collection of the Florida Museum of Natural History.

Discussion: The most recent strontium dating studies on the Shoal River Formation show that these deposits are about 4.5 to 8.5 million years younger than their Chipola Formation counterpart (Jones *et al.*, 1993, tbl. 1, p. 45). In addition, fossils collected from this deposit suggest that the climate was cooler and the reef environment of the Chipola Formation

had been replaced by a shallow-water, silty bottom (Gardner, 1926, p. 2; Hoerle, 1976, p. 3). Under these new environmental conditions, *Phalium aldrichi* evolved into the larger, more globose *Phalium murrayi*. Like its Chipola counterpart, fragments of *Phalium murrayi* collected by the investigator indicate that the new species had a wide range of morphological forms with some possessing smooth body whorls and noded shoulders, while others lack the noded shoulders and have cancellate sculpturing.

Phalium murrayi is considered to be the ancestor to *Phalium reclusa* (Guppy, 1873), which is reported from the Late Miocene-Pliocene Cercado and Gurabo formations of the Dominican Republic (Woodring, 1928, p. 308), the Late Miocene Gatun Formation of the Panama Canal Zone (Woodring, 1959, p. 200, pl. 34, figs. 1, 4-6) and the Late Pliocene deposits of the Bowden formation in Jamaica (Guppy, 1866, p. 287, pl. 17, fig. 8; Woodring, 1928, p. 307, pls. 19, 20). For comparative purposes two typical forms of *Phalium reclusa* from two different Dominican Republic localities are pictured in Plate 3. The smaller, cancellate form (fig. 3) comes from the Cercado formation on the Rio Cana at Caimito (TU 1230) and the larger specimen (fig. 4), with the double row of nodes at the shoulder, comes from Cercado Formation deposits on the Rio Gurabo (TU 1358). *Phalium murrayi* bears the closest resemblance to the specimen of *Phalium reclusa* illustrated in figure 4. Both are about the same size, but *Phalium murrayi* is more globose, lacks the double row of nodes at the shoulder, has early teleoconch whorls that are more convex, and possesses a more elevated protoconch with three rather than two and one-half whorls.

PLATE 1

Figures

1-5. Different morphological types of *Phalium aldrichi* Dall, from the Chipola Formation, Florida. (All X 1)

1. UF 68995; height 32.5 mm, diameter 21.2 mm; locality TU 951.
2. UF 68996; height 35.9 mm, diameter 28.4 mm; locality TU 655.
3. UF 68997; height 32.2 mm, diameter 21.0 mm; locality TU 655.
4. UF 68998; height 37.8 mm, diameter 23.7 mm; locality TU 951.
5. UF 68999; height 35.6 mm, diameter 27.3 mm; locality TU 825.

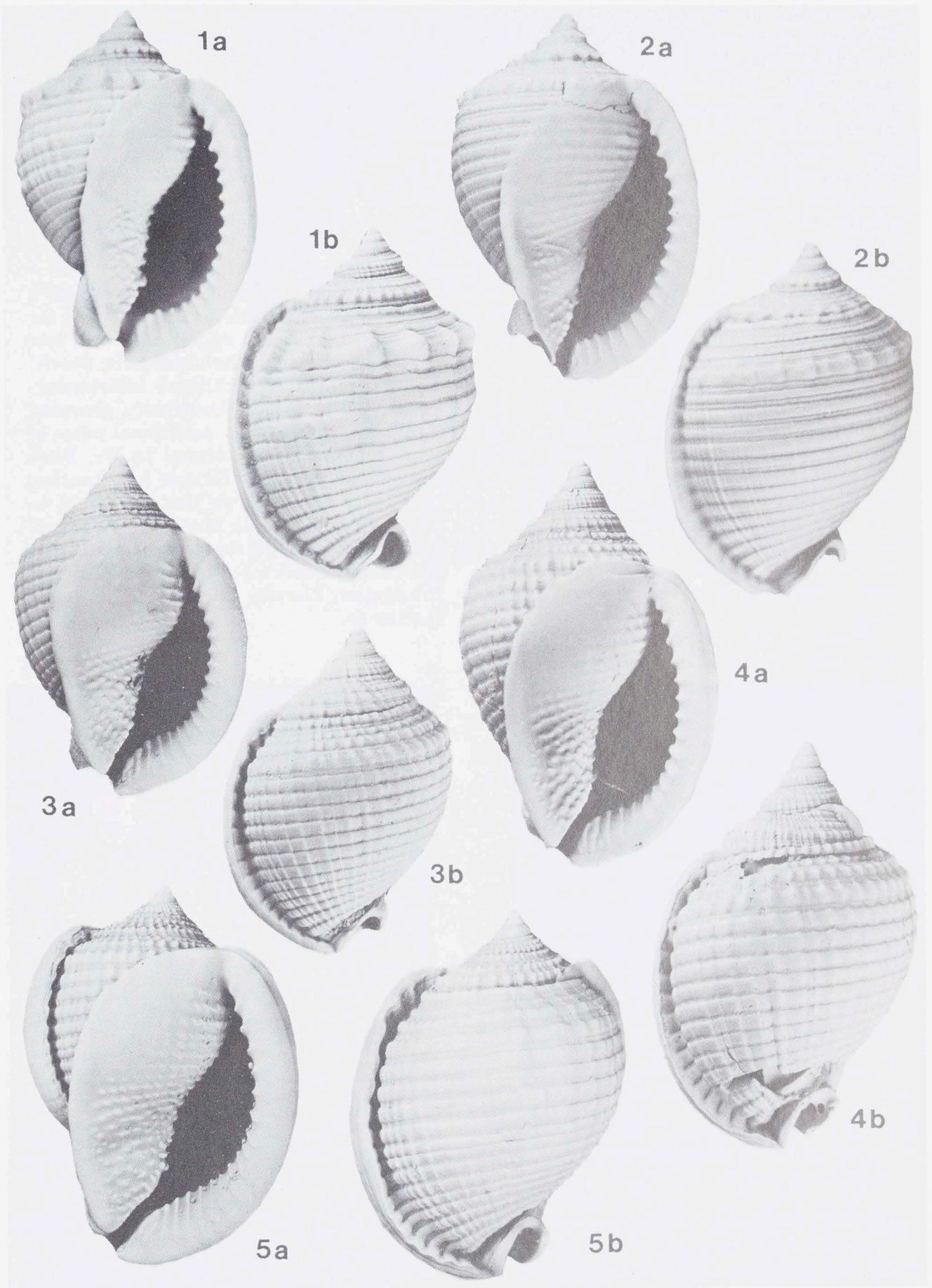


PLATE 1

A number of other Late Miocene and Pliocene species of *Phalium* have been described from Florida, the Caribbean, and South America. These include *Phalium moniliferum* (Guppy, 1866) (see Maury, 1917, p. 110, pl. 44, figs. 4-5) from the Dominican Republic, *Phalium (Tylocassis) sulcosum* var. *senni* (Rutsch, 1934, p. 55, pl. 3) from Venezuela, *Semicassis (Tylocassis) inflata waltonensis* (Mansfield, 1935, p. 40, pl. 4, figs. 5, 9) from Florida, and *Semicassis (Tylocassis) maleaformis* (Vokes, 1938, p. 24, figs. 22-23) from Trinidad. In general, these species are morphologically very similar to *Phalium reclusa* and are considered synonyms of that species by Abbott (1968, p. 163). In addition, Maury (1925, p. 199, pl. 5, figs. 5-7) collected a unique high spired species, *Phalium paraensis*, from Early Miocene, Pirabas Formation, deposits in Brazil. This species may predate *Phalium aldrichi*, but additional geologic dating needs to be done on this formation in order to confirm its appropriate evolutionary placement (Vokes, personal communication).

Pilsbry (1922, p. 361) suggested that *Phalium reclusa* is the ancestor to both *Phalium granulatum* (Born, 1778) in the Atlantic and *Phalium centiquadrata* (Valenciennes, 1832) in the Pacific. This investigator has discovered numerous fossil specimens of *Phalium granulatum* in Florida Pleistocene deposits at the Capeletti Brothers pit in Dade County, and the Griffin Brothers quarry in Palm Beach County. *Phalium granulatum* was also collected from Florida Plio-Pleistocene spoil piles at Star Ranch in Palm Beach County. An examination of over a hundred specimens of *Phalium granulatum* from these locations reveals that they possess a wide range of morphological forms, some of which are identical to *Phalium alligator*

(Petuch, 1991, p. 23, pl. 3, figs. 13-14), and *Phalium granulatum loxahatcheensis* (Petuch, 1994, p. 272, pl. 38, figs. A-B). These findings suggest that both *Phalium alligator* and *Phalium granulatum loxahatcheensis* should be considered synonyms for *Phalium granulatum*. *Phalium cicatricosum* (Gmelin, 1791) cited by Petuch (1994, p. 188, pl. 38, fig. F) for a fossil from the Capeletti Brothers pit, is listed by Abbott (1968, p. 157) as a synonym of *Phalium granulatum*.

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LOCALITY DATA

The following are Tulane University fossil locality numbers:

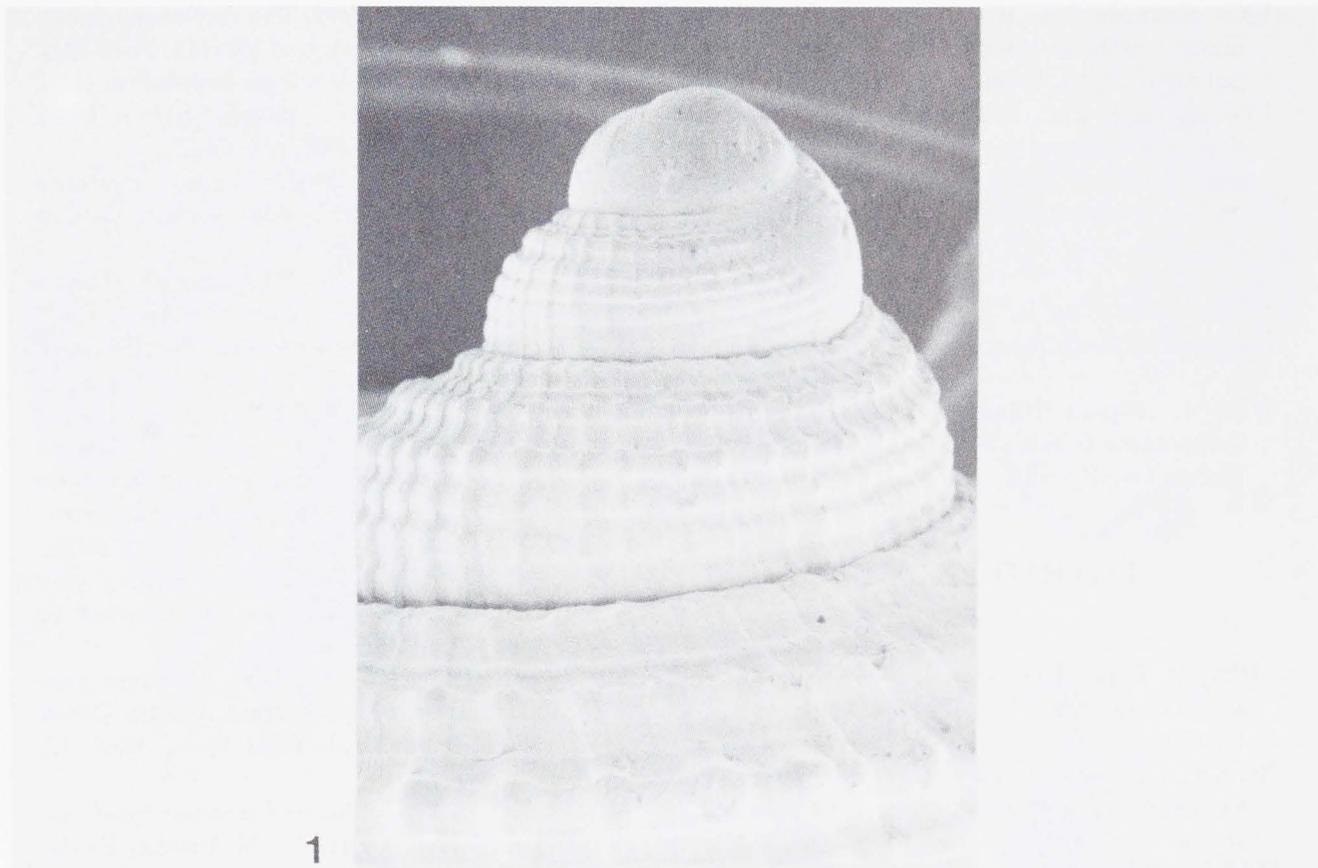
- 655. Chipola Fm., Tenmile Creek, about 0.1 mile downstream from bridge of Florida Highway 73 (NW 1/4 Sec. 12, T1N, R10W), Calhoun Co., Florida.
- 825. Chipola Fm., Farley Creek at abandoned mill about 1/4 mile west of bridge of Florida Highway 275 (SW 1/4 Sec. 21, T1N, R9W), Calhoun Co., Florida.
- 951. Chipola Fm., Tenmile Creek, about 1/4 mile west of Chipola River (SE 1/4 Sec. 12, T1N, R10W), Calhoun Co., Florida.

PLATE 2

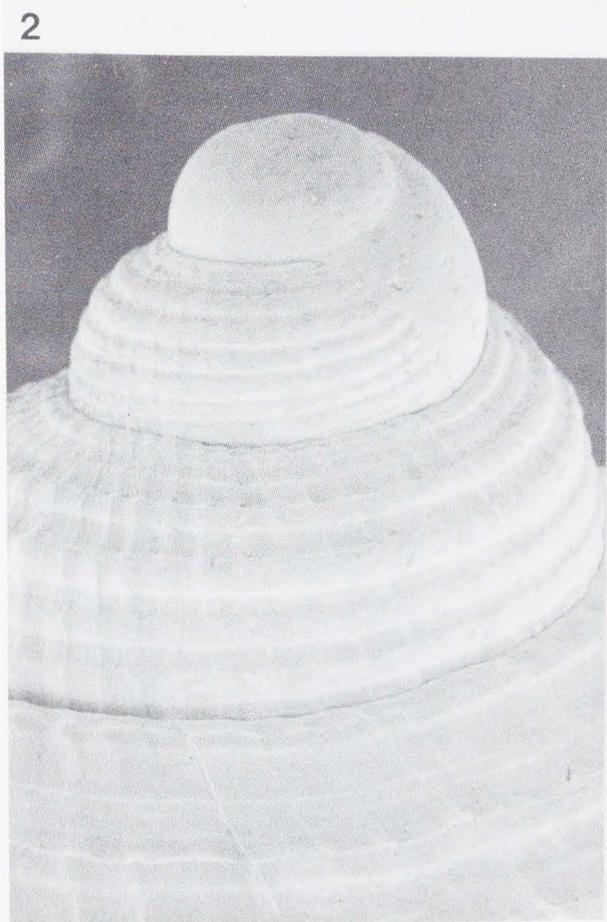
Figures

1-3. SEM photographs of different morphological types of *Phalium aldrichi* Dall, from the Chipola Formation, Florida. (X 20)

1. UF 68995; height 32.5 mm, diameter 21.2 mm; locality TU 951.
2. UF 68996; height 35.9 mm, diameter 28.4 mm; locality TU 655.
3. UF 68999; height 35.6 mm, diameter 27.3 mm; locality TU 825.



1



2



3

1230. Cercado Fm., Rio Cana, east bank, just above bridge at Caimito on Los Quemados - Sabaneta Road, Dominican Republic.
1358. Cercado Fm., Rio Gurabo, west side and downstream from mouth of Arroyo La Cabra, approximately 6 km (airline) above the ford on Los Quemados-Sabaneta Road, Dominican Republic.

The following is a Florida Museum of Natural History fossil locality number:

- WL004. Shoal River Fm., New Harmony Quadrangle USGS 1987 (Sec. 4, T3N, R21W), Walton Co., Florida.

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PLATE 3

Figures

1-4. A comparison of *Phalium murrayi* with *Phalium aldrichi* Dall and *Phalium reclusa* (Guppy). (All X 1 1/2)

1. *Phalium murrayi* Schmelz, n. sp.
UF 67410 (holotype); height 45.5 mm, diameter 33.5 mm.
Locality: WL004, Shoal River Formation, Walton County, Florida.
2. *Phalium aldrichi* Dall
UF 68995; height 32.5 mm, diameter 21.2 mm.
Locality: TU 951, Chipola Formation, Florida.
3. *Phalium reclusa* (Guppy)
UF 70000; height 26.6 mm, diameter 18.2 mm.
Locality: TU 1230, Cercado Formation, Rio Cana at Caimito, Dominican Republic.
4. *Phalium reclusa* (Guppy)
UF 68993; height 45.8 mm, diameter 30.6 mm.
Locality: TU 1358, Cercado Formation, Rio Gurabo, Dominican Republic.

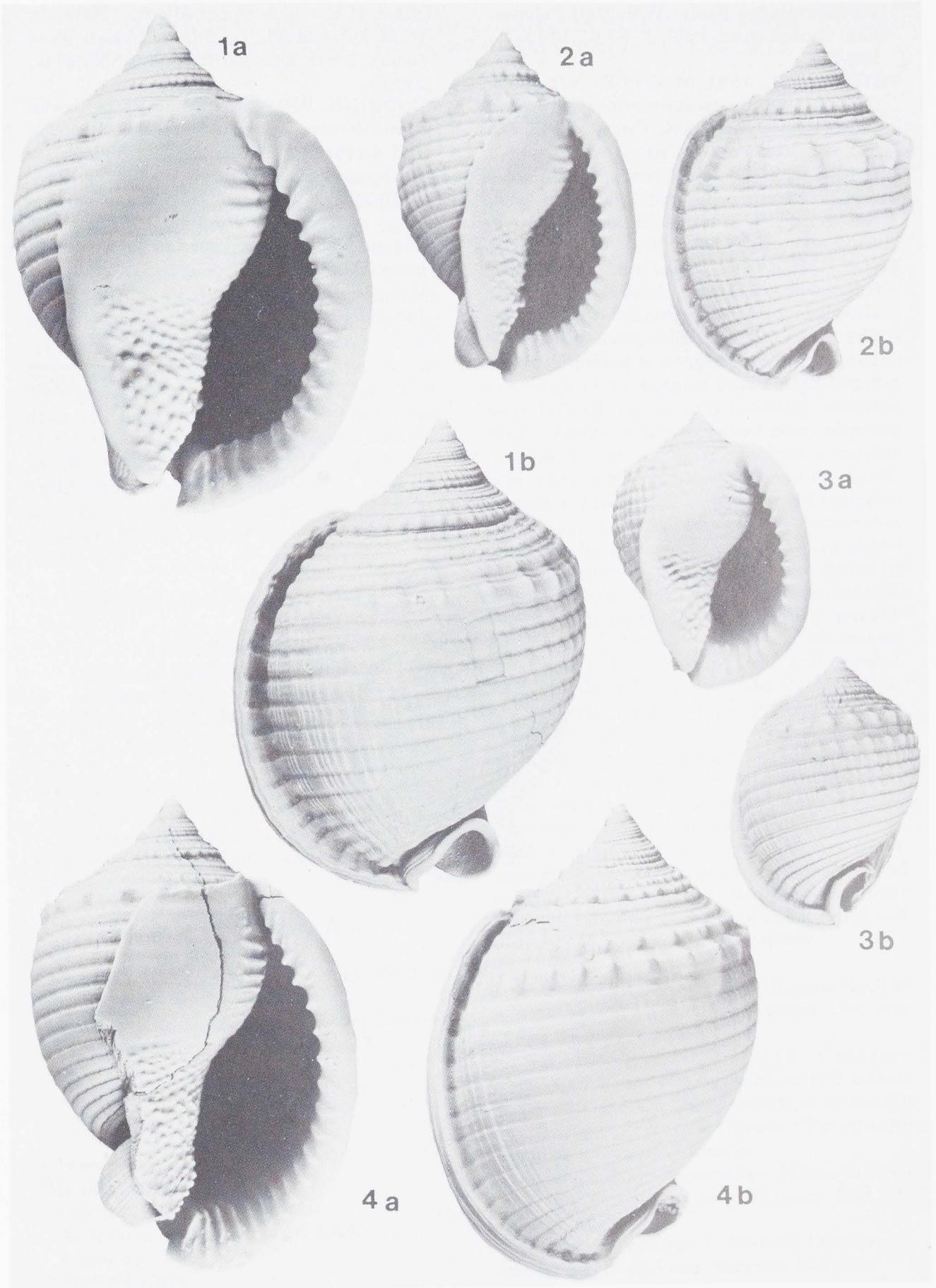


PLATE 3

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