

Four new buccinid species (Gastropoda: Buccinidae) from the western Atlantic

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ABSTRACT. Four new buccinid species from the western Atlantic are described: *Anna florida* n. sp., the first western Atlantic species to be assigned to that genus; *Bartschia frumari* n. sp., and *Manaria burkeae* n. sp., two deep- water species from southern Florida; and *Retimohnia acadiana* n. sp., a presumed inhabitant of hydrocarbon cold vents in the Gulf of Mexico. All species are compared with their most similar congeners.

INTRODUCTION

During a 2004 dredging expedition in the Gulf of Mexico on board the R/ V Pelican I obtained two specimens of a buccinid species that defied generic placement. Upon inspecting my collection, I discovered two other lots of the same species collected more than 30 years earlier and identified as "*Pisania* sp.". Not being able to resolve the generic or specific problems of the species I contacted Dr. Harry G. Lee, of Jacksonville, Florida, who supplied me with 5 more lots. It is described here as *Anna florida* n. sp., the first species from the western Atlantic to be assigned to the genus *Anna* Risso, 1826.

Private deep- water dredging operations off the southwestern coast of Key West, Florida, have brought to light many interesting new species (García, 2007). Among them is a new species of *Bartschia*, described herein as *Bartschia frumari* n. sp., dredged in relative abundance by Frank Frumar, of Kirkwood, Missouri and his dredging partner Steve Kern, of Key West, Florida using the latter's lobster boat. The same two collectors also obtained at this same location several specimens of an undescribed *Manaria* species. This species had appeared in literature as *Mohnia carolinensis* (A. E. Verrill, 1884) (Sunderland, 1992:14) and had been identified as such in several private collections. However, Verrill's taxon is very different from the new *Manaria*, which seems to be confined to the deep waters off the southern tip of Florida. It is described in this paper as *Manaria burkeae* n. sp.

In 2002 Dr. Darryl Felder, chair of the Biology Department at the University of Louisiana, Lafayette, brought to me a series of interesting mollusks that he had collected at "Bush Hill", a name given to one of a series of deep- water hydrocarbon cold vents that occur off the Louisiana coast. Among this material, which has been reported elsewhere (García, 2002), there was a buccinid species that was first reported as a *Mohnia* species. Described here as *Retimohnia acadiana* n. sp., it is the first species of *Retimohnia*

McLean, 1995 to be reported from the Gulf of Mexico.

After this paper was sent for review, I visited the collection of Kevan and Linda Sunderland, of Sunrise, Florida. In their collection, more specimens of *Anna florida* n. sp., *Bartschia frumari* n. sp., and *Manaria burkeae* n. sp. were discovered. The Sunderlands had obtained most of these specimens as a by-catch of Royal Red shrimp boats working in 200 to 400 m between Key West and Dry Tortugas, southern Florida.

Moreover, a mixed lot of four shells collected off Texas and recently sent to me by Dr. Fabio Moretzsohn contained three specimens of *Anna florida* n.sp.

All specimens in this study have been collected as empty shells unless otherwise stated.

Abbreviations

ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

BMSM: Bailey-Matthews Shell Museum, Sanibel, Florida, USA.

EFG: author's collection

FF: Frank Frumar collection, Kirkwood, Missouri, USA.

HGL: Harry G. Lee collection, Jacksonville, Florida, USA.

KLS: Kevan and Linda Sunderland collection, Sunrise, Florida.

TAMUCC: Center for Coastal Studies, Texas A & M University, Corpus Christi, Texas, USA.

UF: University of Florida, Florida Museum of Natural History, Gainesville, Florida, USA.

USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

SYSTEMATICS

Family **BUCCINIDAE** Rafinesque, 1815

Genus *Anna* Risso, 1826

Type species: *Anna massena* Risso, 1826 (by monotypy).

Anna florida n. sp.

Figs 1-8

Type material. U. S. A.: Holotype ANSP 418032 length 14.2 mm, width 6 mm, 73 m. WSW of Anna Maria Key, W. Florida, Gulf of Mexico, in 50 m (Figs 1-5). Paratypes: 1 ANSP 418033, 27°42.71'N, 84°13.09'W, in 68- 68.5 m (Figs 6-8); 1 EFG 25352, 24°44.77'N, 83°43.71'W, in 70.6- 72.9 m; 1 EFG13089, 1 UF 419133, 1 HGL, off Sugarloaf Key bridge, southern Florida, in 2 m (live); 1 HGL, off west Florida, in 59- 117 m (*ex pisce*); 2 HGL, 40-50 m off Ponte Vedra, St. John's Co., NW Florida, in 44- 50 m; 4 KLS, off Peanut Island, Palm Beach, east Florida, 1.5 m; 5 KLS, off Big Pine Key, southern Florida, in 27 m. **BERMUDA:** 1 USNM 1111876, 1 HGL, Turtle Beach, south coast of Bermuda, 0 m.

Type locality. WSW of Anna Maria Key, W. Florida, Gulf of Mexico, in 50 m.

Other material examined. 4 juveniles, off Peanut Island, Palm Beach, east Florida, 1.5 m (KLS); 3 specimens, TAMUCC, Stetson Bank, Texas, L. Hyde 2000 (#51).

Distribution. East and west Florida, Texas and Bermuda, live specimens in 2- 73 m. Beach and *ex pisce* specimens have not been taken into consideration for depth.

Description. Holotype 14.2 mm in length, strong, fusiform (width/ length ratio 0.42) (Figs 1-2). Protoconch somewhat eroded, of approximately 1.5 whorls, white with dark dash by suture, brownish maculation near end of protoconch (Fig 3). Transition to teleoconch defined by growth scar and change in ornamentation. Teleoconch of 5.75 whorls; whorls slightly concave. Suture incised, emphasized by slight anterior constriction of whorls. Axial sculpture of strong, rounded costae; costae as wide as interspaces; approximately 10 costae on early whorls, increasing to 13 on last whorl; microscopic corrugated axial threads covering surface of shell. Spiral sculpture of strong, narrow cords; cords developing spirally elongated nodes when crossing axial elements; 5 such cords on early whorls, increasing to 6 on penultimate whorl; three peripheral cords strongest; presutural cord weakest; 13 cords on last whorl; weak spiral threads

of uneven strength showing between and on spiral cords. Aperture elongate-ovate; outer lip thin at edge, downwardly convex, crenulated; a weak, varix-like thickening of shell showing behind; inner side with 8 elongated denticles (Fig 5); posterior canal delimited by two tooth-like projections at outer lip and on parietal wall (Fig 5); parietal wall slightly calloused, weakly erect except at posterior end, showing a strong tooth at anterior end, near basal constriction; tiny, sharp, unequal denticles appearing between anterior and posterior parietal teeth (Fig 4); anterior canal relatively long, almost straight, narrow, slightly wider anteriorly. Shell white, with irregular orange-brown maculations, mostly on top of nodes, at times creating axially oriented bands on shoulder of whorls.

Discussion. The paratypes have all of the main conchological characters of the holotype. The well-preserved protoconch of several paratypes and some juvenile specimens show a smooth surface with one or two irregular brownish spots, as well as a dash of the same color by suture on last whorl (Fig 7). Moreover, the ANSP paratype, a juvenile, and one of the paratypes collected off Ponte Vedra are covered with a yellowish, axially wrinkled periostracum (Fig 8). The largest adult specimen measures 15.3 mm (HGL, *ex pisce*); the smallest measures 10.5 mm (Sugarloaf Key). Interestingly, the larger specimens were collected in deep water and have a larger protoconch than the three shallow-water Sugarloaf Key specimens.

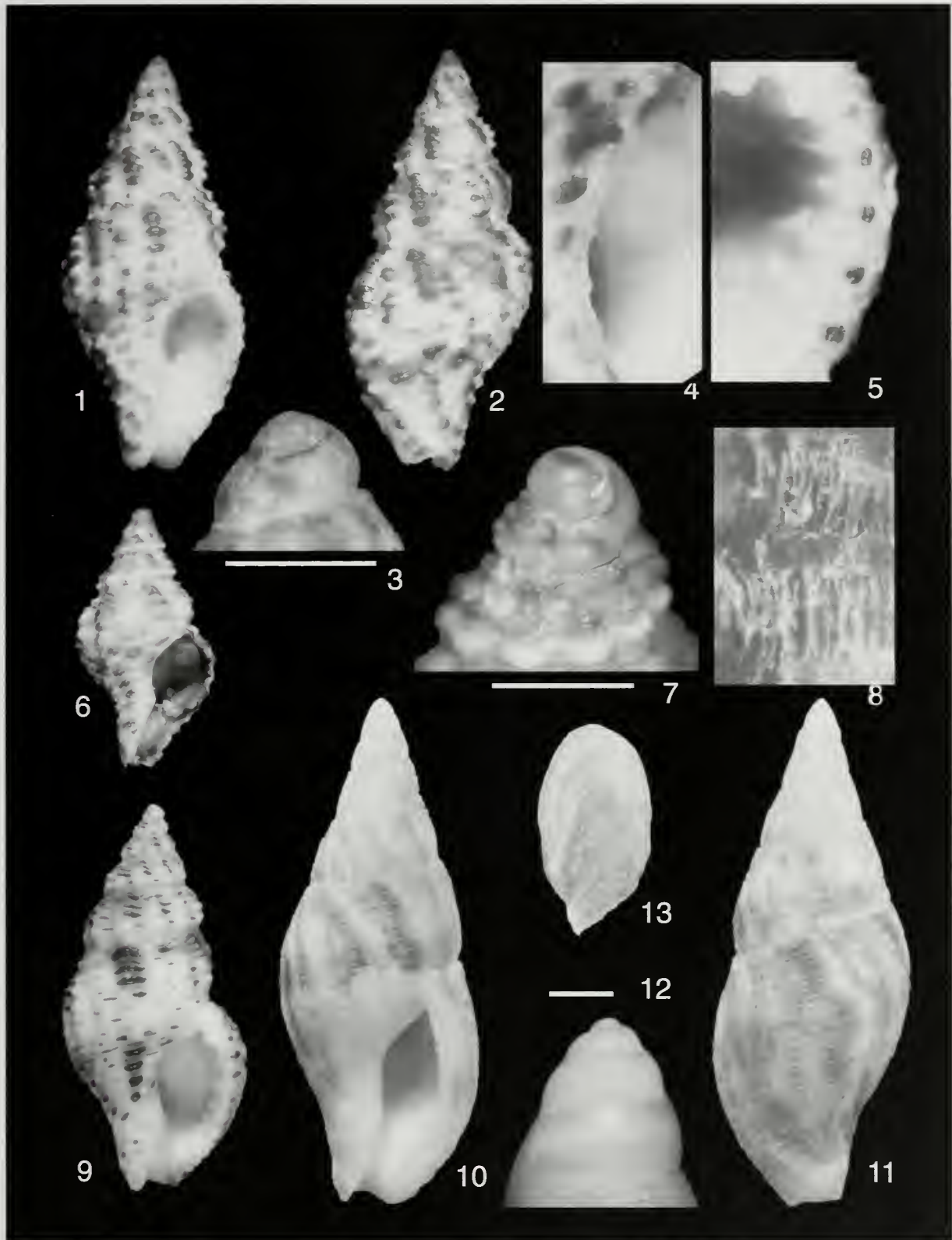
Most Recent species currently assigned to *Anna*, have been in the past variously assigned to *Cantharus* Röding, 1798, or *Polliia* Gray in Sowerby, 1834. However, Vermeij (2006) has shown the distinctive characters that separate *Anna* from other pisanine buccinids.

Vermeij (2006:72) has assigned 4 Recent species to the genus *Anna*: *A. assimilis* (Reeve, 1846), *A. dorbignyi* (Payraudeau, 1846), *A. massena* Risso, 1826 (= *Buccinum scacchianus* Philippi, 1844), and *A. scabra* (Locard, 1886). These species inhabit the eastern Atlantic, from western Europe and the Mediterranean to western Africa. Although Dall & Bartsch (1911: 287), and later Abbott (1974: 219), reported *Cantharus massena* from Bermuda, they were presumably referring to the new *Anna* species described herein, as specimens from that area have been studied and form part of the type material. *Anna florida* is the first species from the western Atlantic to be assigned to the genus *Anna*.

Figures 1- 13

1- 8. *Anna florida* n. sp. 1-5. Holotype ANSP 418032 length 14.2 mm, width 6 mm, 73 m. WSW of Anna Maria Key, W. Florida, Gulf of Mexico, in 50 m; 6-8. Paratype, ANSP 418033, 27°42.71'N, 84°13.09'W, in 68- 68.5 m, 7.5 mm.

9. *Anna massena* Risso, 1826, Karaburun, Izmir, Turkey, Aegean Sea, 2 m (HGL); 10- 13. *Bartschia frumari* n. sp. Holotype ANSP 418030 length 29.8 mm, width 12.2 mm, 24°14'N, 82°09'W; approximately 37 kms southwest of Key West, Florida, in 200 m.



Anna florida can be separated from all other congeners by the tiny sharp denticles present in the parietal wall between the anterior and posterior parietal teeth (Fig 4). On other shell characters it can only be confused with *Anna massena* (Fig 9), the type species of *Anna*. Both species have similar fusiform shells and superficially similar axial and spiral ornamentation, and the maculations of *Anna massena* also show mainly on top of the nodes and tend to form axially oriented bands on top of the whorls. However, *Anna massena* has finer, more irregular spiral cords and more elongated nodes, some showing only as spiral dashes of color; its nodes are a rich dark brown, rather than orange- brown; the axial costae on the body whorl are more numerous, weaker; the anterior canal is somewhat shorter, and the shell does not seem to attain the larger size of *Anna florida*.

Etymology. From the Latin *floridus* (adjective, meaning full of flowers), in reference to the profusion of bright nodes that cover the surface of the shell. The epithet is also meant to evoke both the state of Florida, whose name has the same provenance and where the new species seems to be most common, and Anna Maria Key, its type locality in that state.

Genus *Bartschia* Rehder, 1943

Type species: *Bartschia significans* Rehder, 1943, by original designation.

***Bartschia frumari* n. sp.**

Figs 10-13

Type material. Holotype ANSP 418030 length 29.8 mm, width 12.2 mm (Figs 10-11). Paratypes: 1 ANSP 418031, 1 USNM 1111875, 1 UF 419134, 1 BMSM 15028, 2 EFG 28093, 29 FF, 24°14'N, 82°09'W; approximately 37 kms southwest of KeyWest, Florida, in 200 m; 6 KLS, between Key West and Dry Tortugas, in 200 to 400 m

Type locality. 24°14'N, 82°09'W; approximately 37 kms southwest of KeyWest, Florida, in 200 m (live).

Other material examined. 10 juveniles, between Key West and Dry Tortugas, in 200 to 400 m (KLS).

Distribution. Between Key West and Dry Tortugas, in 200 to 400 m.

Description. Holotype 29.8 mm in length, solid, elongate- ovate (width/ length ratio 0.41) (Figs 10-11). Protoconch conical, of approximately 3.5 whorls; first whorl conspicuously small, less than half the size of subsequent whorl; second whorl strongly convex, shouldered; following whorls rapidly decreasing in convexity; whorls smooth, polished (Fig 12); termination of last protoconch whorl creating weak, inconspicuous axial threads; transition to teleoconch whorls signaled by appearance of spiral elements and

strengthening of axial threads, creating a nodulose surface. Teleoconch of 4.25 whorls; whorls slightly convex. Suture appressed, subsuturally delineated with strong, rounded beads; termination of suture slightly raising where labral thickness begins. Axial sculpture of numerous, narrow, sinuous, beaded riblets; riblets as wide as interspaces, becoming more irregularly spaced on last whorl; microscopic axial threads covering surface of shell. Spiral sculpture of 8 beaded cords of almost even strength on early whorls, increasing to 10 on penultimate whorl; beads well-defined, rounded on early whorls and subsutural cord, more spirally elongated on later whorls; cords as wide as interspaces. Aperture narrowly ovate, pointed posteriorly; outer lip strengthened behind by low, broad, varix- like thickening of shell; inner labrum beveled, thicker portion showing numerous elongated denticles; posterior denticles stronger; parietal wall and columella covered with smooth callus; callus widening, thickening posteriorly; anterior canal broad, relatively short, only slightly recurved. Shell light cream, with irregular yellowish- brown maculations of different intensity; some darker maculations tending to form axial flammules; aperture and parietal wall milky-white, polished.

Discussion. The genus *Bartschia* has been synonymized with *Metula* H & A Adams, 1853 (Rosenberg, 2005); however, although the synonymy may prove to be true when radular and other anatomical studies are conducted, I have chosen to place the new species in *Bartschia* because of the large protoconch shared by *Bartschia frumari* and *B. significans*, unlike the small protoconch of species assigned to *Metula*. Moreover, in typical *Metula* the cancellate sculpture is more defined because of pitting where axial and spiral elements cross, the labral thickening is narrower, more varix- like, and the sub-sutural cord stands out more, either because of size or spacing.

The paratypes of *Bartschia frumari* conform in all major characters with those of the holotype. Of the 28 adult specimens studied, the largest measures 34.4 mm (FF). Some specimens as small as 21.6 mm (FF) have already developed the labral thickening. Although the shell coloring of the paratypes is similar to that of the holotype, a few specimens tend to form 1 to 3 irregular bands: sub- suturally, peripherally, and/ or anteriorly. The coloring of these bands intensifies at the labrum, where they may show as yellowish- brown rectangular maculations. The inner labrum denticles in adults vary from strong to absent (EFG 228093).

Bartschia frumari can only be confused with its congener, *B. significans* (Fig 14), from which it differs by having a conical protoconch (Fig 12) instead of dome- shaped (Fig 15; see also Olsson & Bayer, 1972, p. 924, fig. 14), less numerous axial and spiral elements, 4.25 teleoconch whorls instead of 5.5, and by growing to a smaller size. Although the maximum reported size for *B. significans* is 54.5 mm

(Rosenberg, 2007), this species grows to at least 56.5 mm (EFG 15060a), nearly twice as large as the largest *B. frumari*. The two species live sympatrically; the large specimen of *B. significans* and several other slightly smaller specimens I have inspected were collected from Dry Tortugas to Key West, southern Florida, in 200 to 400 m.

Etymology. Named for Mr. Frank Frumar, of Kirkwood, Missouri who, together with Steve Kern, of Key West, Florida collected the shells and donated most of the type material.

Genus *Manaria* Smith, 1906

Type species: *Manaria thurstoni* Smith, 1906 by original designation.

***Manaria burkeae* n. sp.**

Figs 16-22

Type material. Holotype ANSP 418034 length 33.5 mm, width 13.2 mm. 24°14'N, 82°09'W; approximately 37 kms southwest of Key West, Florida, in 200 m (Figs 16-17). Paratypes: 4 FF, 24°14'N, 82°09'W; approximately 37 kms southwest of Key West, Florida, in 200 m; 1FF, 16 miles SW of Key West, Florida, 170 m (live); 1 HGL, SE of Alligator Reef Lighthouse, approximately 24°51'N 80°37'W, in 135- 150 m, 1 EFG 11554, ESE of Key West Florida, in 300 m; 2 KLS, 1 EFG 28329, between Key West and Dry Tortugas, in 200- 400m.

Type locality. 24°14'N, 82°09'W; approximately 37 kms southwest of Key West, Florida, in 200 m.

Distribution. From Islamorada Key to Dry Tortugas, lower Florida Keys, offshore in 135 to 400 m. Collected alive at type locality.

Description. Holotype 33.5 mm in length, light in weight but strong, fusiform (width/ length ratio 0.39) (Figs 16-17). Protoconch slightly eroded, translucent white, bulbous, paucispiral, of approximately 1.75 whorls, smooth, showing one narrow axial fold behind termination of last whorl. Transition between protoconch and teleoconch conspicuous, signaled by appearance of strong axial and spiral elements. Teleoconch of 6 whorls; early whorls almost straight-sided; last whorl convex, inflated, occupying nearly 60% of shell length. Suture deep, channeled. Axial sculpture on first three whorls of 12 or 13 strong, angular ribs; ribs as wide as interspaces, quickly weakening in strength on later whorls, almost completely evanescent on last two whorl; numerous axial threads covering surface of shell. Spiral sculpture of 5 sharp, nodulose cords; sutural cord weakest; cords slightly narrower than interspaces, creating an undulating pattern when crossing over axial elements; intercalating secondary cords appearing on antepenult whorl; cords gaining strength

on later whorl, becoming almost as strong as primary cords on last whorl, becoming imbricated as they cross over axial threads; approximately 30 primary and secondary cords on last whorl. Aperture elongate-ovate, lirate within; labrum thin; parietal wall strongly arched, showing a spiral sculpture of shell surface at either end of wall, smoother at middle, developing a somewhat bidentate callus at basal constriction; anterior canal long, rather narrow, twisted to the left. Shell ivory- white; spiral cords pale yellow.

Discussion. The somewhat eroded protoconch of the holotype shows one axial fold behind the termination of the last whorl; however, fresher, younger specimens in the type series show as many as four such folds (Fig 22). Moreover, the axial sculpture of the teleoconch may evanesce at earlier or later whorls than that of the holotype. The largest specimen measures 38.3 mm (Fig 18) (FF). In this specimen, the two denticles at the basal constriction are stronger; and an elongated callus has developed at the posterior end of the parietal wall (Fig 19); moreover, it also has developed a strong swelling of the apertural lirations at the labral beginning of the anterior canal (Fig 20). The same apertural characters have been observed on three other fully mature specimens in the type series (KLS, EFG 28329). The operculum of two live-collected juveniles is yellow, with a terminal nucleus (Fig 21). The yellow coloring of the spiral cords fades to white in long- dead specimens.

There are three buccinid genera that look rather similar: *Manaria* Smith, 1906, *Eosipho* Thiele, 1929, and *Phaenomenella* Fraussen & Hadorn, 2006. The former two have been compared by Bouchet & Warén (1986). All three genera have been subsequently compared by Fraussen and Hadorn (2006: 103-104). I have placed the new species in *Manaria* because of its similarity with *Manaria thurstoni* Smith, 1906 (Bouchet & Warén, 1986: 478, pl. 13, fig. 86), a species from the northern Indian Ocean and the type species of *Manaria*. Although the new species does not have the distinct parietal tooth of the type species, it does have a somewhat bidentate callus in the same area, more readily visible in the largest specimen (Fig 20). *Manaria burkeae* is also similar to *M. thurstoni* in having almost straight-sided whorls, a channeled suture, a fusiform profile with a short, ovate aperture, and a strongly arched columella. Although the general shape and sculpture are similar to *Phaenomenella inflata* (Shikama, 1971), the new species lacks the strong angulation of the upper spire whorls, as well as the thickened lip characteristic of *Phaenomenella*.

The single western Atlantic species assigned to *Manaria* by Harasewych (1990: 126) is *M. fusiformis* (Clench & Aguayo, 1941). Although this species has not been reported in literature as inhabiting the Gulf of Mexico, I do have a specimen in my collection collected in the southeastern quadrant of the Gulf (Fig 23, EFG 13916). However, *M. fusiformis* grows to 85 mm, has a significantly smaller protoconch, is more

elongated, has a proportionately larger aperture with a less twisted columella, and lacks the apertural characters of *M. burkeae*.

Etymology. Named for Mrs. Alice Burke, of Fort Myers, Florida, an ardent shell collector who for 10 years unselfishly assisted the well-known malacologist Alan Solem with his work.

Genus *Retimohnia* McLean, 1995

Type species: *Mohnia frielei* Dall, 1891 (by original designation)

***Retimohnia acadiana* n. sp.**

Figs 24-26

Type material. Holotype ANSP 418029 length 20.9 mm, width 8.5 mm (Figs 24-25).

Type locality. 27°46.904'N 91°30.286'W, in 546-555 m; off Louisiana, "Bush Hill" hydrocarbon cold seeps

Distribution. Known only from the type locality.

Description. Holotype 20.9 mm in length, strong, fusiform (width/ length ratio 0.40) (Figs 24-25). Protoconch missing. Teleoconch of 5, slightly convex whorls. Suture narrowly channeled, undulating. Axial ornamentation of strong, rounded ribs; 13 such ribs on penultimate whorl; ribs as wide as interspaces, stretching from suture to suture on early whorls, evanescent below periphery of last whorl; vestiges of secondary axial threads appearing on less corroded surface of shell (Fig 26). Spiral ornamentation of an undulating thread at suture; vestiges of a supra-sutural thread also showing on less corroded surface of shell. Aperture elongate-ovate, less than half the length of shell; labrum thin; columella almost straight; anterior canal moderately long, curved to the left. Shell yellowish-brown.

Discussion. The genus *Retimohnia* was proposed by Mc Lean (1995: 40) for those *Mohnia*-like species

whose axial sculpture of projecting ribs is the principal sculpture. Although the single specimen was collected as an empty shell and its surface has undergone some chemical corrosion, this new species has been placed in *Retimohnia* because of the strong conchological similarities with species assigned to that genus, as well as for its deep-water habitat. Judging by sculptural vestiges observed on the less corroded portions of the surface, the species does seem to have microscopic spiral ornamentation.

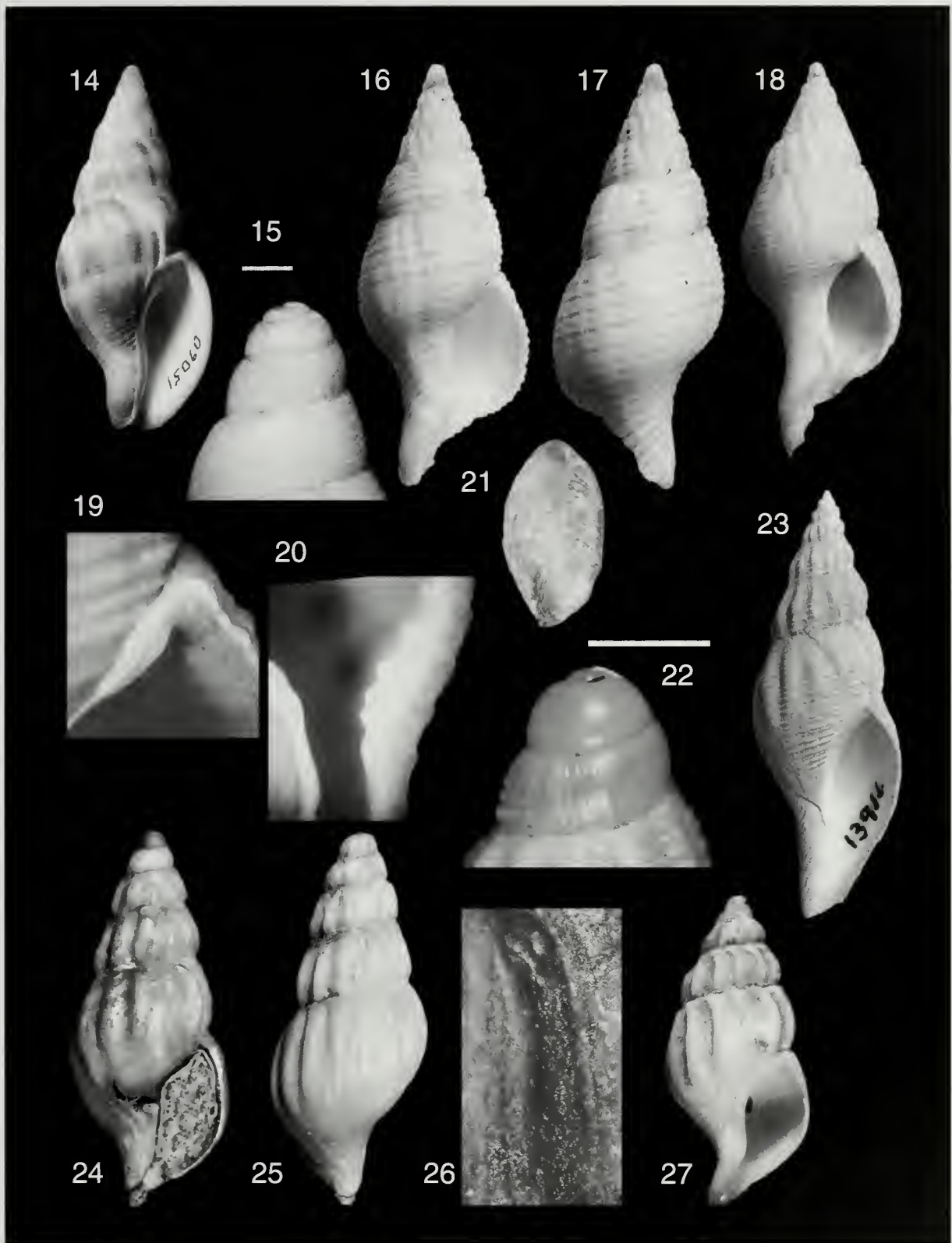
Three western Atlantic species have been placed by McLean in *Retimohnia*. *R. glypta* (Verrill, 1882), which inhabits the northeastern United States and Iceland, has a thinner shell, strong spiral ornamentation, and more convex whorls; and *R. carolinensis* (Verrill, 1884), found off North Carolina, grows to only 11 mm and has a strong axial and spiral ornamentation that forms knobs at intersections. The third species, *R. caelata* (Verrill, 1880), has almost the same distribution as *R. glypta*, and is the most similar to the new species.

Retimohnia caelata (Fig 27) is a rather variable species. With numerous specimens at their disposal Bouchet and Warén (1985: 212) have demonstrated that *Sipho hebes* Verrill, 1884 and *Sipho obesus* Verrill, 1884, are ecological variations of *R. caelata*. Both of these forms are more globose than the new species, have less pronounced, more sinuous axial elements, and have strong spiral ornamentation. Some specimens of *R. caelata* from SE Delaware Bay (Bouchet & Warén, 1985: 214, fig. 548) have a smoother surface; however, the spiral ornamentation of this morph is still rather prominent, particularly on early whorls, the shell is more elongated, and the axial ribs are narrower, more sinuous. None of the forms of *R. caelata* have the secondary axial ornamentation present in *Retimohnia acadiana*.

Etymology. Named for Acadiana, the region of southwestern Louisiana settled by Acadian immigrants from Canada. Their wonderful descendants have greatly enriched the culture of the region.

Figures 14- 27

14- 15. *Bartschia significans* Rehder, 1943, south of Dry Tortugas in 210 m, 46.4 mm (EFG 15060b); **16- 22.** *Manaria burkeae* n. sp., 24°14'N, 82°09'W; approximately 37 kms southwest of KeyWest, Florida, in 200 m **16- 17.** Holotype ANSP 418034 length 33.5 mm, width 13.2 mm. **18-20.** Fully adult paratype, 38.3 mm (FF). **21- 22.** Operculum and protoconch of juvenile paratype showing terminal axial folds, 17.8 mm (FF). **23.** *Manaria fusiformis* (Clench & Aguayo, 1941), 24°14'N; 87°45'W, in approximately 500 m, 44 mm (EFG 13916); **24- 26.** *Retimohnia acadiana* n. sp. Holotype ANSP 418029 length 20.9 mm, width 8.5 mm, 27°46.904'N 91°30.286'W, in 546-555 m; off Louisiana, "Bush Hill" hydrocarbon cold seeps; **27.** *Retimohnia caelata* (Verrill, 1880), off Sable Bank, Nova Scotia, in 1200 m, 19 mm (HGL).



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