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Bathyal gastropods of Bimini Chain, Bahamas

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Abstract.—This paper summarizes the taxonomic findings of the three cruises on board of Florida Institute of Oceanography research vessels *Bellows* and *Suncoaster* conducted between 2000 and 2005 as well as to discuss the unique regional oceanographic settings that were found to be essential in supporting the diverse and unique bathyal molluscan fauna encountered in the depths of the eastern Straits of Florida. Approximately 30 stations were sampled, from South Cat Cay (25°42.085′N) through Victory Cay (25°28.355′N), at depths ranging from 120–600 meters and averaging 400 m depth. A total of 74 molluscan taxa belonging to 34 families were identified from over 400 individual mollusk specimens. The gastropods *Architectonica sunderlandi* Petuch 1987, *Bursa finlayi* McGinty 1962, and *Exilia meekiana* (Dall, 1889a) were collected from the eastern side of the Straits of Florida for the first time. The Ranellid *Pisanianura grimaldii* (Dautzenberg, 1889) is reported from the western Atlantic Ocean for the first time. Two new taxa are described, including a new species of eratoid, *Hespererato pallida*, new species, and a new species of volute, *Scaphella* (*Scaphella*) *biminiensis*, new species. Additionally, a number of rare or otherwise poorly known molluscan taxa are illustrated, described, and discussed in context of the oceanographic settings from which they were collected. The presence of a diverse and unique deep-water molluscan community is attributed to the distinctive current structure and temperature asymmetry that has been observed between the western and eastern slopes of the Straits of Florida.

Keywords: Bahamas, bathyal zone, Bimini Chain, Gastropoda, mollusks

The molluscan communities of the Straits of Florida have been extensively, but sporadically, sampled since as early as the 1870s when Louis François Pourtalès and Alexander Agassiz first reported on the deep-sea dredging work done by the United States Coast Survey's Steamer *Bibb* (Agassiz 1888). The pioneering work of Pourtalès and Agassiz was continued into the twentieth century by William H. Dall, who reported on the collections amassed between 1877 and 1880 during the *Blake* expeditions (Dall 1881, 1889a, 1927). The *Blake* expeditions extensively surveyed the Gulf of Mexico and the Caribbean Sea, including the Straits of Florida. The next intensive Caribbean molluscan faunal survey was carried out by the University of Miami (UM) between 1962 and 1972 aboard R/V *John Elliott Pillsbury* and R/V *Gerda* and was reported on by Dr. Fredrick M. Bayer. Bayer (1971) was the first of only three brief studies, to date, to have been focused particularly on the deep-water gastropods of the western Bahamas. More recently,

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two works by Petuch (1987, 2002) described a number of new deep-water taxa from the western Bahamas and clearly indicated the richness and endemism of the regional malacofauna.

The strikingly steep and sometimes even concave banks of the eastern (Bahamas) side of the Straits of Florida have been noted for at least half of a century, since the earliest geologic reconnaissance surveys of the Straits of Florida and the Great Bahama Bank (Newell & Rigby 1957, Siegler 1959, Hurley et al. 1962) but have only recently begun to be systematically investigated by detailed depth soundings and biological surveys. A great deal of the research done has been focused on the Miami and Pourtalès Terraces on the western (Florida) side of the Straits of Florida (Hurley et al. 1962, Kofoed & Malloy 1965, Rona & Clay 1966, Uchupi 1966, 1969; Malloy & Hurley 1970, Ballard & Uchupi 1971) and more recently, detailed research has been conducted on the deep-water coral reefs which are located throughout the Straits (Reed 1980, 2002a, 2002b, 2004; Reed & Mikkelsen 1987, Messing et al. 1990, Land & Paull 2000, Brooke & Young 2003, Grasmueck et al. 2006, 2007).

The Straits of Florida is an articulate trough 700 km long and 90–145 km wide that is located to the east and south of the Florida Plateau (Fig. 1). Depths along the axis of the Straits of Florida range from 2200 m, south of Dry Tortugas, to 740 m west of Little Bahama Bank (Uchupi 1966). The floor of the northern Straits of Florida is a smoothly graded valley, with a general slope of 0.6 fathoms/nautical mile (=1.1 m/nm), which runs as far south as about 25°30′N where the valley empties into an elevated 'abyssal' plain at the not quite abyssal depth of 845 meters, west of Cat Cay, Bahamas. This deeper plain remains nearly flat for about 60 miles to the south until it nears Cay Sal Bank. Here the valley begins to narrow, the grade increases to about 4.0 fms/nm (=7.3 m/nm), and the bottom topography becomes more irregular (Hurley et al. 1962) as it plunges into its maximum depths to the south and the west (Fig. 2). The Straits of Florida is the longest of the several submarine channels or valleys of the Bahamas region. The trough of the Straits of Florida separates Florida from the Bahamas and Cuba and is of particular interest for several reasons, including the presence of the Florida Current. The Florida Current transports immense amounts of water (36×10^6 m^3 s^{-1}) (Richardson & Schmitz 1965) through the Straits at velocities as high as 4.0 knots or more (Hurley et al. 1962) combining with the Antilles Current from the east to form the Gulf Stream.

The area of the Straits of Florida between Miami, Florida, and Bimini, Bahamas is the narrowest portion of the Straits being only approximately 45 nautical miles wide (Malloy & Hurley 1970) (Fig. 2). Here, powerful ocean currents are funneled between Miami, Florida, and Bimini, Bahamas, providing a large amount of warm productive water flow through the area. It is also here where the Florida and Antilles Currents merge and become deflected toward the north by the constriction of the Straits of Florida between the western margin of the Great Bahama Bank and the eastern margin of Florida's continental shelf. As a result of this constriction, northern deflection, and merging of currents, warm, surface derived waters also are forced downward along the slopes of the western Bahama Bank but not along the eastern slopes of Florida's continental shelf. This flow bathes the Bimini shelf ecosystems in warm, surface derived waters (16.5°C at 400 m), while at comparable depths across the Straits of Florida the shelf faunas are exposed to cooler (7.5°C at 400 m) bottom derived waters (Sverdrup et al. 1942). Unique and diverse benthic invertebrate assemblages, including mollusks, in this area suggest that these

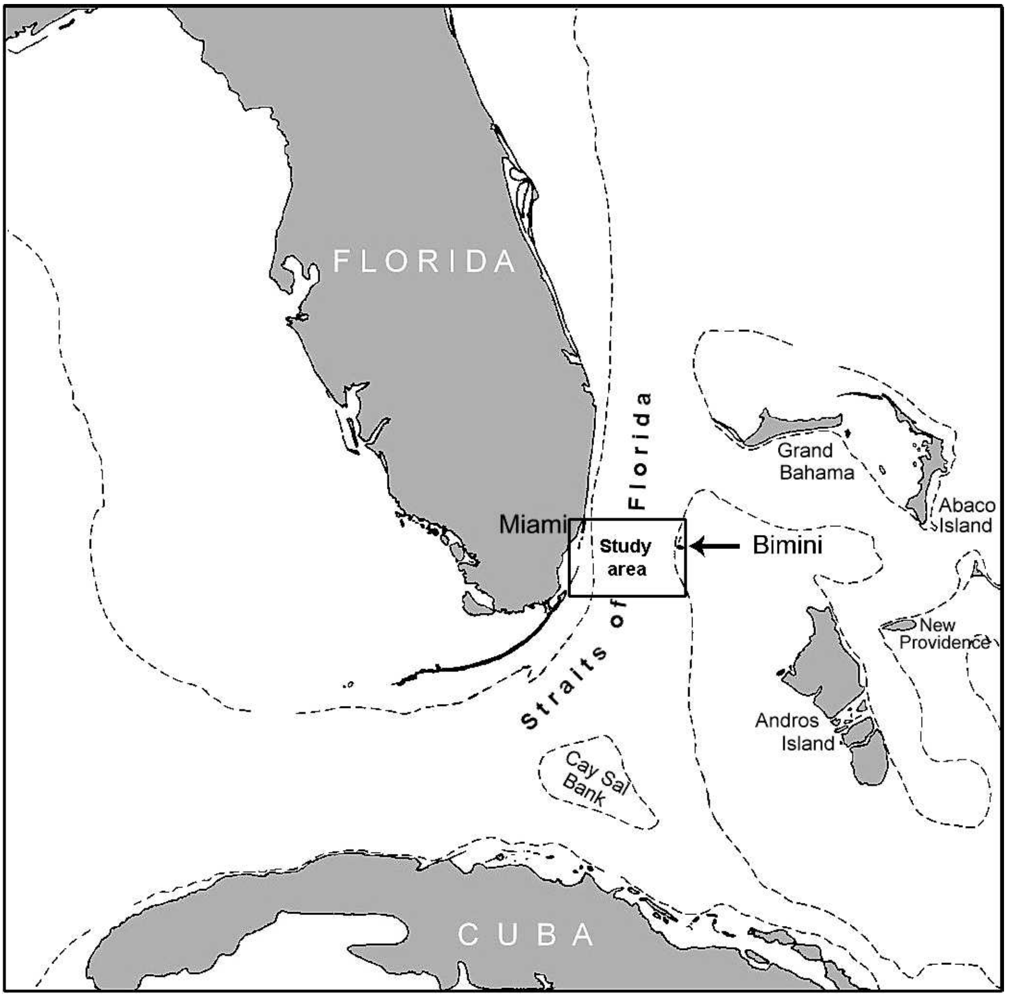


Fig. 1. Location of the study area within the Straits of Florida.

currents carry a plentiful supply of nutrients and plankton that allow these deep-water communities to flourish.

The eastern and the western slopes of the Straits of Florida are very different biologically and geologically. The western slope has a conspicuous step-like appearance, resulting from a prominent ridge at around 366 meters, and a number of terrace, ledge, and scarp features (the Miami Terrace) that are not found on the Bahamian side. All the slopes of the eastern or Bahamian side of the Straits, including Cay Sal Bank but with the exception of the broad nose extending north of the Great Bahama Bank, are steep, at times concave and typically have piles of various sized talus at their base. Recent studies showing that the complicated bathymetry, which has been reported to exist extensively beyond the base of the eastern slopes of the Straits of Florida, is often attributed to the wide spread presence of deep-water ahermatypic coral mounds such as those initially reported by Neumann et al. (1977), and most recently systematically investigated by Grasmueck et al. (2006, 2007). While the distinctive slope morphology of the eastern Straits of Florida has been recognized for at least

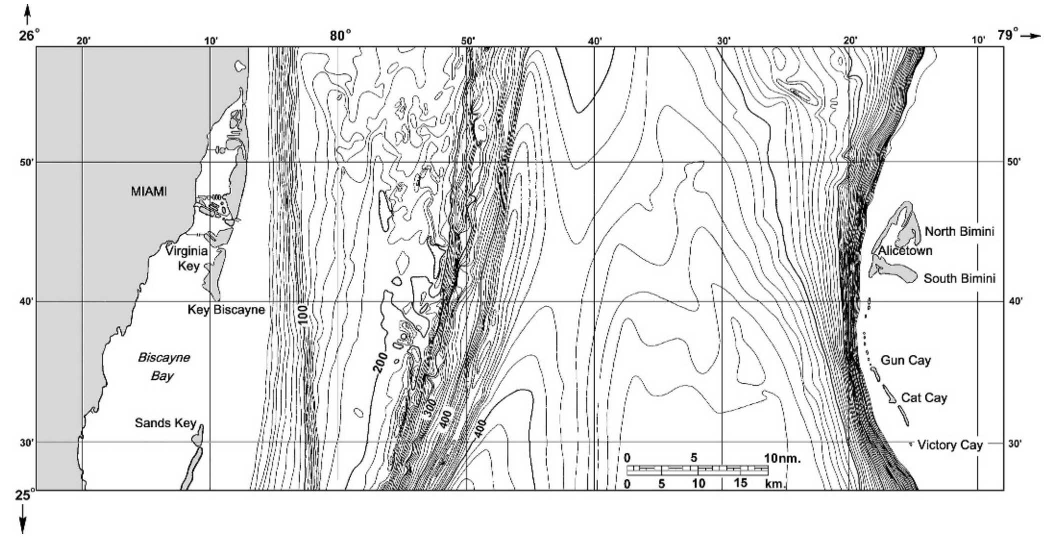


Fig. 2. Bathymetric map of the northern Straits of Florida. Modified after Malloy & Hurley (1970).

half of a century, contemporary mapping efforts and biological surveys are only just beginning to recognize the diverse benthic faunas that are flourishing here due to a number of unique oceanographic conditions.

Materials and Methods

The deep-water surveys in the western Straits of Florida in the vicinity of Bimini Chain were conducted during years 2000, 2002, 2003, and 2005 from the Florida Institute of Oceanography (FIO) research vessels R/V *Bellows* and R/V *Suncoaster*. Sampling consisted of dredgings at upper bathyal depths ranging from 120–600 m and averaging 400 m depth. Dredgings were carried out at over 30 stations located between South Cat Cay (25°42.085′N) and Victory Cay (25°28.355′N). Each research vessel was equipped with a hydraulic dredging winch operated on a stern mounted U-frame. The winches and U-frames were used to tow a steel, fixed-frame, Cape Town dredge (1 ft wide and 3 ft in depth). Dredges were pulled generally perpendicular to the strike of the slope of the Bimini shelf, from the deep waters towards the shallower upslope areas. Occasionally dredges were pulled parallel to the dip of the slope. Once the dredged material was aboard the ship, samples were immediately sorted and preserved in ethanol until they could be further studied in the lab.

Once in the lab, the samples were removed from the alcohol, labeled by station number, and photographed. The images were taken using an Optronics Magnafire Firewire digital camera. For imaging of larger specimens, the camera was operated from a lighted platform and images of smaller specimens were captured through an Olympus SZX12 binocular microscope.

Systematics

This section describes and discusses some of the poorly known bathyal taxa collected during the course of this study. This section does not describe or discuss all of the molluscan taxa that were identified during this study, many of the specimens collected were determined to be primarily littoral inhabitants that had been posthumously transported down the slope from their regularly occurring environment.

Below is the list of stations mentioned in this section with corresponding coordinates.

Station 1	25°30.620′N, 79°17.961′W
Station 1-1	25°30.165′N, 79°18.169′W
Station 1-2	25°29.758′N, 79°18.462′W
Station 1-3	25°30.053′N, 79°19.107′W
Station 1-4	25°29.791′N, 79°18.478′W
Station 1-5	25°29.758′N, 79°18.462′W
Station 1-6	25°30.053′N, 79°19.107′W
Station 1-7	25°29.748′N, 79°18.123′W
Station 2	25°26.008′N, 79°18.617′W
Station 3	25°28.477′N, 79°17.632′W
Station 4	25°29.137′N, 79°18.944′W
Station 4-1	25°28.500′N, 79°18.766′W
Station 4-2	25°28.735′N, 79°19.084′W
Station 5	25°42.189′N, 79°20.496′W

Abbreviations used: FAU—Florida Atlantic University, BCFAU—Bimini Mollusks Collection, Florida Atlantic University, Department of Geosciences, Boca Raton, Florida; USNM—United States National Museum of Natural History, Smithsonian Institution, Washington D.C.

Phylum Mollusca
Class Gastropoda Cuvier, 1797
Subclass *Prosobranchia* Milne-Edwards, 1848
Superfamily Trochoidea Rafinesque, 1815
Family Trochidae Rafinesque, 1815
Subfamily Calliostomatinae Thiele, 1924
Genus *Calliostoma* Swainson, 1840
Calliostoma apicinum Dall, 1881
Fig. 3A–C

Material examined.—USNM 1138011, one freshly dead specimen dredged from 380 m, west of Victory Cay, Bahamas, Station 1.

Type locality.—Barbados.

Range.—Deep water in the Straits of Florida from Cuba north to the western Bahamas.

Discussion.—Quinn (1992) recognized that typical *Calliostoma apicinum* is only found in Barbados, whereas other specimens with similar morphologies that have been collected in the Bahama Islands and northwestern Cuba may prove to be a separate species. Until more specimens are collected from Bahamian and Cuban localities for comparison with their Barbados counterparts, this specimen will be considered to be *C. apicinum*. The subtle differences initially recognized by Quinn were recognizable in the Bimini specimen.

Although most closely resembling *Calliostoma apicinum*, the Bimini specimens are also similar to *C. debile* Quinn 1992 and *C. roseolum* Dall 1881. Two defining characteristics of *C. apicinum* are the presence of eight or nine strong lirae running into the throat of the aperture and a chink-like umbilicus that generally disappears when the shells are fully mature. The Bahamian specimen is more sharply keeled than typical *C. apicinum*, with a narrower aperture and a more projected periphery. The protoconch is white, not purplish-brown as in typical *C. apicinum*. This specimen differs from C. *debile* by having early whorls composed of five strong, beaded spiral chords rather than two. Bimini specimen lacks distinct radial threads and fine beading of the basal spiral chords as in *C. debile*. The columella is also thickened and the umbilicus is chink-like. *C. roseolum* does not have lirae present in the throat, does not develop the tooth-like process on the columella which forms in adult *C. apicinum* and also when fully mature, the later body whorls of *C. roseolum* become convex. This gives the shell a step-like appearance, while mature *C. apicinum* retain flat-sided body whorls.

Family Architectonicidae Gray, 1850
Architectonica sunderlandi Petuch, 1987
Fig. 3D, E

Architectonica sunderlandi Petuch 1987:21, pl. 10, figs. 1–4.

Material examined.—USNM 1138009, dead specimen dredged from 400 m, south and west of Victory Cay, Bahamas, Station 3, May 2002.

Type locality.—Key West, Florida, 250 m.

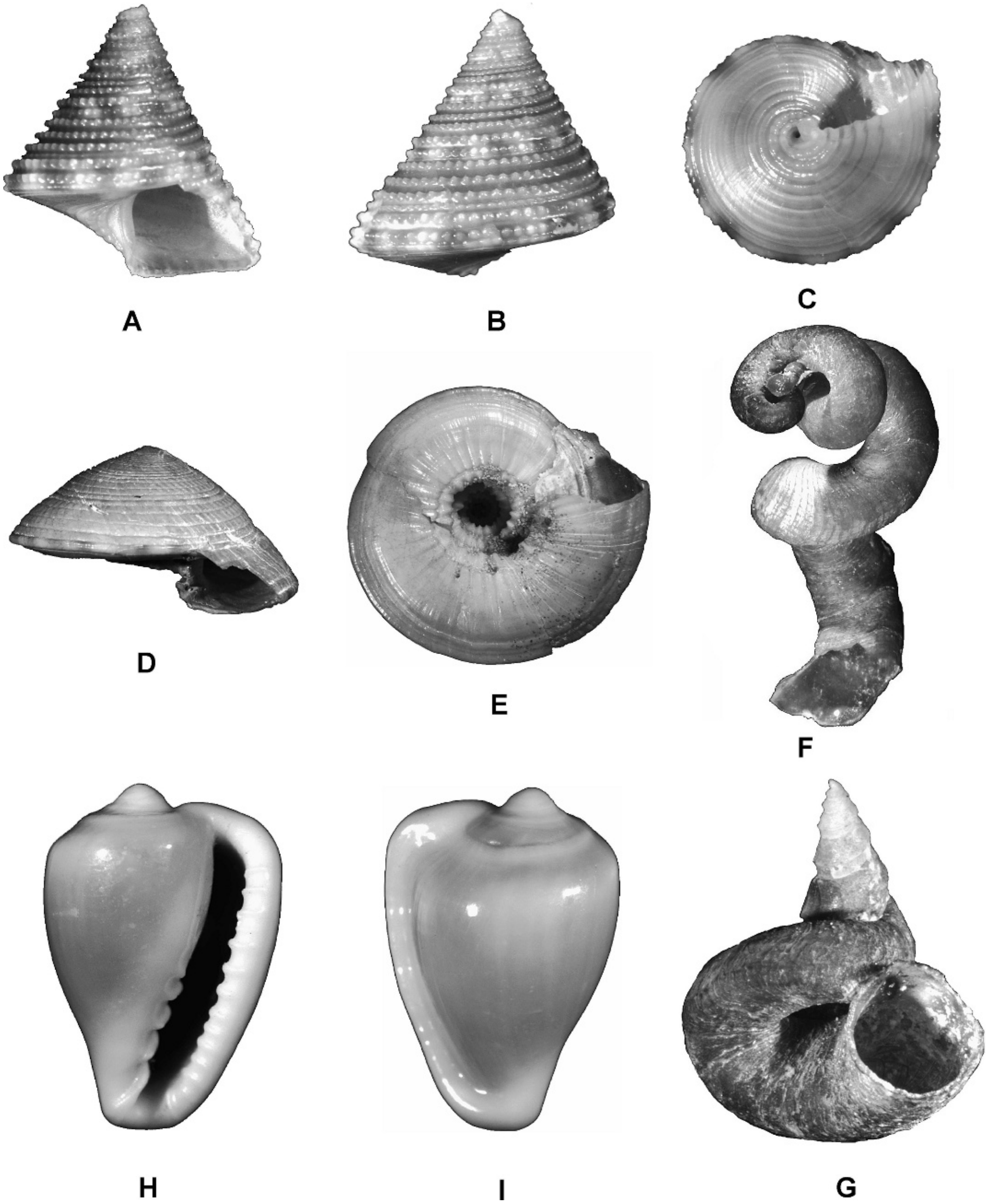


Fig. 3. A–C, *Calliostoma* cf. *apicinum* Dall, 1881, height: 7.6 mm, diameter: 7.7 mm, USNM 1138011; D, E, *Architectonica sunderlandi* Petuch, 1987, height: 8 mm, diameter: 17 mm, USNM 1138009; F, G, *Vermicularia bathyalis*, height: 9.1 mm, width: 7.0 mm, USNM 1138035; H, I, *Hespererato pallida*, height: 9.6 mm, width: 6.6 mm, Holotype USNM 1138036.

Range.—Deep water on both sides of the southern Straits of Florida.

Discussion.—This specimen of *Architectonica sunderlandi* Petuch 1987 differs in a number of ways from the originally described specimens from off the Florida Keys. Not much is known of the morphological variations and range of *A. sunderlandi* since there were previously only two other known specimens to compare, both from off Key West, Florida. This specimen may be an extreme variant or it could possibly be a Bahamian subspecies of *A. sunderlandi.* The shell differs from the Key West specimens in having five not six chords per whorl with the peripheral two being smaller, not larger than the central chords; in having three spiral grooves around the periphery of the base rather than being smooth; and in having a less keeled periphery than that of the Floridian *A. sunderlandi.* The coloration of the Bahamian specimen is somewhat different from the Floridian ones but it may well have faded since the death of the shell. Regardless, it is comparable in general tone, and in having remnants of dark flammules on the subsutural chord and the peripheral chords. The Bahamian *A. sunderlandi* is similar in size to the *A. sunderlandi* from Florida and smaller than the common shallow-water *A. nobilis* Röding, 1798 which is the most similar western Atlantic *Architectonica* species. *A. sunderlandi* differs from the common, widespread *A. nobilis* in being a smaller, flatter shell, with a much less developed, smoother sculpture. The base of *A. nobilis* is heavily sculpted with beaded cords, while the base of *A. sunderlandi* is smooth or only finely sculpted by three smooth spiral grooves around the periphery. *A. sunderlandi* could also be confused with *A. peracuta* (Dall 1889a:275, pl. 33, figs. 2, 5) but differs in having a higher spire, less developed peripheral keel, and in having orange flammules around the periphery.

Superfamily Cerithiacea Fleming, 1822
Family Turritellidae Clarke, 1851
Subfamily Vermiculariinae
Genus *Vermicularia* Lamarck, 1799
Vermicularia bathyalis Petuch, 2002
Fig. 3F, G

Vermicularia bathyalis Petuch 2002:63, fig. 1C–F.

Material examined.—USNM 1138077, length 7.5 mm; BCFAU 0013, 36 mm, two freshly dead specimens dredged from 600 m, south and west of Victory Cay, Bahamas, Station 2, 23 May 2002.

Type locality.—Off Victory Cay, Bahamas, 400 m.

Range.—This species was described by Petuch (2002) with the type locality being the carbonate mud bottom at 400 meters depth, 7 km southwest of Victory Cay, Bimini Chain, Bahamas. The specimens referred to herein were dredged from deeper water, just down slope of the type locality (600 meters, Station 2). The geographic extent of this species is presently not known beyond the type locality.

Discussion.—*Vermicularia bathyalis* is currently the deepest dwelling *Vermicularia* known from the western Atlantic. The holotype was collected from 400 m in 2000 and two more specimens were collected from 600 m. This is remarkably deep water for the genus. Both specimens clearly display the unique characteristics of the protoconch and early whorls. The turritelloid stage is composed of four whorls in all, the first three being white while the fourth is orange-brown. The early whorls have a distinct single large keel-like spiral chord around the midbody that gives way to the scaly texture of the teleoconch after the fourth early whorl. The larger specimen is less scaly than the holotype and the smaller, presumably juvenile specimen. The 12 main spiral chords are very faint. The thickness of the spiral sculpture seems to be a variable characteristic from specimen to specimen, based on the limited material. There are three other species present in the western Atlantic: *Vermicularia spirata* (Philippi, 1836), *V. fargoi* Olsson, 1951, and *V. knorri* (Deshayes, 1843). *Vermicularia bathyalis* is most similar to *V. knorri* but differs in having a proportionally much smaller turritelliod stage with 4 whorls while *V. knorri* has 6–7. *V. bath-*

yalis also has 12 main chords on the body whorl while *V. knorri* has 2.

Family Eratoidae Gill, 1871
Subfamily Eratoinae Gill, 1871
Genus *Hespererato* Schilder, 1933
Hespererato pallida, new species
Fig. 3H, I

Etymology.—The name was selected to reflect the pure ivory white color of all specimens collected.

Diagnosis.—Shell bright white to semi-transparent, moderately elongated, distinctly angled periphery, shoulder concave, four strong columellar plates.

Description.—Shell much larger than common *Hespererato maugeriae* (Gray in G. B. Sowerby I 1832), averaging 8–10 mm in height; shell pure white, smooth, semi-transparent, with distinctly angled periphery and concave shoulder; all whorls, including protoconch covered with bright white glazy callus; outer lip thickened, curled in, with row of 13–17 evenly spaced small teeth; upper end of outer lip well shouldered and elevated to almost same height as apex; apex bulbous and rounded; spire elevated but low and consisting of three whorls; columella straight, roughly parallel to axis of coiling and marked by 4–5 elevated folds; 4 anterior-most plates are strongest, blade-shaped and always present; fifth fold closest to parietal end of shell can be weak or absent; aperture narrow, elongated with broad and short siphonal canal; axial sculpture composed of very thin growth lines best visible on shoulder.

Type material.—Holotype USNM 1138036, Paratype USNM 1138037.

Material examined.—Seven specimens collected alive and dead in the vicinity of Victory Cay, Bahamas, Stations 1-1, 1-3, 3. Heights ranged from 7.0–9.6 mm and widths ranged from 5.1–6.6 mm.

Type locality.—South and west of Victory Cay, Bimini Chain, Bahamas, Station 1-1, 25°30.165′N, 79°18.169′W, 400–600 m, May 2002 and May 2003.

Discussion.—*Hespererato maugeriae* (Gray in G. B. Sowerby I 1832) and *H. martinicensis* Schilder 1933 are the only two *Hespererato* species currently recognized from the western Atlantic. The *Hespererato* shells collected from off Victory Cay most closely resemble *H. maugeriae* in overall shape but are very different in a number of ways. The shells differ from typical *H. maugeriae* in being always pure, ivory white, in having 4–5 heavy columellar plications, in having a lower more rounded spire, in having a more elevated outer lip; in having a distinctly sharp angled periphery and concave shoulder; and by living in much deeper water (to 600 m). *Hespererato maugeriae* is tan with pinkish or yellowish undertones, has less distinct columellar plications, has a more elevated, pointed spire, and the outer lip is generally flush with the broadly rounded shoulder. *Hespererato maugeriae* inhabits much shallower water (maximum 120 m). *Hespererato martinicensis*, which is most common around Martinique Island and throughout the Lesser Antilles, is usually even smaller than *H. maugeriae* and has more labial teeth that are placed closer together than in *H. maugeriae*. This species is uniquely colored with a yellow to reddish spire and green to pink anterior extremity.

Family Bursidae Thiele, 1925
Genus *Bursa* Röding, 1798
Subgenus *Colubrellina* Fischer, 1884
Bursa (*Colubrellina*) *finlayi* McGinty, 1962
Fig. 4A, B

Bursa finlayi McGinty 1962:39, plate 3.

Material examined.—USNM 1138010, one specimen dredged alive, 410 m, south and west of Victory Cay, Bimini Chain, Bahamas, Station 1-2, 24 May 2002.

Type locality.—115 fms, Pourtalès Plateau, off Sombrero Key Light, Florida Keys.

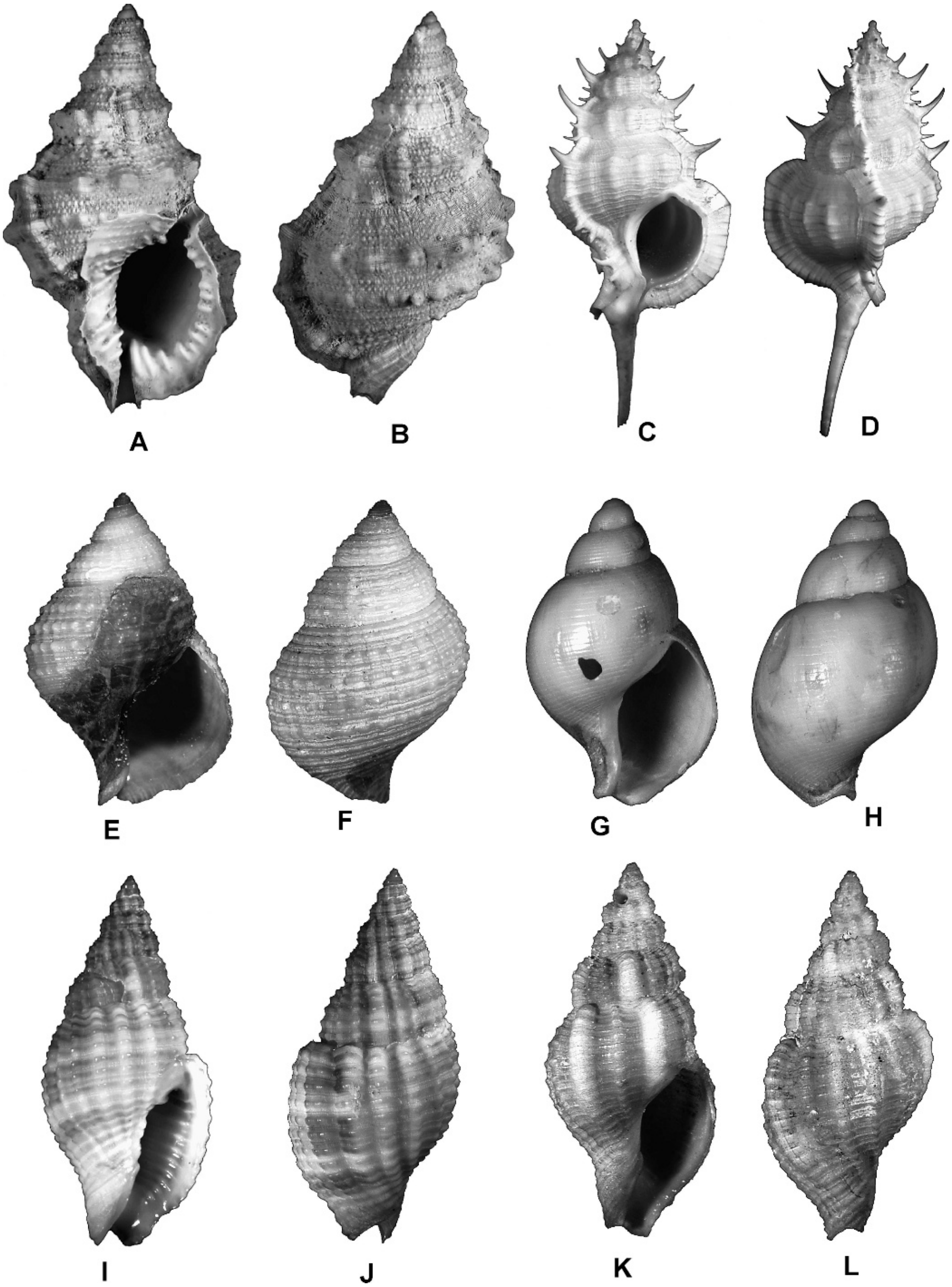


Fig. 4. A, B, *Bursa finlayi* McGinty, 1962, height: 50 mm, width: 28 mm, USNM 1138010; C, D, *Siratus yumurinus* (Sarasúa & Espinosa, 1978), height: 66.5, width: 27.1 mm, USNM 1138048; E, F, *Pisanianura grimaldii* (Dautzenberg, 1889), height: 21.2 mm, width: 13.6 mm, USNM 1138058; G, H, *Chickcharnea fragilis* Petuch, 2002, height: 35.5 mm, width: 21.0 mm, USNM 1138015; I, J, *Antillophos bahamasensis* Petuch, 2002, height: 21.0 mm, width: 9.7 mm, USNM 1138007; K, L, *Antillophos freemani* Petuch, 2002, height: 19.5 mm, width: 7.7 mm, USNM 1138008.

Range.—Florida Keys to the western Bahamas.

Discussion.—The Bimini specimen closely resembles the shells of *Bursa finlayi* from Florida and displays no major morphological differences. This is the first official record of collection of *B. finlayi* from the Bahamas, along the eastern slopes of the Florida Straits.

Family Ranellidae Gray, 1854
Subfamily Pisanianurinae
Warén & Bouchet, 1990
Genus *Pisanianura* G. Rovereto, 1899
Pisanianura grimaldii (Dautzenberg, 1889)
Fig. 4E, F

Hindsia grimaldii Dautzenberg 1889: pl. 2, fig. 4.
Anura clathrata Dautzenberg & Fischer 1906:25, pl. 3, figs. 6–8.
Pisanianura grimaldii: Warén & Bouchet 1990:64, figs. 126, 127, protoconch figs. 94, 95, radula figs. 25, 26, jaw fig. 55, operculum fig. 68—Henning & Hemmen 1993:130, pl. 26, fig. 1.

Material examined.—USNM 1138058, one freshly dead specimen dredged from 580 m depth near Wedge Rock, Bahamas, Station 4, 10 May 2003.

Type locality.—Azores, eastern Atlantic Ocean, 1278 m, Monaco Expeditions station 112.

Range.—This is the first record of *Pisanianura grimaldii* from the western Atlantic Ocean. The previously known distribution is: NE Atlantic (S. Morocco, Azores, S. Madeira), SW Indian Ocean (N. Mozambique), SW Pacific (New Caledonia).

Description of Bahamian specimen.—Shell thin but strong, imperforate, sculpted with numerous fine spiral and axial ridges; whorls 6, globose, convex and regularly increasing in size; nucleus of 2.5 large, sinuous whorls, brown in color; shell color ivory white; aperture ovate, coming to points at ends; outer lip thin, sharp; parietal area with medium white glaze beneath thick periostracum through which spiral sculpture is visible; anal canal lacking; siphonal canal very short, broad and twisted to left; sutures distinct and well impressed; spiral sculpture consisting of numerous rather coarse but distinct spiral cords of three sizes which alternate regularly with each other; four primary, or largest, cords present with central two being heaviest; axial sculpture of numerous raised costae which produce small, rounded nodes at intersections with primary spiral cords, giving the shell beaded, lattice-like surface; axial sculpture becomes obsolete below periphery of body whorl; periosticum thick and brown.

Discussion.—The recovery of this specimen of *Pisanianura grimaldii* is regarded as the first record of this species from the western Atlantic Ocean. The early whorls on the shell indicate a long-lived planktonic larval stage that obviously can remain suspended in the water column for a length of time before settling and maturing. This species has been documented alive from as deep as 2200 meters (Henning & Hemmen 1993). Recognizing the fact that only one specimen has been recovered in the previous four years of dredging off the western Bahama Bank, it is hard to say whether there may or may not be a population of *P. grimaldii* living in the deep waters of the Florida Straits. It is likely that this could be a chance specimen with its larva drifted the north equatorial current across the Atlantic Ocean and settled far out of place.

Superfamily Muricoidea da Costa, 1776
Family Muricidae da Costa, 1776
Subfamily Muricinae da Costa, 1776
Genus *Siratus* (Jousseaume, 1880)
Siratus yumurinus
(Sarasúa & Espinosa, 1978)
Fig. 4C, D

Murex (*Murex*) *yumurinus* Sarasúa & Espinosa 1978:3, fig. 1A–D.

Siratus yumurinus: Petuch 2002:65, fig. 2G.

Material examined.—USNM 1138048, one live specimen taken in 564 m, southwest of South Cat Cay, Bahamas, Station 1-3.

Type locality.—Bahía de Mantanzas, Cuba.

Range.—Restricted to northern Cuba, southern Gulf of Mexico and the Straits of Florida.

Original description (*translated from Spanish*).—"Shell strong, spiny, of medium size reaching more than 50 mm in length, with 2 nuclear whorls and 7 postnuclear whorls and a markedly angular profile. Spire extended, suture irregular, not deep. Subsutural area well marked. Aperture oval, slightly oblique, with porcelaneous lips; internal lip with the upper portion adhering to the wall of the body whorl and the lower portion with a free edge; outer lip well developed with denticulations on the border. Siphonal canal moderately long, comparatively wide and curved toward the dorsum. The posterior part of the siphonal canal is wide and bulky. Subsutural area well indicated, characterized by a lack of sculpture with only growth lines present. The three equidistant varices are flexed dorsally, rounded, with convex profiles, and have short, open, sharp spines which begin at the anterior face of the varix; in adults the varix behind the outer lip is much more sharp; the varices can possess up to six spines which may vary greatly, the shoulder spine is longer and sharper. In adults, the base of the siphonal canal has a single spine; juveniles can have two well developed spines along with two other small ones. There are three intervarical costae which are elevated in the middle of each whorl forming an angular profile for the periphery of the whorls; occasionally there are one or two intervarical costae which begin just below the subsutural area. The spiral sculpture consists of a base of small, elevated, evenly separated cords which are more elevated when they cross the varices and the intervarical costae; a smaller, finer cord appears between each of the primary cords. Operculum oval, caramel colored, with an apical nucleus and strong concentric growth lines. Color pale cream-white, sometimes with two or three caramel colored spiral lines on the body whorl" (Sarasúa & Espinosa 1978).

Discussion.—*Murex yumurinus* is most similar to *M. cailleti* Petit 1856, which differs in having the varices less elevated, the base more bulky, in having more pronounced sutures, and by having the subsutural area well marked with spiral ridges. In general, *M. yumurinus* has a greater number of spines, and the primary spine situated on the shoulder of the varices is always present and directed posteriorly. The spiral cords are placed closer together and the protoconch is composed of two whorls.

Murex yumurinus collected from off Victory Cay in 2001 was illustrated by Petuch (2002). Petuch's illustration shows a specimen without spines or siphonal canal, as it was collected dead and had been tumbled. Two specimens, one alive and one dead were collected during the FAU cruise in 2002. The dead specimen was in the same condition, as illustrated by Petuch (2002), while the live specimen is in excellent condition and is comparable to the holotype. The shell from off Cat Cay has a nucleus of two bulbous, porcelaneous whorls that are followed by seven postnuclear whorls. The entire outer lip has only faint indications of numerous denticulations. A particular characteristic of the outer lip is that it is hollowed-out inside of the aperture, creating a continuous sulcus from the posterior canal to the siphonal canal. The subsutural area of the body whorls is lacking in sculpture compared to the rest of the shell, but there are 5–6 weak spiral threads in the subsutural area of each whorl. Each varix is ornamented with three, forward curved spines, a large one posteriorly and two smaller ones on the anterior portion of the varix. The varix, which was being formed just behind the outer lip, has no spines. There are three moderately strong intervarical costae between each of the three primary varices and there is an indication of a fourth costae to the right of those three, but only on the body whorl. The siphonal canal is well developed and there is a former canal present that was broken off. There are also two smaller spines at the base of the siphonal canal, a characteristic that is common in juvenile specimens (Sarasúa & Espinosa 1978). The shell is spirally sculpted with numerous, evenly spaced, low cords that alternate in size and possesses a faint caramel color. This is the only color on the shell other than the pale cream-white base coloration. On the specimen that was collected dead: there are seven body whorls, the nucleus is missing, and the shell only measures 39.2 mm from the base of the aperture to the approximate tip of the nucleus. There are faint traces of many denticles along the entire outer lip, the primary varices are not so well developed, and there are three intervarical costae with no indication of a fourth to the right of them. All spines are broken off, including the siphonal canal, and the inside of the outer lip is solid, not channeled like the specimen that was collected alive.

Family Buccinidae Rafinesque, 1815
Subfamily Photinae Vaught, 1989
Genus *Chickcharnea* Petuch, 2002
Chickcharnea fragilis Petuch, 2002
Fig. 4G, H

Chickcharnea fragilis Petuch 2002:68, fig. 2E, F

Material examined.—USNM 1138015, one freshly dead specimen collected from 400–480 m, west of South Cat Cay, Station 1-4, 24 May 2002.

Type locality.—Carbonate mud bottom, 400 m depth, off Victory Cay, Bimini Chain, Bahamas.

Range.—Known only from the type locality.

Description.—"Shell small and fragile; color translucent and shape resembles inflated, *Ptychosalpinx*-type buccinid; shoulders rounded, with deeply impressed sutures and elevated spire whorls; subsutural area slightly flattened, producing scalariform spire; first postnuclear whorl sculpted with 12 strong spiral cords; body whorl smooth and silky with strong spiral cords confined to subsutural area and anterior third of the body whorl; siphonal canal short, stubby, open and flaring, ornamented with four large spiral cords and numerous fine spiral threads; columella smooth, straight, without any plications or ornamentation; parietal region and columella glossy; interior of shell smooth and glossy; protoconch proportionally very large, bulbous, dome-like, glossy, polished, flattened at tip, and composed of 2½ whorls; entire shell pure white; periostracum thin, pale brown" (Petuch 2002).

Discussion.—Only three specimens of *Chickcharnea fragilis* have ever been recorded, all dredged from the type locality in 2000 and 2002. As a result of its scarcity, very little is known about the possible variations in size and sculpture that this species may possess. *Chickcharnea fragilis* resemble *Ptychosalpinx globosus* (Dall, 1889a) or *Liomesus stimpsoni* (Dall, 1889a) but differs from *P. globulous* in lacking the large, sharp edged, prominent fasciolar plication on the columella that characterizes all *Ptychosalpinx* species, fossil and Recent. In this sense, it more closely resembles *L. stimpsoni* but differs in being a much smaller, more fragile shell with a smooth body whorl that lacks coarse spiral cords.

The specimen collected in 2002 shows some variation from the descriptions of the holotype and paratype. Most obviously it is over 10 mm larger than any of the others collected, expanding the known size range to 15–35+ mm. Instead of having low spiral cords confined to the subsutural area and the anterior third of the body whorl, the entire shell is sculpted with many faint, low spiral cords (35 on the body whorl) and there is no indication of any smooth area on the body whorl. Additionally, the siphonal canal lacks the four large spiral cords present on the holotype, but does have numerous fine spiral threads that terminate upon intersecting with the thickened, glazed callus covering the parietal region. The parietal region, columella, and interior of the shell are glossy white and smooth. This specimen is also covered by a thin light-brown periostracum, unlike the other two specimens that lacked any trace of periostracum.

Genus *Antillophos* Woodring, 1928
Antillophos bahamasensis Petuch, 2002
Fig. 4I, J

Antillophos bahamasensis Petuch 2002:65, fig. 2A, B.

Material examined.—USNM 1138007, one freshly dead specimen dredged from 432 m, west of South Bimini Island, Bahamas, Station 5, 9 May 2003.

Type locality.—400 m depth off Victory Cay, Bahamas.

Range.—Endemic to the deep waters off the Bahamas.

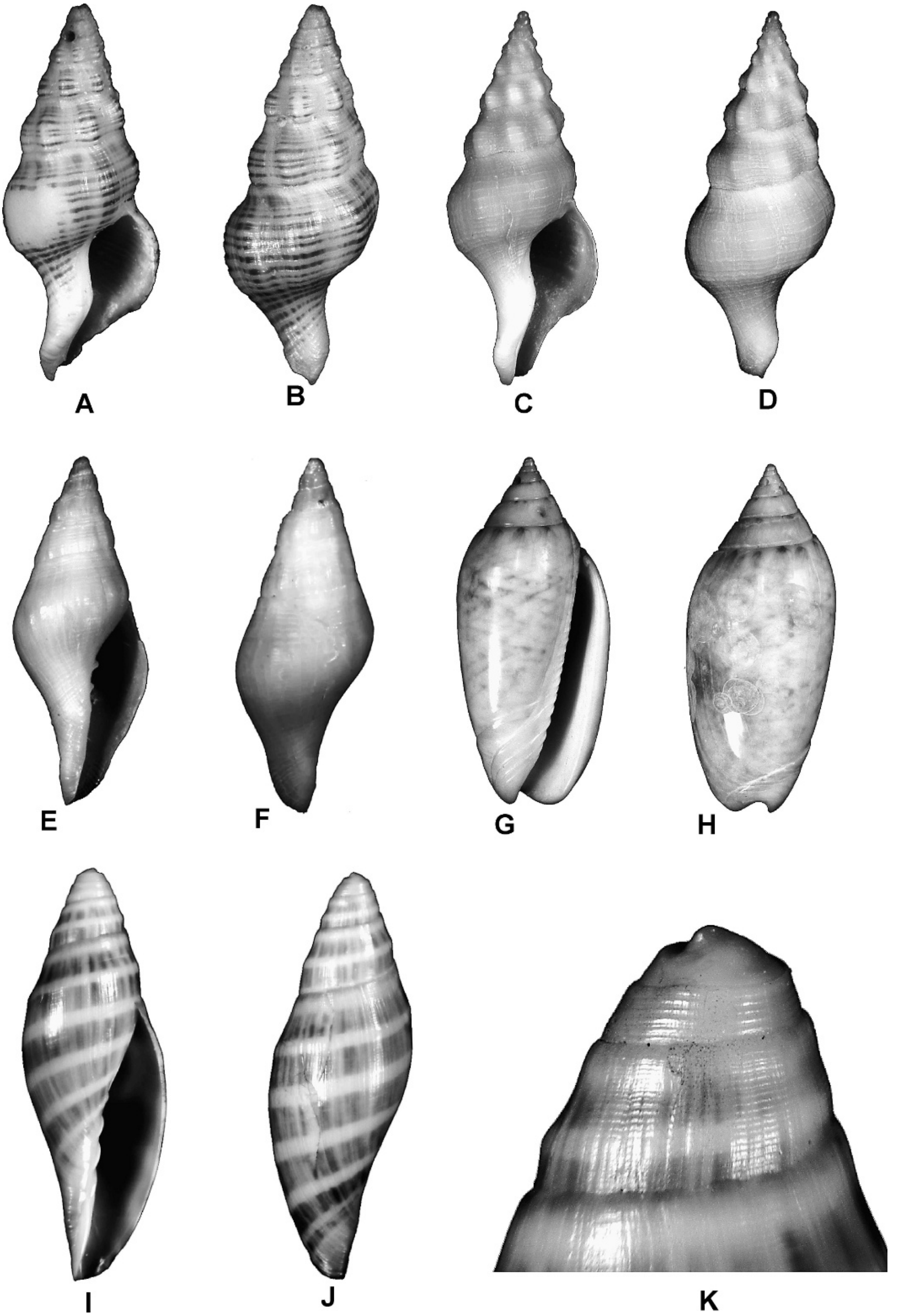
Discussion.—*Antillophos bahamasensis* is very similar in size, shape, and general color to *A. bayeri* Petuch 1987 from the western and southern Caribbean. *Antillophos bahamasensis* differs in being a broader, stockier shell with a proportionally lower spire, in having a distinctly shorter and wider siphonal canal, in having more sloping spire whorls, and by inhabiting much deeper water. Originally, *A. bahamasensis* was thought to have only a single columellar denticle, which further differentiated it from *A. bayeri*. It is now known that *A. bahamasensis* may have as many as five columellar denticles. Although *A. bahamasensis* is sympatric with *A. freemani* (Petuch, 2002), it was noted that *A. bahamasensis* seems to be much less common in the deep waters off Victory Cay than *A. freemani* (Petuch, 2002). The FAU dredgings of 2002 and 2003 seem to support this conclusion, as there were three *A. freemani* collected but only one *A. bahamasensis*.

The new specimen is roughly the same size as the others collected in 2001 but displays some minor sculptural variation. The body whorl has 18 longitudinal costae and 14 spiral cords that are tan in color and stand out against the whitish background color of the body whorl. The spiral cords on the body whorl have a single thin thread between them, which is also faintly darker in color. The spire whorls have 5–6 spiral cords as opposed to 8–10. There are two varices per spiral whorl that are not very large and are fairly obscure. The outer lip is thickened and has only 10 large chords instead of 14–16. The columella has five randomly-sized plications instead of one, with the anterior-most two being largest. There is a single large denticle at the posterior-most end of the columella that seems to form a posterior canal. The protoconch is shiny, tan colored and smooth, composed of 2.5 volutions, with a single, brown, spiral thread at their center. The body whorl is whitish-tan with three darker tan bands. The spiral whorls are whitish-tan, mottled with darker tan. The outer lip, siphonal canal, interior of aperture, and columella area are all white.

Antillophos freemani Petuch, 2002
Fig. 4K, L

Antillophos freemani Petuch 2002:65, figs. 2C, D.

Material examined.—USNM 1138008, one freshly dead specimen and two larger,


A
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broken specimens dredged from 410 m, south and west of Victory Cay, Bimini Chain, Bahamas, Station 1-5, 24 May 2002.

Type locality.—400 m depth off Victory Cay, Bahamas.

Range.—Endemic to the deep waters of the Bahamas.

Discussion.—*Antillophos freemani* is most similar to the common, widespread, shallow water *A. candei* (Orbigny, 1842). *Antillophos freemani* differs mainly in being a much more slender, elongated shell with a higher, more protracted spire, in having fewer ribs on the body whorl, in having more numerous and finer spiral cords, in having a more developed, and narrower siphonal canal, in having a proportional larger protoconch, and in being completely white or pale off-white in base color. The most obvious difference between *A. freemani* and the sympatric *A. bahamasensis* is the overall body sculpture. In *A. bahamasensis* the spiral and axial sculpture produce a nearly reticulate pattern, while in *A. freemani* the axial sculpture is dominant and it has larger, more prominent varices.

On the specimen collected in 2002, there are 16 large, primary spiral cords on the body whorl. With each pair being separated by a single, smaller, secondary thread and two smaller, tertiary, finer spiral threads. There are 15 axial costae and three heavy, varices on the body whorl and two to three thick varices on each spiral whorl. The intersection of the spiral and axial sculpture produces prominent, rounded beads. There are five primary ribs on the spiral whorls. The outer lip is wide, thickened, expanded, and semi-transparent with an interior sculpture of 16 very thin, obscure spiral threads. The columella possesses a heavy, prominent fold at the anterior end and a very faint dentification at the posterior end. The shell color is pure white, stained gray, with no indication of additional color bands or patches. Two other broken specimens were dredged in 2002, and these are larger than the complete shell that was recovered. These can easily be identified by the pure white color, the unique sculpture, the presence of numerous rounded varices on the body whorl, comparatively thin outer lips, and the single heavy plication on the anterior portion of the columella.

Family Fasciolariidae Gray, 1853
Subfamily Peristerniinae Tryon, 1880
Genus *Bullockus* Lyons & Snyder, 2008
Bullockus mcmurrayi Clench & Aguayo, 1941
Fig. 5A–D

Latirus (*Hemipolygona*) *mcmurrayi* Clench & Aguayo, 1941:178, pl. 14, fig. 3.—Petuch 1987:45, figs. 5, 6; 2002:65, fig. 2I, J.

Material examined.—USNM 1138041, four specimens freshly dead and well preserved, dredged from 564 m, west of South Cat Cay, Bahamas, Station 1-6, May 2002. (See Table 1 for dimensions of specimens.)

Type locality.—Off Matanzas, Cuba in 347 m.

Range.—Northern Cuba and the Florida Straits.

Discussion.—Although this species seems to be somewhat restricted in range,

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Fig. 5. A–D, *Latirus macmurrayi* (Clench & Aguayo, 1941). A, B, USNM 1138041, height: 36.1 mm, width 13.3 mm; C, D, USNM 1138033, height: 28.6 mm, width: 10.8 mm; E, F, *Exilia meekiana* (Dall, 1889a), height: 12.9 mm, width: 5.0 mm, USNM 1138032; G, H, *Oliva bahamasensis* Petuch & Sargent, 1986, height: 42.9 mm, width: 18.5 mm, USNM 1138053; I–K, *Scaphella* cf. *gouldiana* Dall, 1887, height: 48.0 mm, width: 15.8 mm, USNM 1138066.

Table 1.—Dimensions of individual *Latirus macmurrayi* specimens.

Color form	Height (mm)	Width (mm)
Pale yellow with spiral banding	36.1	13.3
Pale yellow with spiral banding	25.5	10.3
Pale yellow with spiral banding	24.6	9.7
Pinkish-white, no spiral bands	28.6	10.8

it is highly variable in form and color, as are most *Latirus* species. The color may be off-white to dark brown, with or without darker spiral bands. Most remarkably, the umbilicus may be wide and flaring as in the holotype (illustrated by Petuch 1987), or it may be narrow and nearly absent, as in the specimens illustrated herein and by Petuch (2002, fig. 2i, j). The subgenus *Hemipolygona* was erected in 1899 by Rovereto to include *L. maderensis* Watson 1897 from the eastern Atlantic off the Madeira Islands. *Latirus mcmurrayi* definitely belongs in *Hemipolygona* along with *L. maderensis* but is proportionally longer, and lacks the very strong spiral costae of *L. maderensis*.

A total of four specimens of *Latirus mcmurrayi* were collected in 2002, all with the same general shape. Two distinct color forms were present with three of the specimens having an off-white or pale-straw base color with numerous narrow brown spiral threads (16–18 on the body whorl and 8–10 on spire whorls). One specimen, which happens to be the freshest (non-eroded) specimen, is dull pinkish-white in color with no spiral color banding and has an intact large, bulbous two-whorled nucleus that is smooth and glassy. The smallest specimen is 24.8 mm in height and the largest is 36.1 mm in height. All four specimens from the Bimini vicinity have a narrow pseudoumbilicus.

Superfamily Volutacea Rafinesque, 1815
Family Olividae Latreille, 1825
Subfamily Olivinae Swainson, 1840
Genus *Oliva* Bruguière, 1789
Subgenus *Strephona* Mörch, 1852

Oliva (*Strephona*) *bahamasensis*
Petuch & Sargent, 1986
Fig. 5G, H

Oliva (*Strephona*) *bahamasensis* Petuch & Sargent, 1986:125, pl. 20, figs. 15–18.

Material examined.—USNM 1138053, one freshly dead specimen dredged from 500 m, off Wedge Rock, Bimini vicinity, Bahamas, Station 4-1, 10 May 2003.

Type locality.—200 m depth off the north coast of Grand Bahama Island, Bahamas.

Range.—Bahamian deep water endemic.

Discussion.—*Oliva bahamasensis* is similar to *O. drangai* Schwengel, 1951, and *O. barbadensis* Petuch & Sargent, 1986, two other deep-water olives from the eastern Caribbean. The Bahamian species is noticeably more inflated and stockier, has only very weak columellar plications, and characteristically has a bright yellow color. This record can be regarded as a minor range extension; pushing the range from the northern slopes of the Little Bahama Bank into the deep waters of the Florida Straits and south along the shelf of the Great Bahama Bank throughout the Bimini Chain of Islands. *Oliva bahamasensis* is one of the deepest dwelling olives in the entire western Atlantic.

Dredged specimen figured herein, matches the original description by Petuch & Sargent (1986), with little if any variation. The shell is solid and thick with an overall fusiform shape and the protoconch large. The edge of the suture is marked with purple-red flammules that run onto the shoulder. The interior of the aperture of the Bimini specimen is white instead of pale-yellow orange and the columellar area has 15 thin, weak plications, with the anterior four being the strongest.

Family Turbinellidae Swainson, 1840
Genus *Exilia* Conrad, 1860

Exilia meekiana (Dall, 1889a)
Fig. 5E, F

Fasciolaria (*Mesorhytis*) *meekiana* Dall, 1889a:172, pl. 36, fig. 7; 1889b: 112, pl. 36, fig. 7.

Teremachia meekiana: Bayer, 1971:197, fig. 54 (left).—Abbott, 1974:243, fig. 2653.

Material examined.—USNM 1138032, two dead specimens dredged from 400–450 m, west of Victory Cay, Bahamas, Station 4-2, 24 May 2002.

Type locality.—Off Morro Light, Cuba in 450–730 m.

Range.—Deep waters (440–1100 m) of the Gulf of Mexico, Cuba, Jamaica, and the Bahamas.

Discussion.—This shell has had quite a number of names since Dall originally referred to it as *Mesorhytis*, a genus erected by Meek (1876) to include some Cretaceous fossils. The genus was originally placed under the subfamily Fasciolariinae. Bayer (1971) placed the shell in the Turbinellidae based on shell morphology and anatomy and moved the species to the genus *Teremachia* Kuroda, 1931. Because the genus *Teremachia* is restricted to the southwestern Pacific, the species was later referred back to the genus *Mesorhytis* until Kantor et al. (2001) synonymized the genus *Mesorhytis* with the genus *Exilia*, placing the shell in its current taxonomic position.

This species was described by Dall (1889a) from only a "couple" of dead specimens collected aboard the R/V *Blake* in the late nineteenth century. Bayer (1971) collected one live aboard the R/V *Gerda* off the southwestern coast of Jamaica in 1970 and some specimens have since been dredged alive from shallower water (30–60 m) off Miami and the Florida Keys by Kevin and Linda Sunderland of Fort Lauderdale, Florida (pers. comm.). Two additional specimens were dredged aboard the R/V *Bellows* in 2002 off Victory Cay, Bahamas. This is the first known record of *Exilia meekiana* from the Bahamas. Attesting to the rarity of this species, Dr. Bayer noted that, over a period of more than six years of trawling and collecting in the tropical western Atlantic during the Deep-Sea Biology Program of the Rosenstiel School of Marine and Atmospheric Sciences, among many specimens of gastropods, only two specimens of this species were ever collected.

The specimens collected aboard the R/V *Bellows* are only approximately half the length of full-sized specimens, and they are fairly thin and delicate and pure white in color. On the unbroken specimen, there is a blunt and globose protoconch that persists for only one whorl. There are six postnuclear whorls that are rounded and have about 10 raised axial ribs on the second, third, and fourth whorls that abruptly become obsolete on the fifth whorl. There, the sculpture becomes dominated by 5–6 fine, spiral threads that are restricted to the posterior part of each whorl. None of the spiral threads appear to be stronger than the rest, as they are all nearly equal in thickness and are fairly faint mainly visible under magnification. The outer lip is smooth and sharp and the parietal wall is finely glazed, but there is no visible callus. The columella has three distinct, narrow, oblique plaits which rise at nearly right angles from the columella. The broken specimen differs from the complete specimen in being larger (reconstructed altitude of protoconch 15.5 mm), having a more inflated body whorl, and a much more developed spiral sculpture, composed of 10 raised ribs on the penultimate whorl and over 30 raised ribs on the body whorl. There are 14 raised axial ribs on the penultimate whorl that appear just below the suture on the body whorl as small raised nodes. Dall (1889a) commented that the point at which the axial sculpture of the shell becomes obsolete is variable from specimen to specimen, which is apparent when both Bahamas specimens are compared. The degree of spiral sculpture is also a variable character, as can be seen in the two specimens from the Bahamas. Bayer (1971) also observed that as the shells mature, the body whorls become slightly more inflated, the outer lips become more flared, and the anterior canals are more distinctly recurved.

Exilia meekiana most closely resembles *E. chaunax* (Bayer, 1971) from west of St. Lucia, Lesser Antilles but differs in lacking axial ribs on the body whorl, in having 5–6 subsutural spiral cords rather than one, and in having larger, more distinct columellar plaits. Another species, *E. costatus* (formerly *Mesorhytis costatus*) Dall, 1890, was dredged from 687 fathoms off St. Kitts, Lesser Antilles. This species is distinctly different from both *E. meekiana* and *E. chaunax*, primarily in having a more developed sculpture of numerous spiral threads and raised axial costae covering the entire shell.

Subfamily Scaphellinae Swainson, 1832
Genus *Scaphella* Swainson, 1832
Subgenus *Scaphella* Swainson, 1832
Scaphella cf. *gouldiana* (Dall, 1887)
Fig. 5I–K

Material examined.—USNM 1138066, one specimen collected from around 400 m in 2002 aboard R/V *Bellows*, Station 1-6.

Type locality.—The type locality of *Scaphella gouldiana* is Albatross sta. no. 2625, 75 mi off Cape Fear, North Carolina, 32°35′N, 77°30′W (Clench 1946).

Range.—From North Carolina to Bahamas and Cuba (Poppe & Goto 1992).

Description.—The shell collected off Bimini (and described herein) is comparatively small for the genus, highly polished and shiny, fusiform, and moderately solid; spire somewhat protracted; nuclear whorl smooth with small, polished calcarella extending above, but depressed within, second whorl; early whorls with numerous, fine spiral threads, becoming most prominent above shoulder and nearly obsolete on body whorl; only visible sculpture on body whorl are sets of fine axial growth increments; under magnification, faint traces of spiral cords are barely visible above shoulder; shoulders smooth, with no trace of nodulations; teleoconch consisting of five smooth whorls with anterior portion of whorls moderately convex, shouldered, and concave; sutures moderately incised; aperture elliptical, two-thirds length of shell; outer lip thin; parietal wall with light glaze; columella straight with three distinct plicae and faint fourth on anterior; central two plicae strongest; siphonal canal rather broad and straight, not arching; base color pale-ivory with 10 wide yellowish-brown spiral bands circling the entire shell.

Discussion.—Only a single, freshly dead specimen was collected in 2001 aboard the R/V *Bellows*, from deep water off Victory Cay, Bahamas. In general, the shell displays some characteristics typical of the *Scaphella gouldiana* (Dall, 1887). The

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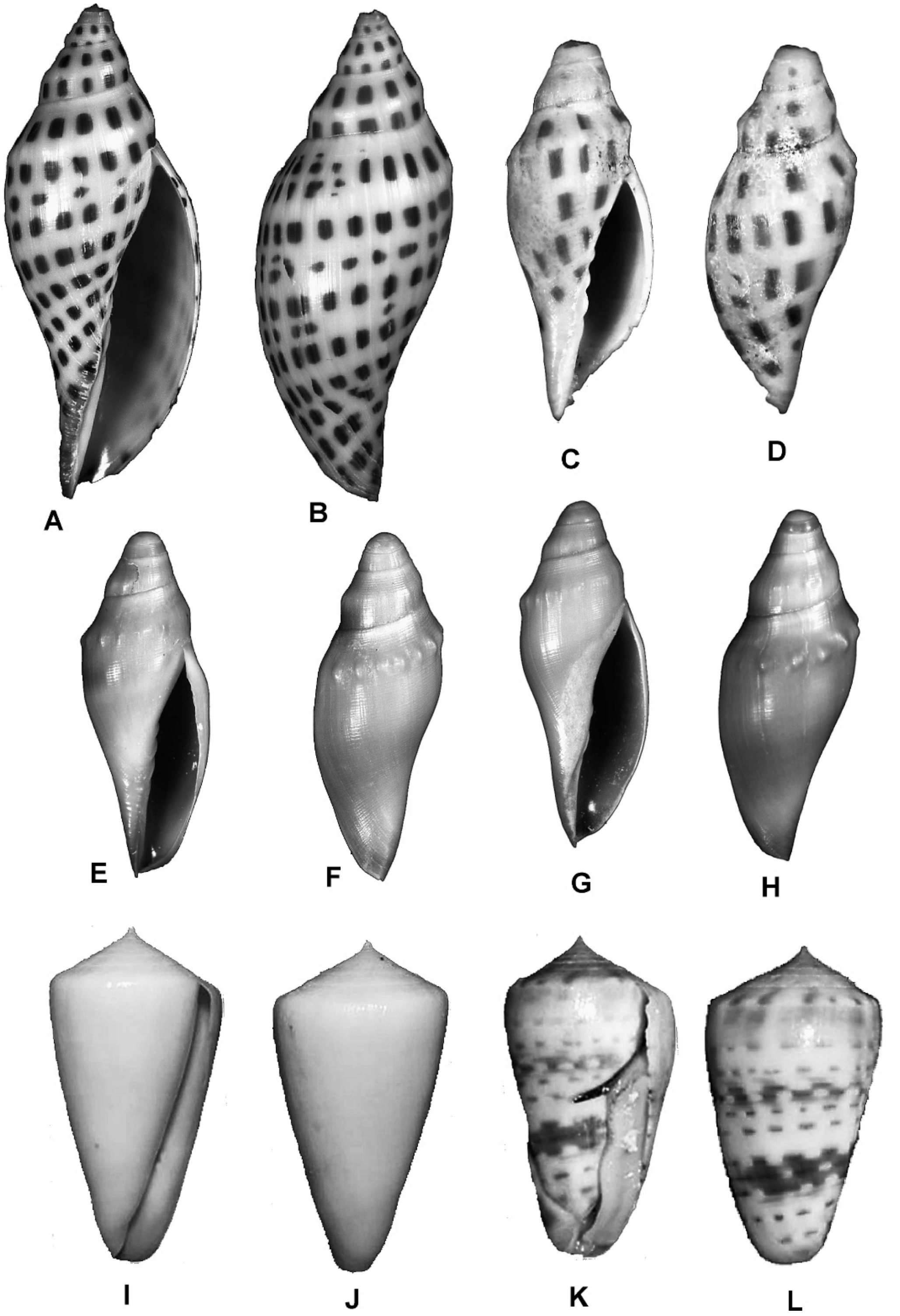
Fig. 6. A, B, *Scaphella atlantis* Clench, 1946, height: 66.6 mm, width: 26.0 mm, USNM 1138064; C, D, *Scaphella bermudezi* (Clench & Aguayo, 1940), height: 38.3 mm, width: 15.2 mm, USNM 1138065; E–H, *Scaphella biminiensis*; E, F, Paratype USNM 1138068, height: 34.9 mm, width: 12.7 mm; G, H, Holotype USNM 1138067, height: 37.9 mm, width: 14.3 mm; I–L. *Conus* (*Lindaconus*) *lindae* Petuch, 1987; I, J, Pure white specimen, collected alive, height: 44.0 mm, specimen from a private research collection; K, L, Banded color form, live with animal, height: 35.0 mm, specimen from a private research collection.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Bahamian shell differs from typical *S. gouldiana* in being smaller, more thin-shelled, more highly polished, more protracted and less convex with more rounded shape, and in having no traces of axial costae at the shoulders. The Bahamian specimen also has a nucleus with a distinctly projecting calcarella that is immersed within the first body whorl. This shiny, highly polished *Scaphella* may prove, upon the collection of more specimens, to be a new species endemic to the Bimini Chain of Islands.

Scaphella (*Scaphella*) *atlantis* Clench, 1946
Fig. 6A, B

Scaphella (*Aurinia*) *atlantis* Clench, 1946:53, pl. 29, fig. 5.
Scaphella (*Clenchina*) *dohrni* (Sowerby III, 1903): Weaver & du Pont, 1970:143, pl. 59, fig. A, B.
Scaphella atlantis Clench, 1946.—Poppe & Goto, 1992:143, pl. 53, figs. 3, 4.

Material examined.—USNM 1138064, two specimens dredged from 450–476 m, off Victory Cay, Bahamas, Station 1-7, May 2002 and June 2005. The second examined specimen measured 46.0 mm in height and 18.0 mm in width.

Type locality.—Off Punta Alegre, Camagüey, Cuba in 385 m.

Range.—Previously only known from the northern coast of Cuba, these specimens were collected from the northwestern margin of the Great Bahama Bank, is a range extension. The species is probably found throughout the deep waters of the eastern and southern Straits of Florida.

Discussion.—When *Scaphella atlantis* was originally described in 1946, only a single mature specimen was known (97.5 mm in length). Since the original account, we are unsure how many more *S. atlantis* may have been collected, but through personal communications with a number of other malacologists working on the genus *Scaphella*, it is our understanding that no shell has ever been collected that exactly matches the holotype. The true identity of *Scaphella atlantis* still remains unknown and many malacologists place it in synonymy with *Scaphella dohrni*, as it is most similar species. In their very conservative work, Weaver & du Pont (1970) synonymized a number of *Scaphella* species with *S. dohrni*. These species include *S. atlantis, S. dubia, S. gouldiana, S. robusta, S. florida, S. bermudezi,* and *S. cuba*. Most *Scaphella* species are highly variable and many of the *Scaphella* forms undoubtedly intergrade within and throughout their ranges. It is, however, difficult to be completely confident about the taxonomic placement of various forms and species of the western Atlantic *Scaphella*, because the biology, ecology, and biogeography of the separate populations remain poorly known. Of the two *Scaphella atlantis* collected off Victory Cay, the larger specimen is fairly mature but, at only 66.5 mm, it is probably still not a fully mature specimen. The shell is moderately thin and consists of only six whorls. The color is nearly ivory white with a faint yellow undertone and has 15 spiral rows of dark brown spots on the body whorl. The outer lip is thin and the parietal wall has a thin glaze. The columella is straight with three strong plicae and a very faint underdeveloped fourth plica. The nucleus has a smooth, finely-pointed calcarella that is immersed within the first whorl, while the early whorls have a finely reticulate sculpture that is strongest on the first whorl and becomes obsolete after the third whorl. On the later whorls, the only trace of sculpture is the numerous fine growth increments that encircle the body whorl. There is a faint trace of nodulations on the penultimate and body whorl, giving the shoulder a slightly angled profile.

Scaphella (*Scaphella*) *bermudezi* (Clench & Aguayo, 1940) Fig. 6C, D

Aurinia bermudezi Clench & Aguayo, 1940:89, fig. 2.
Scaphella (*Aurinia*) *bermudezi* Clench, 1946:56, pl. 30, fig. 6.
Scaphella (*Clenchina*) *dohrni* Weaver & du Pont, 1970:300, pl. 57, figs. A, B.

Material examined.—USNM 1138065, one dead specimen, with protoconch missing, dredged from around 400 m, Station 3.

Type locality.—Bahía de Cochinos, Las Villas, Cuba, in 330–350 m.

Range.—Unknown, most likely Florida Straits off the north coast of Cuba to along the western margin of the Great Bahama Bank.

Discussion.—Only one specimen of *Scaphella bermudezi* was collected off Victory Cay. For now, we refer this specimen to *S. bermudezi* primarily because it differs in a number of ways from the other *Scaphella* species collected off of the Victory Cay. In general, this specimen is thick shelled, has four heavy columellar plicae, has numerous low, rounded nodes around the shoulder of the last two whorls, and has a color pattern of eight spiral rows of dark brown axially drawn out bars. Unfortunately, the protoconch is broken off. Of the other *Scaphella* forms from the Victory Cay locality, this species most closely resembles *Scaphella atlantis*, primarily in having a similar color pattern of axially extended brown dots or bars. On the other hand, the Victory Cay shell is much thicker, with heavy nodes at the shoulder of the last two whorls, and is generally less inflated than *S. atlantis.* When first comparing the overall shape and sculpture of this specimen with that of the new species described below, we were initially inclined to refer to this specimen simply as a spotted color form of it. However, the new species described below does not have any traces of the barred color pattern, is not as thick-shelled, and does not have such heavy columellar plicae.

Scaphella (*Scaphella*) *biminiensis*, new species Fig. 6E–H

Scaphella (*Clenchina*) *gaudiati* Bail & Shelton, 2001.—Petuch, 2002: 65, figs. 2K, 2L, 2M, 2N, 2Q.

Etymology.—Named for the Bimini Chain, Bahamas, the type locality.

Diagnosis.—Shell thin, small for genus, elongate-fusiform, color variable but solid; nucleus bulbous, rounded; early whorls with small, even spiral cords; shoulder of last two whorls with nodes; outer lip thin.

Description.—Shell moderately small for genus, known to reach only 48 mm in length, fusiform, moderately thin and light; protoconch large with diameter reaching 2.0 mm, white and bulbous, of only one whorl, rounded, usually with a worn appearance, and slightly flattened; teleoconch of five whorls, sculpted with numerous fine spiral threads which become nearly obsolete on the body whorl; sculpture on early whorls composed of 9–10 low, even, spiral cords which may appear to be finely reticulated by growth increments; body whorl with traces of the numerous fine spiral threads and axial growth lines; body whorls convex, shouldered; sutures irregular, lightly incised; adult shells may have 12–14 rounded evenly spaced nodules along the shoulder of the last two whorls; knobs absent on early whorls or on young shells; aperture elongate-elliptical; outer lip thin; glaze of parietal wall variable, ranging from absent to thin white glaze to thickened white callus; columella straight, recurved dorsally, usually dark in color, with two to four well developed plications; number of columellar plications variable, with no correlation between shell size and number of plications; shell color varies from pure ivory-white to pale yellow to pinkish to orange, traces of spots or stripes; periostracum variable in thickness, brown.

Type material.—Holotype USNM 1138067, Paratype USNM 1138068.

Material examined.—Eight specimens that were collected from a number of dredges carried out at Stations 1-4, 1-6, and 1-7; 2002, 2003, 2005; 380–480 m depth. (See Table 2 for dimensions of specimens.)

Type locality.—Off Victory Cay, Bimini Chain, Bahamas in 400–600 m.

Range.—Only known from the type locality.

Discussion.—This is a highly mutable species, with all of the variations of color, sculpture, and form intergrading from shell to shell. Of all of the specimens collected, only one had a thickened, white parietal callus. Most other larger shells had only a thin glaze while the smaller shells had no glaze at all. Strangely enough, the largest specimen also has no glaze. If the development of the parietal callus is a sign of maturity of the shell, it may be safe to assume that this species may not grow much larger than about 40 mm in length. The shells are very similar in size and form to *Scaphella bermudezi* Clench & Aguayo, 1940 but does not have the spotted color pattern, and are much thinner-shelled. It is very possible that these shells and *S. bermudezi* may intergrade or even be the same species, but because of the subtle differences in color and structure of the shell, we are treating them as separate species for now until more is known about the taxonomy of *Scaphella* in the western Atlantic. This species is also similar to *Scaphella neptunia* Clench & Aguayo, 1940, collected in 644 meters of water off Jamaica, and also resembles *Scaphella gaudiati* Bail & Shelton, 2001, a species collected off west Guadeloupe. It differs from *S. neptunia* primarily in having more heavily sculpted early whorls, by lacking a calcarella extending above the second whorl, and by being a solid color instead of having brownish bands or bars. The new species differs from *S. gaudiati* in being much smaller, thinner shell, by having only five body whorls instead of six, by having a sculpture in the early whorls composed of fine spiral cords, by having a thin outer lip instead of a thick one, by having 2–4 columellar plicae instead of two, and by having a different color.

Table 2.—Dimensions of individual *Scaphella* (*Scaphella*) *biminiensis* specimens.

State of shell collected	Height (mm)	Width (mm)
Live	37.9	14.3
Dead, broken lip & canal	35.4	13.8
Freshly dead	34.9	12.7
Freshly dead	29.8	12.2
Dead, eroded	24.1	9.9
Dead, broken	Indeterminate	11.5
Freshly dead, juvenile	18.0	8.1
Freshly dead, juvenile	12.0	5.7

Superfamily Conacea Rafinesque, 1815
Family Conidae Rafinesque, 1815
Genus *Conus* Linnaeus, 1758
Subgenus *Lindaconus* Petuch, 2002
Conus (*Lindaconus*) *lindae* Petuch, 1987
Fig. 6I–L

Conus (*Floraconus*) *lindae* Petuch, 1987:55, pl. 9, figs. 9, 10.

Conus (*Lindaconus*) *lindae* Petuch, 2002:69–70, Figs. 3G, 3H, 3I, 3J, 3K, 3P.

Material examined.—Holotype USNM 859886 and approximately 40 shells. Most shells were collected dead and only 5 collected alive, which were dredged from 350–481 m at Stations 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 3, 4, and 5, from 2000–2005.

Type locality.—240 m depth off the southern coast of Grand Bahama Island, Bahamas.

Range.—Endemic to the deep waters of the Bahamas, possibly confined to the northwestern margin of the Great Bahama Bank.

Discussion.—In 2002 Petuch placed *Conus lindae* into a new subgenus that he described, called *Lindaconus.* The subgenus *Lindaconus* only includes two taxa, *C. lindae* from the deep waters of the Bahamas and *C. lightbourni* Petuch, 1986 from the deep water off Bermuda. As recognized the subgenus contains taxa similar to the subgenus *Floraconus* Iredale, 1930 that contains shells from Australia and South Africa. *Lindaconus* was erected to represent similar shells from the western Atlantic that have probably evolved their similarities through convergence and not direct genetic relationships. In general, shells in *Lindaconus* are from deep waters, of average size for the genus, glossy with a pocellaneous texture, are adorned with delicate pink, white and orange colors; they have proportionally large, bulbous protoconchs, and they have a large anterior columellar plication which may be variable in prominence as in *C. lindae*. *Lindaconus lindae* is one of the most variable cones in the western Atlantic, both in shell color and shape. Pure white has been found to be the most common color and the pink colored specimens are less frequently collected and the most rarely encountered specimens are shells with multiple bands of pink or tan spots or shells with bands of pink spots and rows of and large dark rose-pink patches. Equally as variable as the color is the shape of the shells. Some individuals, such as the holotype, are short and stocky with broad shoulders and subpyriform shapes while other specimens are very slender and elongate. Spire height is also variable with some specimens having proportionally low, sloping spires while others have elevated, protracted spires with slightly canaliculated whorls. If two specimens with opposite variations were compared, one would assume that there were two distinct species off Bimini, yet complete intergrades of all morphological extremes have been found, demonstrating that a single, highly variable species occurs in the deep waters of the western Bahamas.

Discussion

Although they are geographically so close, the deep-water benthic communities of the Bahamian (eastern) and Floridian (western) sides of the Straits of Florida are strikingly different. Variations in current regimes and vertical temperature profiles from east to west are major factors affecting benthic communities. Surface and bottom currents on the eastern side of the Straits of Florida are predominantly northerly. Off Miami, on the Miami Terrace, surface currents are typically northerly, but significant southerly bottom currents of 8–10 cm s^{-1} are commonly reported. The southerly bottom currents may, in some cases, have resulted from a seasonal submarine counterclockwise gyre in the western Straits of Florida (Neumann & Ball 1970). Minter et al. (1975) also recorded an unexpected westerly flowing current 9–23 cm s^{-1} at 430 m in the Tortugas and Agassiz valleys, to the west of the Pourtalès Terrace. In all cases of observed countercurrents, geomorphological features on the bottom of these valleys indicate that the predominant flow is parallel with the continental shelf in the easterly or northerly direction (in the direction of the Florida Current).

Grasmueck et al. (2006, 2007) measured current speeds and directions over a 45-hour period at the toe-of-slope of the Great Bahama Bank, off Bimini, Bahamas, in 590–710 meters of water. Here, bottom currents in the lower 40 meters of the water column changed direction from north to south seven times during the 45-hour period of observation. This observation indicates that the constant northerly surface currents are decoupled from the variable bottom currents. The observed current velocities were shown to correlate with the tide level curve for North Bimini, indicating that the bottom currents are tidally controlled. Although bottom current directions were variable, the geomorphologic features on the bottom indicated a dominant northerly direction of flow. Differences in ocean currents and current regimes have a major effect on the sources of larvae and larval distribution of pelagic and benthic organisms on either side of the Straits of Florida (Reed et al. 2005a). The counterclockwise gyres and cold-water upwellings, which have been recognized on the western side of the Straits of Florida, may be a major factor preventing certain planktonic larvae from reaching the Miami and Pourtalès Terraces.

Temperature is also a major factor affecting benthic communities on the western and eastern sides of the Straits of Florida. Cold water upwelling events are known to occur on the west side of the Straits of Florida along the eastern Florida shelf but are not known to occur on the eastern side of the Straits in the Bahamas (Reed et al. 2005b). These episodic events are known to affect the deep-water *Oculina* reefs off central Florida (Reed 1981, 1983) and also occur in the Florida Keys and Pourtalès Terrace (Smith 1982, Lee & Williams 1999, Leichter et al. 2003). The absence of periodic cold water upwelling events and higher average water temperatures at depth in the Bahamas allows Bahamian ecosystems, shallow and deep, to rely on more stable, and higher, water temperatures year-round. Water temperatures in the deep waters (below 200 m) of the Straits of Florida are constantly warmer on the eastern (Bahamian) side of the Straits than on the western (Floridian) side. The water temperature at 400 meters depth (the average depth of this study) is 9°C warmer on the eastern side (16.5°C) than it is on the western side (7.5°C) of the Straits (Sverdrup et al. 1942) (Malloy & Hurley 1970). The water temperature observations of Sverdrup et al. (1942) have been more recently supported by observations made during submersible dives within the study area aboard the *Johnson Sea-Link* (John Reed, Harbor Branch Oceanographic Institution, pers. comm. 2009; Grasmueck et al. 2006, 2007).

This temperature asymmetry observed across the Straits of Florida is due, in part, to the Antilles Current that contributes much warmer water to the eastern side of the Gulf Stream than the Florida Current does to the western side. The Antilles Current, which is fed by the North Equatorial Countercurrent, originates deeper in the tropical Caribbean (to the south and east) and naturally carries warmer water than the Florida Current, which originates in the Gulf of Mexico. Also, the constriction of the Straits of Florida between Miami, Florida and Bimini, Bahamas, along with the merging and northern deflection of the Florida and Antilles currents, forces warm, surface-derived waters downward along the slopes of the western Bahama Bank but not along the eastern slopes of Florida's continental shelf. As a result, Bimini Shelf ecosystems can rely on warm, surface derived waters while at comparable depths across the Straits of Florida the shelf faunas are exposed to cooler bottom-derived waters (Malloy & Hurley 1970). Stable water temperatures are likely extremely important in supporting the diverse deep-water molluscan community off Victory Cay. Petuch (2002) pointed out that many of the taxa living in the deep waters off the western Bahamas are derived from predominantly shallow-water families that may be more stenothermal than typical deep-water molluscan communities. This makes them dependent on the consistently warmer waters provided to the area by the local oceanographic setting.

Observations made by Neumann & Ball (1970) from the *Aluminaut* identified three discrete, depth restricted shelf environments off Bimini, all having different current and substrate types. A strong distinction was made between the shallow, intermediate and deep slope base environments. Depth soundings and dredged materials from FAU surveys between 2001 and 2007 support the observations reported by Neumann & Ball for the Bimini study locality. Beyond the shallow reef area, the seafloor between 30–76 m consists of a continuous, vertical to overhanging wall that is approximately 46 meters high and plummets from the shallow reef environment at around 30 m down to the intermediate depths around 76 meters. In this zone Neumann & Ball (1970) reported current velocities from 50–150 cm/sec to the north.

The intermediate zone of the shelf off Bimini was defined as 76–222 meters depth and has relatively low current velocities (5–10 cm/sec) compared to its upper and lower counterparts. The upper portion of the intermediate zone is covered by a mud filled breccia of large talus blocks that have accumulated at the base of the vertical cliff that characterizes the upper shelf environment. Below the talus deposits, muddy sands slowly thin out to expose hard bedrock at approximately 222 m. Interestingly, higher current velocities in the deeper zone below have restricted the deposition of muddy sediments to the intermediate zone, above 222 m. Here in these muddy sediments, current formed structures were rarely observed by Neumann & Ball. Instead, the sediment surface was dominated by pits, mounds, trails and burrows of benthic organisms.

The environment observed at the base of the slope (222–540 m) is unique for its depth. Here the seafloor planes off and begins to gently dip to the west at around 5 degrees from the Bimini shelf. The slope base is a smooth, hard bedrock surface covered by a moving veneer of sediment. The ripples are 1–2 m high in places and are being pushed northward by an unusually strong bottom current of up to 50 cm/sec. In general, this lower zone exhibits more of the surficial features typical of a shallow, current swept bottom rather than those of the archetypical deep sea. Here on the deep shelf, the sediment is composed of pteropod fragments, foraminifera, pelecypods, gastropods, calcareous algae fragments, shell hash, and gravel sized bedrock fragments. From the western edge of this shallow dipping slope, the sea floor plummets abruptly to depths of over 950 m into the Straits of Florida.

Grasmueck et al. (2006, 2007) used an autonomous underwater vehicle to map a 16 km^2 area 15 km west of Bimini, in waters just beyond the average depths of this study. The mapped area contained over 150 individual coral mounds of various sizes and shapes, the tallest reaching 120 meters off the seafloor. Farther offshore, in an area 30 km west of Bimini, a 12 km^2 area was mapped and explored. Here, 70% of the seafloor was covered with small, horseshoe shaped coral mounds that were generally less than 5 m high. Grasmueck et al. (2007) also noted that the style of coral mound architecture changes dramatically across the Florida Straits, from Bimini to Miami. These morphological differences likely reflect variations in current regimes, sediment inputs, and other abiotic conditions affecting the eastern and western sides of the Straits of Florida. The differences in mound morphology across the Straits likely reflect deep-water corals' and related faunas' ability to adapt to variations in environmental conditions.

In defining bathymetric zones for the Straits of Florida, Quinn (1979) proposed a modified version of the bathymetric zones defined by Ekman (1953). According to Quinn's observations, the littoral, or shelf fauna extends from the tidal area down to about 150–180 meters. This depth is somewhat shallower than the boundary used by Ekman (1953), Bruun (1957), and Voss (1967). In the fauna of gastropods of the family Trochidae studied by Quinn (1979) and in the molluscan fauna studied herein, a distinct break in species composition is recognized at the 150–180 m depth. The littoral fauna observed off Victory Cay is composed of 18 species and is dominated in composition by the gastropod families Trochidae, Triviidae, and Mitridae. Of the 18 littoral species, eight are also known from waters deeper than 180 meters. Most of the deeper records can be attributed to fortuitous occurrences or collection of dead specimens washed down slope from shallower water. At least three species, *Emarginula tuberculosa, Solariella lamellosa,* and *Astyris diaphana*, may be considered true inhabitants of both the littoral and the bathyal zones.

The bathyal zone extends from 180–2000 m, or to about the 4°C isotherm. Recognizing that only the southwestern portion of the Straits of Florida reaches depths of over 1000 m, Quinn (1979) termed the depths from 180–1000 m the upper bathyal, and those from 1000–2000 m the lower bathyal. Since the depth of the Straits of Florida off the Bimini Islands does not reach much more than 900 meters depth before arriving at the western slope, the rest of the mollusks collected in this study are considered a part of the upper bathyal fauna. A few of the species included in the Bahamian fauna have been collected from the lower bathyal zone at other localities, namely those of the family Turridae. As is generally observed in western Atlantic deep-water molluscan faunas, the families Trochidae and Turridae were very common in the dredge hauls but were almost always represented by only dead (although sometimes very fresh) shells. A total of 25 individual trochid specimens were identified (5 species from 4 genera), and a total of 25 individual turrid specimens were identified (12 species from 10 genera) (Table 3).

The shell that was most commonly collected alive was the xenophorid *Tugurium caribaeum*, with over 30 individuals collected (about half alive). The most abundant mollusk, overall, in the dredge hauls was *Lindaconus lindae*, with over 40 specimens being collected from 2002–2005. A total of four were collected alive and the rest were collected dead. The dead cone shells appear to be so abundant on the ocean bottom at around 400 m depth off Victory Cay that Petuch (2002) used the term "*Conus* pavement" to illustrate their abundance. The dead shells that make up the *Conus* pavement are usually partially buried in fine carbonate mud and serve as a substrate for the attachment of a number of cnidarians and poriferans, principally the hydrocoral *Stylaster laevigata*.

Conclusions

A total of 74 molluscan taxa from 34 families were identified from over 400 individual mollusk specimens collected off Victory Cay, Bimini, Bahamas (Table 3). Three species, *Architectonica sunderlandi, Bursa finlayi,* and *Exilia meekiana*, were collected from the eastern side of the Straits of Florida for the first documented time. *Pisanianura grimaldii* is reported from the western Atlantic Ocean for the first time. Two new species *Hespererato pallida* and *Scaphella biminiensis* are described. Additionally, a number of rare or otherwise poorly known molluscan taxa are illustrated, described, and discussed in context with the oceanographic setting. Although Miami, Florida and Bimini, Bahamas lie only 25 nautical miles apart, the benthic communities observed on the east and west sides of the Straits of Florida are

Table 3.—Alphabetical list of species of mollusks dredged in the vicinity of the Victory Cay, Bimini, Bahamas. Abbreviations: D, diameter; H, height; L, length; W, width.

Species	Bahama locality	Number collected and condition	Date collected	Depth (m)	Size (mm)
Actaeon danaida Dall, 1881	West of Victory Cay, 25°28.082′N, 79°18.393′W	1 dead	23 May 2002	400	H = 7.1, W = 3.9
Acteocina perplicatus Dall, 1889	Victory Cay, 25°27.332′N, 79°19.223′W	1	23 May 2005	500	H = 8.0, W = 3.6
Admete cf. *microscopica* Dall, 1889	Off Victory Cay, 25°27.332′N, 79°19.223′W	1 dead	23 May 2002	500	L = 11.0, W = 6.1
Antillophos bahamasensis Petuch, 2002	West of South Bimini Island, 25°42.189′N, 79°20.496′W	1 dead	9 May 2003	432	H = 21.0, W = 9.7
Antillophos freemani Petuch, 2002	South and west of Victory Cay, 25°29.758′N, 79°18.462′W; Station 1-2	3: 1 dead, 2 larger, broken	24 May 2002	410	H = 19.5, W = 7.7
Architectonica sunderlandi Petuch, 1987	South and west of Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	1 dead	23 May 2002	400	L = 17.0, H = 8.0
Bullockus mcmurrayi (Clench & Aguayo, 1941)	West of South Cat Cay, 25°30.053′N, 79°19.107′W; Station 1-3	4 dead, well preserved	May 2002	564	H = 28.6–36.1, W = 10.8–13.3
Bursa (*Colubrellina*) *finlayi* McGinty, 1962	South and west of Victory Cay, 25°29.758′N, 79°18.462′W; Station 1-2	1 dredged alive	24 May 2002	410	L = 50.0, W = 28.0
Calliostoma apicinum Dall, 1881	West of Victory Cay, 25°30.620′N, 79°17.961′W; Station 1	1 dead	24 May 2002	380	H = 7.61, W = 7.77
Calliotropis (*Solarcida*) *calatha* (Dall, 1927)	West of Victory Cay, 25°27.332′N, 79°19.223′W	10 dead	23 May 2002	400–500	H = 5.0–3.7, W = 7.1–4.6
Cerithium (*Thericium*) *eburneum* Bruguière, 1792	Off western slope of Victory Cay/South Cat Cay, 25°31.197′N, 79°18.801′W	1 dead, drilled	27 May 2002	564	H = 15.8, W = 7.8
Cerithium (*Thericium*) *litteratum* (Born, 1778)	Off Wedge Rock, Victory Cay, 25°30.449′N, 79°18.214′W	1 tumbled, eroded, filled with sediment	28 May 2002	440	H = 13.5, W = 6.8
Chickcharnea fragilis Petuch, 2002	West of South Cat Cay, 25°29.791′N, 79°18.478′W; Station 1-4	1 dead	24 May 2002	400–480	H = 35.5, W = 21.0
Cochlespira radiata (Dall, 1889)	South Cat Cay, 25°29.791′N, 79°18.478′W; Station 1-4	1 dead	24 May 2002	481	H = 20.7, W = 8.0
Columbarium (*Peristarium*) *electra* Bayer, 1971	South and west of Victory Cay, 25°27.332′N, 79°19.223′W	1 dead, with broken siphonal canal	23 May 2002	500	H = ~24.0, D = 6.49

Table 3.—Continued.

Species	Bahama locality	Number collected and condition	Date collected	Depth (m)	Size (mm)
Compsodrillia acsestra (Dall, 1889)	Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	1 dead	23 May 2002	400	H = 24.6, W = 6.9
Compsodrillia tristicha Dall, 1889	Victory Cay, Bimini Chain; Station 3	2 dead		400	H = 10.9–12.8, W = 4.0–4.7
Conus (*Lindaconus*) *lindae* Petuch, 1987	Off Victory Cay; Stations 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 3, 4, 5	> 50 shells, only 5 collected alive	May 2002, May 2003, May 2005	350–481	$\bar{X}$H = 44.10, $\bar{X}$D = 22.36
Coralliophilia caribaea Abbott, 1958	Off Wedge Rock, 25°30.165′N, 79°18.169′W; Station 1-1	1 dead, partially eroded, with broken anterior canal	10 May 2003	472	H = 18.75, W = 15.75
Cymatosyrinx pagodula (Dall, 1889)	Victory Cay, Bimini Chain; Station 3	1 eroded	23 May 2002	400	H = 9.4, W = 3.6
Dephnella pompholyx Dall, 1889	South and west of Victory Cay, 25°26.008′N, 79°18.617′W; Station 2	1, dredged	23 May 2002	600	H = 6.5, W = 3.9
Diodora fluviana (Dall, 1889)	West of Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	1 dead	23 May 2002	400	L = 19.0, H = 9.0, W = 14.0
Diodora sayi (Dall, 1889)	Off Cat Cay, 25°31.197′N, 79°18.801′W	2 dead, partially eroded	27 May 2002	400	L = 18.8, 16.7; W = 11.7, 10.1; H = 7.2, 7.0, respectively
Diodora tanneri (Verrill, 1883)	West of Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	2: 1 dead, 1 tumbled and eroded	23 May 2002	400	L = 40.0, H = 15.0, W = 27.0
Distorsio perdistorta Fulton, 1938	West of Victory Cay, 25°29.748′N, 79°18.123′W; Station 1-7	1 live juvenile, 2 broken	May 2002, May 2005	360–476	(Live juv.) H = 20.9, W = 12.3
Drillia havanensis Dall, 1881	Victory Cay, Bimini Chain; Station 3	3 dead, well preserved	23 May 2002	400	H = 6.4–11.4, W = 1.9–3.8
Emarginula tuberculosa Libassi, 1859	South and west of Victory Cay, 25°26.008′N, 79°18.617′W; Station 2	1 dead	23 May 2002	600	L = 19, H = 11.5
Enaeta reevei Dall, 1907	South and west of Victory Cay, 25°29.758′N, 79°18.462′W; Station 1-5	1 dead	May 2003	400	L = 12.7

Table 3.—Continued.

Species	Bahama locality	Number collected and condition	Date collected	Depth (m)	Size (mm)
Eudolium crosseanum Monterosato, 1869	South and west of Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	4 dead, eroded with broken lips and missing protoconchs	23 May 2002	400–600	L = 9.0–26.0
Exilia meekiana (Dall, 1889)	West of Victory Cay, 25°28.735′N, 79°19.084′W; Station 4-2	2 dead	24 May 2002	400–450	L = 12.9, W = 5.0
Fusinus (*Heilprinia*) *halistreptus* (Dall, 1889)	West of South Cat Cay, 25°30.053′N, 79°19.107′W; Station 1-6	5	May 2002	400–564	H = 19.1–76.7, W = 5.8–23.2
Harasewychia amphiurgus (Dall, 1889)	South and west of Victory Cay, 25°28.477′N, 79°17.632′W; Section 3	1 dead, semi-eroded	23 May 2002	400	H = 10.4, W = 3.8
Hesperato	South and west of Victory Cay, 25°30.165′N, 79°18.169′W; Station 1-1	7, collected alive and freshly dead	May 2002, May 2003	400–600	H = 7.9–9.6, W = 5.1–6.6
Hyalina avenacea (Deshayes, 1844)	South and west of Victory Cay, 25°26.008′N, 79°18.617′W; Station 2	2 dead	23 May 2002	600	L = 15.4, W = 6.5
Inodrillia acova Bartsch, 1943	Victory Cay, Bimini Chain; Station 3	2 dead	23 May 2002	400	H = 16.3, W = 5.5 (both)
Kurtziella serga (Dall, 1881)	Victory Cay, 25°27.332′N, 79°19.223′W	1 dead	23 May 2005	500	H = 9.7, W = 3.3
Leucosyrinx verrillii (Dall, 1881)	Victory Cay; Station 3	1, partially eroded with broken outer lip	23 May 2002	400	H = 16.7, W = 5.3
Microgaza rotella inornata Quinn, 1979	West of Victory Cay, 25°27.332′N, 79°19.223′W	3 dead	23 May 2002	400–500	H = 4.5, 4.1, 3.1; W = 7.5, 6.0, 4.3
Mitra (*Mitra*) *barbadensis* (Gmelin, 1791)	Off Victory Cay, 25°28.477′N, 79°17.632′W; Station 3	1	23 May 2002	400	L = 20.0
Mitra (*Mitra*) *swainsonii antillensis* Dall, 1889	Off Wedge Rock, 25°30.470′N, 79°18.380′W	1	May 2003	430–440	H = 89.5, W = 25.0
Mitra (*Nebularia*) *straminea* A. Adams, 1853	Off Wedge Rock, 25°30.470′N, 79°18.380′W	1	May 2002	430–440	H = 40.5, W = 11.0
Mitrella (*Astyris*) *diaphana* (Verrill, 1882)	South and west of Victory Cay, 25°27.332′N, 79°19.223′W	6	23–27 May 2002	380–450	H = 12.0–14.7, W = 4.9–6.0
Natica perlineata Dall, 1889	West of Wedge Rock, 25°30.165′N, 79°18.169′W; Station 1-1	3 dead	May 2002, May 2003	472	H = 9.5–23.0, W = 9.5–22.9
Niso interupta var. albida (Dall, 1889)	West of Victory Cay, 25°28.082′N, 79°18.393′W	1 dead, nearly perfect condition	23 May 2002	400	H = 22; W = 9.6

Table 3.—Continued.

Species	Bahama locality	Number collected and condition	Date collected	Depth (m)	Size (mm)
Niveria (*Cleotrivia*) *candidula* (Gaskoin, 1836)	South and west of Victory Cay, 25°27.332′N, 79°19.223′W	1 dead	23 May 2002	500	H = 11.0, W = 8.2
Niveria (*Niveria*) *nix* (Schilder, 1922)	West of Victory Cay, Bimini Chain, 25°29.748′N, 79°18.123′W; Station 1-7	~20 dead	May 2002, May 2003	400–500	H = 8.7–10.9, W = 7.1–9.0
Nodicostellaria styria Petuch, 2002	South and west of Victory Cay, 25°27.332′N, 79°19.223′W	1 dead, dredged from muddy ooze		500	H = 11.4, W = 3.8
Oliva (*Strephona*) *bahamasensis* Petuch & Sargent, 1986	Off Wedge Rock, Bimini Vicinity, 25°28.500′N, 79°18.766′W; Station 4-1	1 dead	10 May 2003	500	H = 42.85, W = 18.5
Olivella (*Macgintiella*) *watermani* McGinty, 1940	West of Victory Cay, 25°28.735′N, 79°19.084′W; Station 4-2	4	24 May 2002	400–500	H = 8.7–18.4, W = 3.8–7.5
Ovulacteon meekii Dall, 1889	Victory Cay, 25°27.332′N, 79°19.223′W	1	23 May 2002	500	H = 5.3, W = 3.1
Perotrochus (*Entemnotrochus*) *adansonianus* (Crosse & Fischer, 1861)	West of Victory Cay, 25°29.617′N, 79°18.041′W	1 dead, broken	23 May 2002	380	H = 28.0, D = 55.0
Persicula bahamasensis Petuch, 2002	Off Victory Cay, 25°30.449′N, 79°18.214′W	5	2002, 2005	360–440	H = 5.8–8.8, W = 3.8–4.7
Pisanianura grimaldii (Dautzenberg, 1889)	Off Wedge Rock, 25°29.137′N, 79°18.944′W; Station 4	1 dead	10 May 2003	580	H = 21.2, W = 13.6
Poirieria (*Paziella*) *pazi* (Crosse, 1869)	West of Victory Cay, 25°28.735′N, 79°19.084′W; Station 4-2	4: 2 alive, 2 dead	24 May 2002	400–600	H = 19.4–41.8, W = 9.4–17.2
Polinices bahamiensis (Dall, 1925)	South and west of Victory Cay, 25°26.008′N, 79°18.617′W; Station 2	2 dead	23 May 2002	600	H = 6.5, 7.2; W = 5.9, 6.7
Polystira staretti Petuch, 2002	Victory Cay, 25°29.370′N, 79°18.243′W	3	May 2003	400–511	H = 27.1–39.8, W = 9.1–10.3
Polystira tellea (Dall, 1889)	Victory Cay, 25°29.370′N, 79°18.243′W	3 dead	2002, 2003	440–511	H = 29.5–60.0, W = 8.5–18.3
Ringicula natida Verrill, 1873	Victory Cay, 25°27.332′N, 79°19.223′W	1, broken	23 May 2005	500	H = 4.5, W = 2.2
Scaphella (*Scaphella*) *atlantis* Clench, 1946	Off Victory Cay, 25°29.748′N, 79°18.123′W; Station 1-7	2	May 2002, Jun 2005	450–476	H = 46.0–66.6, W = 18.0–26.0
Scaphella (*Scaphella*) *bermudezi* (Clench & Aguayo, 1940)	Off Victory Cay; Station 3	1 dead, protoconch missing	23 May 2002	400	L = 38.3, W = 15.2
Scaphella (*Scaphella*) *biminiensis*	Off Victory Cay, 25°29.748′N, 79°18.123′W; Station 1-7	8	2002–2005	380–480	H = 12.0–37.9, W = 5.7–14.3

Table 3.—Continued.

Species	Bahama locality	Number collected and condition	Date collected	Depth (m)	Size (mm)
Scaphella (*Scaphella*) cf. *gouldiana* (Dall, 1887)	Off Victory Cay; Station 1-6	1	2001	400	L = 48.0, W = 15.8
Siliquaria modesta Dall, 1881	West of Victory Cay, Bimini Chain, 25°29.748′N, 79°18.123′W; Station 1-7	3: only 1 well preserved, mature	24 May 2002	476	L = 20.5, 9.5, 23.0
Siratus yumurinus (Sarasua & Espinosa, 1978)	South and west of South Cat Cay, 25°30.053′N, 79°19.107′W; Station 1-6	1 live	27 May 2002	564	L = 66.5, W = 27.1
Solariella (*Sauvotrochus*) *lubrica* Dall, 1881	West of Victory Cay, 25°27.332′N, 79°19.223′W	1 dead	23 May 2002	400–500	H = 5.2, D = 4.5
Solariella (*Solariella*) *lamellosa* Verrill & Smith, 1880	West of Victory Cay, 25°27.332′N, 79°19.223′W	2 dead	23 May 2002	400–500	H = 6.2, 6.1; D = 5.5, 5.3
Splendrillia lissotropis (Dall, 1881)	Victory Cay, Bimini Chain; Station 1-7	1, eroded		400	H = 8.1, W = 3.3
Sthenorytis pernobilis (Fischer & Bernardi, 1856)	Off Victory Cay, Bimini Chain, 25°30.362′N, 79°18.086′W	1 live	12 Jun 2005	390	H = 35.8, W = 26.5
Terebra (*Myurella*) *floridana* Dall, 1889	Off Victory Cay, 25°30.470′N, 79°18.380′W	2	May 2002	440–476	H = 18.0, 26.0; W = 26.6, 62.9
Terebra evelynae Clench & Aguayo, 1939	Victory Cay, 25°42.189′N, 79°20.496′W; Station 5	4	May 2003	432–472	H = 35.3–53.5
Turbo castanea Gmelin, 1791	West of Wedge Rock, 25°30.165′N, 79°18.169′W; Station 1-1	1 dead, partially encrusted with coralline algae, well intact	10 May 2003	307–472	H = 26.7, W = 16
Vermicularia bathyalis	South and west of Victory Cay, 25°26.008′N, 79°18.617′W; Station 2	2 dead	23 May 2002	600	L = 7.5, 36
Xenophora (*Tugurium*) *caribaeum* (Petit, 1856)	Off Victory Cay, 25°29.370′N, 79°18.243′W	>30 specimens, dead and alive	2002–2005	>511	H = 5.7–39.9, D = 8.6–68.8

strikingly different. The presence of the diverse and unique deep-water molluscan community encountered off Bimini is attributed to a current and temperature asymmetry that has been observed between the western and eastern slopes of the Straits of Florida. This current asymmetry forces warm, surface-derived waters down to bathyal depths on the eastern slopes of the Straits of Florida, supporting a bathyal fauna with distinct tropical shallow water affinities.

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