DEEP SEA MOLLUSCS OF THE WESTERN MARGIN OF THE GREAT BAHAMA BANK: SYSTEMATICS AND ZOOGEOGRAPHY

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by

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. Anton Oleinik, Department of Geosciences, and has been approved by the members of his supervisory committee. It was submitted to the faculty of The Charles E. Schmidt College of Science and was accepted in partial fulfillment of the requirements for the degree of Master of Science.

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ABSTRACT

Author:	**William C. Aley IV**
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Seventy-four gastropod species from thirty-eight families are reported from the Straits of Florida in depths of 400-600 meters or more. Each taxon is fully described and illustrated with photographs, synonymies and distributions are given. Two undescribed taxa are recognized: *Hesperato sp.,* and *Scaphella sp.*; *Architectonica sunderlandi* Petuch, 1987, *Bursa finlayi* McGinty, 1962, and *Acteon danaida* Dall, 1881 are reported from the Great Bahama Bank for the first time and *Pisanianura grimaldii* Dautzenberg, 1889 is reported in the western Atlantic Ocean for the first time. The bathymetry and benthic environments of the study locality on the north-western margin of the Great Bahama Bank are discussed. A zoogeographic analysis indicates that the gastropod fauna in the vicinity of Victory Cay, Bimini Chain, Bahamas has a strong tropical affinity with a moderate influence from the temperate waters to the north.

To Mom and Nana

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INTRODUCTION

Although molluscan communities of the Straits of Florida have been extensively, if sporadically, sampled beginning with the BLAKE expeditions (1877-78, 1878-79, 1880) and continuing to 1972 when the R/V GERDA was retired from service by the University of Miami, very little work has been done in the vicinity of the Bimini chain of Islands in the Bahamas. In previous years, only three brief studies have been focused on the deep water gastropods of the western Bahamas, one by Bayer (1971), and two by Petuch (1987; 2002). The three previous studies included descriptions of a number of new deep water taxa from this region. The results of the previous studies have clearly indicated the richness and endemism of the western Bahamas malacofauna.

During years 2001-2005 Florida Atlantic University (FAU) faculty and students attained funding to sample marine natural products and the deep sea molluscan communities of the Florida Straits aboard Florida Institute of Oceanography (FIO) research vessels *R/V SUNCOASTER* and *R/V BELLOWS*. Although data was gathered at various stations in the deep waters of The Gulf of Mexico, The Florida Keys, Cay Sal Bank and in The Bahamas, the majority of time was spent off the Bimini chain of islands, particularly in the vicinity of Victory Cay, sampling the deep sea fauna in 300-600 meters of water. This work is a continuance of the comprehensive survey of deep water gastropods of the Great Bahama Bank initiated by Dr. Edward Petuch (Petuch, 2002) after the first FAU collecting trip to the study locality in 2001.

In the Bimini vicinity, 15 dredges were collected in 2002 from 23-28 May, 10 dredges were collected from 9-10 May 2003, and 5 dredges were collected from 12-17 June 2005. Depths of the dredges ranged from 120-600 m with an average depth of 400 m. The northern most dredging was of the shelf west of South Cat Cay (25°42.085" N) and the southern most dredge was retrieved from the shelf south and west of Victory Cay at (25°28.355" N). A total of with 74 taxa from 34 families are recognized from over 400 individual mollusk specimens collected in the dredges.

This area of the Straits of Florida between Miami, Florida and Bimini, Bahamas is the narrowest portion of the Straits (only around 25 nautical miles wide), where powerful ocean currents are being funneled between Miami and Bimini providing an immense amount of warm productive water flow to the area. Nutrients and plankton carried by these waters offer an important supply of food to the unique assemblages of benthic invertebrates in this area allowing a diverse deep water molluscan fauna to flourish here. The Bimini shelf ecosystems are bathed in warm (16.5°C at 400 m), surface derived waters 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 (Figure5).

In the following pages the general bathymetry of the Straits of Florida, particularly the northern Straits, is discussed and compared to what is known about the general bathymetry of the study locality. The benthic environments present at, and in the broad vicinity of, the study locality will also be discussed. This study is mainly focused on identifying the deep water molluscan fauna which

has been dredged from this north-western margin of the Great Bahama Bank and deals with the systematics and zoogeography of the collection amassed by FAU during 2001-2005. The Bivalvia are excluded from this study because very few were recovered in the dredges and the few bivalves that were recovered were disarticulated single valves that appear to have been transported either from shallower water or from other environments. A moderate component (24%) of the gastropod fauna is determined to have been transported down slope from the littoral zone (0-180 m depths), and the remaining 76% of the identified gastropod fauna are considered typical fauna of the upper bathyal zone (180-1000 m depth) of this area of the Straits of Florida.

PREVIOUS STUDIES IN THE STRAITS OF FLORIDA

The Straits of Florida have attracted the attention of oceanographers since the eighteenth century study by Benjamin Franklin (Franklin, 1786). Although studies of the Straits of Florida started almost immediately after its official discovery, over 250 years ago, large portions of it remain incompletely studied and often poorly known, particularly the deep sea portions. Of the relatively few deep-sea investigations in the Straits of Florida, the western margin, or the Florida side has been more extensively researched than the eastern (Bahamas) side. A great deal of the research done has been focused on the Miami and Pourtales terraces (Hurley, Siegler and Fink, 1962; Kofoed and Malloy, 1965; Rona and Clay, 1966; Uchupi, 1966, 1969; Malloy and Hurley, 1970; Ballard and Uchupi, 1971) although more recently, detailed research has been conducted on the deep-water coral reefs which are located throughout the Straits (Reed, 2004; Brooke & Young, 2003; Reed, 2002 a&b; Land and Paul, 2000; Messing et al., 1990; Reed & Mikkelson, 1987; Reed, 1980). The eastern slopes of the Straits of Florida facing the Bahamas still have never been systematically investigated by detailed depth soundings or biological surveys although their strikingly steep and sometimes even concave banks 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 and Rigby, 1957; Siegler, 1959; Hurley et al., 1962). Where depth soundings have been taken close to shore on the western end of Cay Sal Bank and West of Little Bahama Bank the bathymetry has been noted as extremely complicated and in some areas appears to be generally uncontourable

(Malloy and Hurley, 1970). Contemporary studies are now showing that the complicated bathymetry is often attributed to the presence of extensive deep-water coral reefs (further discussed later). Most areas of the Bahamian slopes, in particular, lack detailed bathymetric information.

Traditionally, the majority of deep-water surveys in the western Atlantic and southeastern U.S. were concentrated on various aspects of regional and marine geology (Jordan and Stewart, 1961; Hurley, Siegler and Fink, 1962; Jordan, Malloy, & Kofoed, 1964; Kofoed and Malloy, 1965; Rona and Clay, 1966; Uchupi, 1966, 1969; Malloy and Hurley, 1970; Ballard and Uchupi, 1971; Emory & Uchupi, 1972; Gomberg, 1976; Freedman-Lynde et al., 1981; Holmes, 1981; Paull et al., 1990) with little attention being paid to details of the ecology and biology of the macrobenthic communities that live associated with the deep-water reefs and other unique environments of the Florida Straits' slopes. Even more specifically, far fewer studies have attempted to document the deep-water molluscan faunas of the western Atlantic.

In the last 150 years there have been only a small number of large works have included marine molluscs of the Straits of Florida (Portaulés, 1868; Dall, 1886; Dall, 1889 a&b; Dall, 1927; Verrill et al., 1898; Warmke and Abbott, 1961; Bayer, 1971; Abbott, 1974). As early as the 1860's, Louis Francois Pourtalés and Louis Agassiz reported on the deep-sea dredging work done by the United States Coast Survey's Steamer BIBB. Among some of the topics they discussed were: the geology of the reef zone, sedimentary zone, and coral slope; the deep-sea floor of foraminiferine mud; geological inferences about the Florida Straits; inclination

of the reefs; pot holes; formation of oolithic, amorphous, and compacted limestones; embryology of corals and formation of colonies by disk embranchment; and also, importantly, the fauna of the submarine zones of the Gulf Stream.

Throughout the end of the 19th century and well into the beginning of the 20th century, William H. Dall continued the work of Pourtalés and Agassiz, reporting on the collections amassed during the BLAKE expeditions (1877-78, 1878-79, 1880) throughout the Gulf of Mexico and the Caribbean Sea, including the Straits of Florida. Dall proceeded to describe a great majority of the marine molluscs from around the United States, particularly many from the southeastern U.S. and the deep waters of the Florida Strait. Dalls work on the deep sea molluscan faunas of the southeastern U.S. will always be considered a fundamental contribution to malacology. In his lifetime William H. Dall described over 5,300 species, many of them mollusks, fossil and living. At least 350 of the living mollusk species described by Dall can be found in the waters of the Straits of Florida from the northern coast of Cuba, across the Straits of Florida north to the Florida Keys, off the Florida coastline and along the western margin of the Bahama Banks. Fourty percent (29 of 74) of the taxa dredged from the eastern margin of the Straits of Florida in this study were named by Mr. Dall.

Dr. R. Tucker Abbott, the chair malacology at the Delaware Museum of Natural History, attempted the task of compiling hundreds of years of malacological works to publish the first and second editions of *American Seashells* in 1955 and 1974, respectively. In general, these books, especially the

second edition (1974), are most helpful as faunal lists. The second edition of *American Seashells* lists over 9,500 molluscs from the western Atlantic Ocean, and illustrates many of them also. This book is the first attempt by a malacologist to compile an exhaustive reference to American and Caribbean seashells and serves as an excellent reference, or at least a starting point, in the identification process. Although the book is limited to short and vague descriptions, very little synonymy is given, only a very few references are cited, and much of the taxonomy is wrong or has since been modified, it still has been of great help to me.

Between 1962 and 1972 the University of Miami (UM) carried out a faunal survey of the tropical western Atlantic, during this time an enormous amount of information concerning the distribution and systematic diversity the regions invertebrates was amassed. In 1971 Frederick M. Bayer published a monograph, *New and Unusual Mollusks Collected by the R/V John Elliott Pillsbury and R/V Gerda in the Tropical Western Atlantic.* The purpose of the monograph was to report on new distributional records and poor and rarely known species from the western Atlantic Ocean which were collected during the UM surveys. Fifty-nine species of new or rare marine molluscs, 55 gastropods from a variety of families and four pelycypods, from the Caribbean area are reported and illustrated.

Another helpful study was Neumann and Ball (1970). Neumann and Ball traversed the submarine Straits of Florida off the western coast of Bimini, Bahamas on 6 September, 1967 in the submersible *Aluminaut.* This paper gave a

first hand report of the slope environments off Bimini, Bahamas. In the published results of their deep sea dives they observed three discrete, depth restricted bottom environments in this area, all having different current and substrate types. A strong distinction was made between the shallow, intermediate and deep slope base environments (Figure 4).

Petuch (2002) reported results from the first year of deep water dredgings carried out by Florida Atlantic University (FAU) along the Bimini Shelf in the vicinity of Victory Cay, Bahamas. The dredgings uncovered a benthic community that contained 28 species of gastropods, eight of which were new to science. Petuch (2002) originally noted the diversity and uniqueness of the deep water fauna off Victory Cay, the study area for this thesis. The study was the first of 5 consecutive years, to date, that scientists from FAU have conducted faunal surveys of the deep water molluscan communities of the Straits of Florida and the results of this thesis may be regarded as a continuance of the original survey conducted in 2001 and reported on by Petuch (2002).

Hundreds of papers have been published in major, peer reviewed, journals like *Nautilus, Johnsonia, Malacologia, Veliger* and others, while many publications on Western Atlantic Malacology have to be searched for in less common journals. Over the years, thousands of molluscan taxa have been proposed, either one-by-one or a couple at a time, and hundreds of refinements of the existing taxonomy have been made. Searching the literature and trying to make sense of it all is something that can take a lifetime to do.

BATHYMETRY OF THE STRAITS OF FLORIDA

The Florida peninsula and the Bahamas islands are located on the eastern margin of an extensive subsiding sub-marine carbonate platform known as the Florida Plateau (Agassiz, 1888). Located on the Florida Plateau also are the Northern Straits of Florida and the Santeren Channel (Malloy and Hurley, 1970). The Florida Strait is an articulate trough 700 km long and 90-145 km wide which is located to the east and south on the Florida Plateau (Figure 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 .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. Typically, Abyssal plains reach depths of between 2,200 and 5,500 m. The northern trough of the Straits of Florida has been referred to as 'abyssal' because it exhibits all of the characteristics typical of abyssal plains except for the depth; it is very flat, covered in a thin layer of sediment, and in some areas punctuated by rugged low abyssal hills (deep water reefs in the case of the Straits of Florida). 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. The Straits of Florida are the longest of the several sub-marine 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 fact that it is occupied by the Florida Current. The Florida Current transports immense amounts of water (36 X 10^6 m^3 s^{-1}) (Richardson and Schmitz, 1965) through the Straits at velocities as high as 4.0 knots or more (Hurley et. al., 1962) contributing to the Antilles Current from the east to form the Gulf Stream (Figure 2).

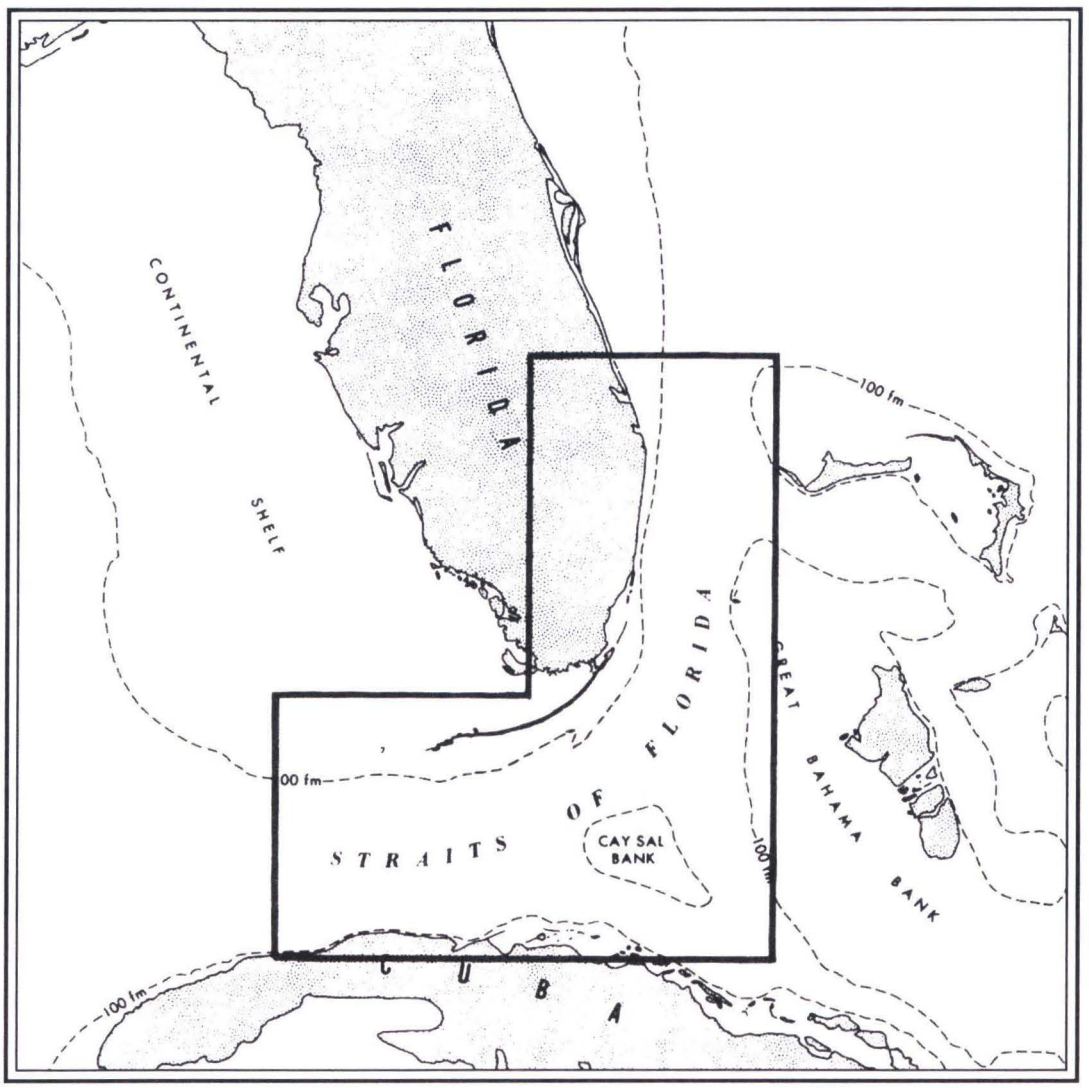

Figure 1. Schematic Diagram illustrating The Straits of Florida.

Adapted from Malloy and Hurley (1970).

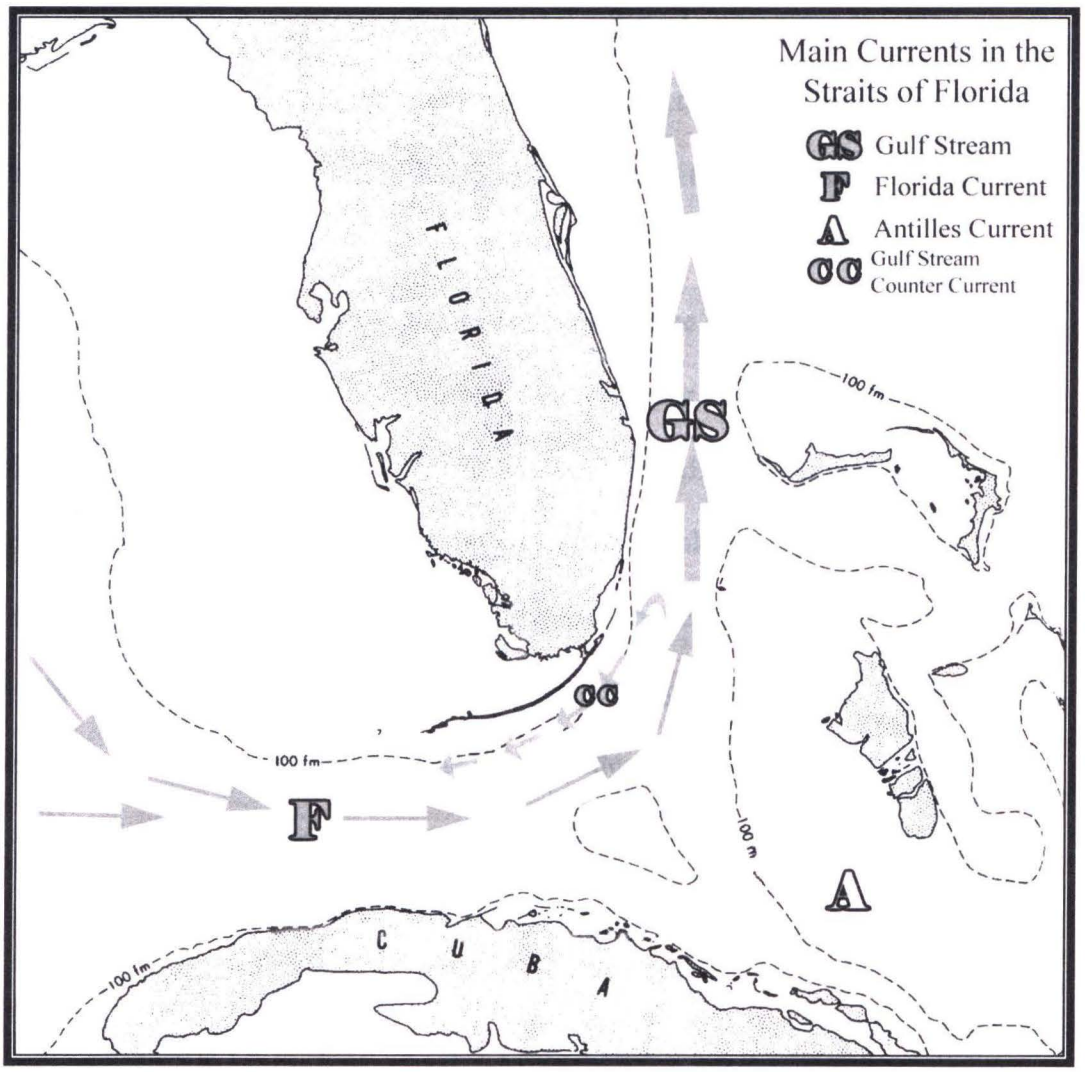

Figure 2. Main currents in the Straits of Florida.

Adapted from Malloy and Hurley (1970).

The Eastern and Western margins of the Straits of Florida- The eastern and the western slopes of the Straights of Florida are very different in structure and topographic expression (Figure 3). Figure 4, reproduced from Neumann and Ball (1970), is a schematic profile of submersible dive traverses off Miami and Bimini, respectively, summarizing major observations of the bottom features of the eastern and western margins of the Florida Straits at these two localities. The western margin of the Straits of Florida differs more in appearance from place to place than the eastern side, generally having a gentler slope than the eastern margin. 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 which 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, concave and typically have rough surfaces near their base (Hurley et. al., 1962). The difference in the appearance of the slope of the Florida side of the Straits may partially reflect the longshore contribution of sediment from the north (Vaughan, 1910, p.161), not available in the Bahama banks region.

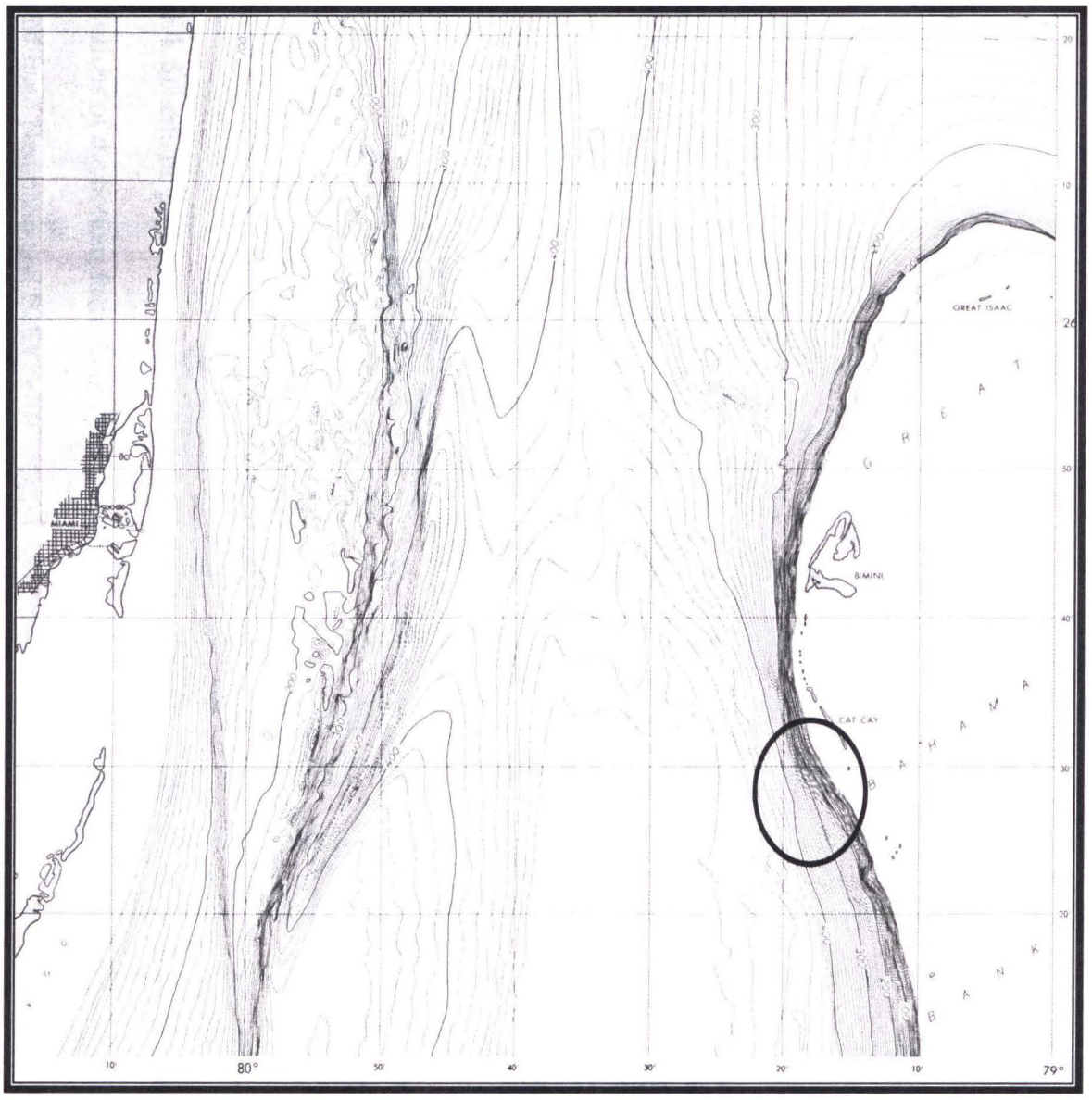

Figure 3. Bathymetric map for comparison of structure and topographic expression of the northern Straits of Florida. The general study locality is represented by the black circle to the south of Bimini, Bahamas.

Cropped from Malloy and Hurley (1970, fig. 2)

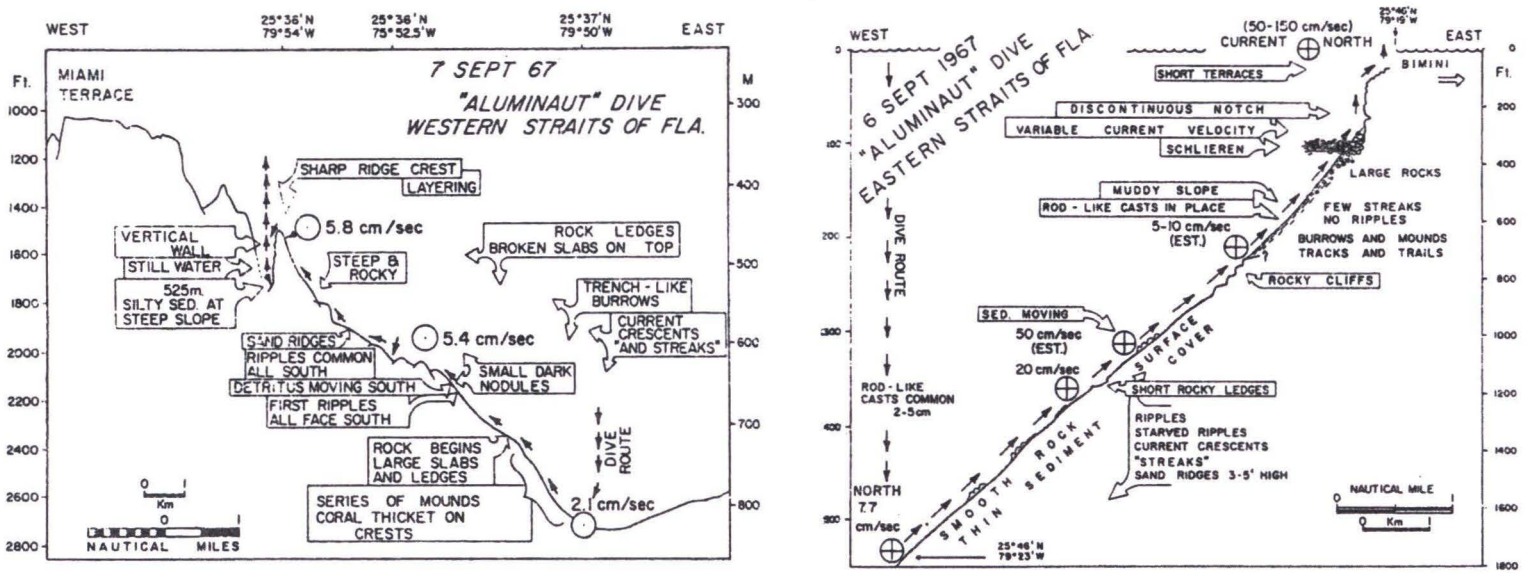

Figure 4. Schematic profile of submersible dive traverses off Miami and Bimini, respectively, summarizing major observations of the bottom features of the eastern and western margins of the Florida Straits.

Adapted from Neumann and Ball (1970).

Benthic Communities- It is known that the deep-water benthic communities of the Bahamian (eastern) and Floridian (western) sides of the Florida Strait can be strikingly different although they are geographically so close (Reed et al., 2005). Major factors affecting the benthic communities of the eastern and western sides of the Straits of Florida are differences in current regimes and temperature profiles from east to west.

Bottom currents on the eastern side of the Straits of Florida are northerly (Neumann and Ball, 1979; Messing, 1990), while off Miami, on the Miami Terrace, dives with the BEN FRANKLIN submersible reported northerly surface currents, as expected, but southerly currents (see Figure 2) of 8-10 cm s^{-1} at the bottom (Neumann and Ball, 1979). It was concluded that this may be the effect of a submarine counterclockwise gyre in the western Straits of Florida. 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 Pourtalés Terrace. It was suggested that these may only be occasional current reversals (possibly seasonal) because the geomorphological features on the bottom of these valleys indicate that the predominant flow is in the easterly direction (in the direction of the Florida Current). It is postulated that these gyres on the western side of the Straits of Florida prevent planktonic larvae from reaching the Miami and Pourtalés Terraces. Differences in ocean currents and current regimes most definitely have a great affect on the sources of larvae and larval distribution of pelagic and benthic organisms on either side of the Straits of Florida (Reed et al., 2005).

Temperature may also be a 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, 2005). 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 Pourtalés Terrace (Smith, 1982; Lee and Williams, 1999; Leichter et al., 2003). The absence of periodic cold water upwelling events and higher average water temperatures in the Bahamas allows Bahamian ecosystems, shallow and deep, to rely on more stable water temperatures year-round.

It is known that water temperatures in the deep waters (below 200 m) are constantly warmer on the eastern (Bahamian) side of the Straits than on the western (Floridian) side. Figure 5 is a west to east sketch illustrating a vertical water temperature profile across the Straits of Florida from Fowey Rocks (near Miami, Florida) to Gun Cay (Bimini Chain, Bahamas). From figure 5 you can see that 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) f the Straits. This is due in part to the fact that the Antilles Current contributes much warmer water to the eastern side of the Gulf Stream than the Florida Current does to the western side (Sverdrup et al, 1946). The Antilles Current (fed by the north equitorial counter current) 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 (Figure 2). Stable water

temperatures may be 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 shallow water families which may be more stenothermal than typical deep-water molluscan communities, making them dependant on the consistently warmer waters provided to the area by the local oceanographic setting.

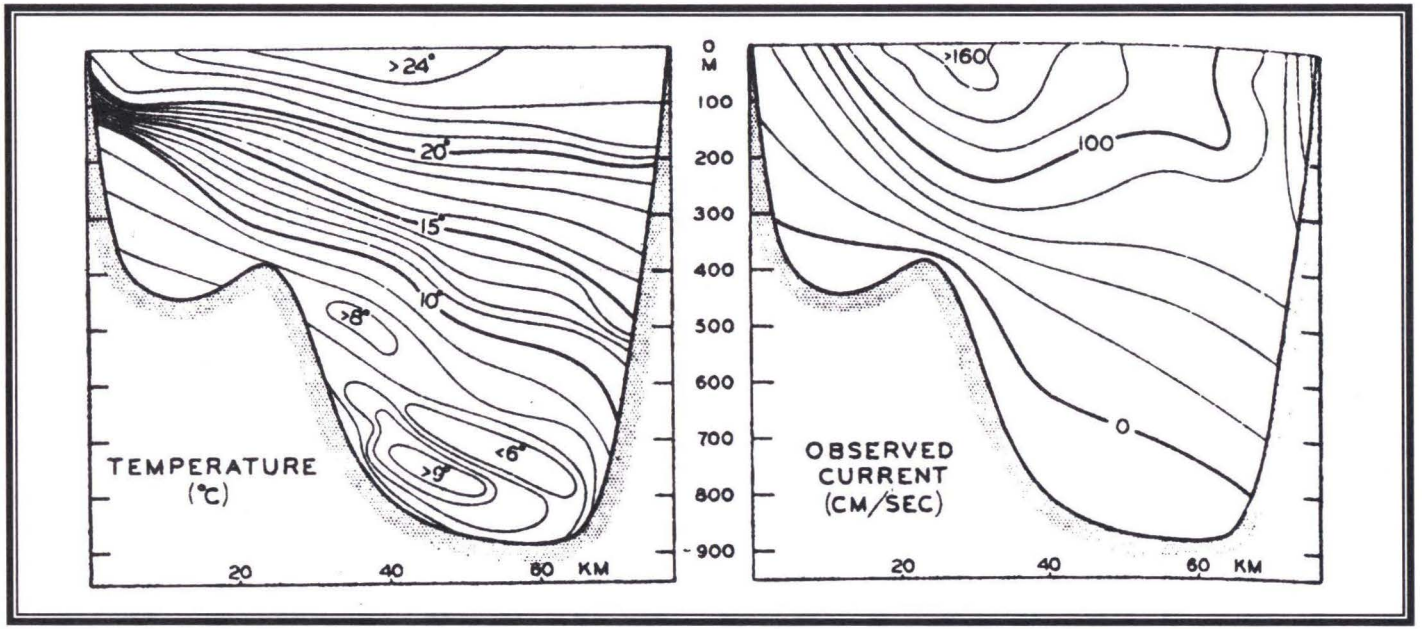

Figure 5. Illustrating vertical temperature and current profiles from west to east across the Straits of Florida from Fowey Rocks (Miami, Florida) to Gun Cay (Bimini Chain, Bahamas). Reproduced from Sverdrup et al, 1946.

AHERMATYPIC DEEP WATER CORAL MOUNDS IN THE STRAITS OF FLORIDA

The deep waters (below 200 m) of the shelf off Victory Cay appear to contain a number of patchily distributed coral thickets which resemble the lithoherms described by Neumann et al (1977). These types of deep water reefs have been referred to as coral banks, bioherms, or lithoherms (See Reed et al., 2005 for references). It is now well known that ahermatypic coral buildups commonly occur in the deep-water (below the photic zone) environment (Reed, 2005; Mullins et. al., 1981). Some deep water reefs consist of caps of living coral on mounds of unconsolidated mud and coral debris, similar to the *Oculina* and *Lophelia* coral bioherms described by Reed (2002), while true deep-water lithoherms are defined as high relief, lithified carbonate limestone mounds rather than unconsolidated mud mounds like those described by Neumann et al (1977). They have been identified in the Atlantic and Pacific Oceans as well as in the Gulf of Mexico and the Mediterranean Sea (Le Danois, 1948; Teichert, 1958; Squires, 1959, 1961, 1965; Moore and Bullis, 1960; Allen and Wells, 1962; Stetson et. al., 1962; MacIntyre and Milliman, 1970; Maksimova, 1972; Neumann et. al., 1977; Sartori, 1980; Scoffin et. al., 1980). These ahermatypic, deep-water coral build ups are found at both low and high latitudes and are presently found at water depths down to at least 6,000 meters (Wells, 1956). Large coral aggregations have been reported in areas around the Florida Straits from a range of depths. Neumann et al. (1977) mapped a broad band of deep water coral mounds in the northeastern Straits of Florida between 600-700 m depth. Mullins

et al. (1981) discovered a diverse benthic community of patchily distributed, unlithified ahermatypic coral mounds in water depths of 1,000-1,300 meters in the northern Straits of Florida. Colonies of ahermatypic corals are most likely sparsely distributed all throughout the flat shelf of the eastern Florida Straits. Paul et al. (2000) described the geology of an extensive system of deep-water lithoherms off northern Florida with relief of 40-150 m at depths of 440 to >900m. They estimated that over 40,000 individual lithoherms may cover as much as 400 km^2 on the Blake Plateau and in the Straits of Florida, possibly even exceeding the aerial extent of all the shallow-water reefs of the southeastern United States. In the Northern Straits of Florida and west of Little Bahama Bank, Neumann et al. (1977) described a region of lithified carbonate mud and sand mounds at depths of 500-700 m which can be 300 m long and up to 50 m high. These lithoherms and coral mounds provide habitat to a diverse community of corals, crinoids, sponges (Messing et al., 1990), and molluscs, as this study shows.

Deep water coral mounds or lithoherms in the Straits of Florida are found to be associated with current winnowed sands and submarine lithified hardgrounds (Wilber, 1976; Neumann et. al., 1977) much like the environment observed at the base of the slope in the study area off Victory Cay. The deep waters of the shelf off Victory Cay appear to contain a number of patchily distributed coral thickets that most likely resemble Figure 6 but may or may not be to the scale of the true lithoherms described from the north and from deeper waters to the south and west off Bimini, Bahamas. The coral thickets in the

Bimini area are supported by the warm, nutrient-rich waters of the Gulf Stream that are funneled through this area, which happens to be the narrowest portion of the Florida Strait (between Miami and Bimini).

Figure 6. Photograph taken at the bottom of the Northern Straits of Florida by Malloy and Hurley (1970) showing a dense colony of Stylaster and Lophelia corals. This type of coral thicket is common in the Bimini study area and all throughout the depths of the Straits.

The area all along the base of the Bimini slope is historically thought to be a smooth, hard bedrock surface covered by a thin, moving veneer of rippled sand (Neumann and Ball, 1970). According to this knowledge, the dredge paths should have been primarily obstruction free. A number of dredges (#'s 7 and 8 in 2002 and #'s 18, 21, 26 in 2003) were snagged on some feature of the bottom at depths of 250-600 m and in some cases the Capetown dredge frames were even lost. In most cases when we retrieved dredges that had been stuck they returned full of large (30 cm) broken chunks of limestone and solitary and branching, ahermatypic coral fragments (*Stylaster, Lophelia, Enallopsammia sp.*). It is speculated that the structures that we were snagged on were some form of these deep water, ahermatypic coral buildups although there is also the possibility that the dredges may have been lodged in dissolution holes or possibly even remains of shipwrecks…etc. The obstructions commonly snagged by the dredges were not to the scale of the "Lithoherms" of the Northern Bahamas described by Mullins et al. (1981), and Neumann et al. (1977) (up to 50 m of relief), but we most certainly encountered some sort of large bio-accumulations that had built up in the otherwise barren, flat hardgrounds of the Florida Straits, possibly small mounds in early stages of formation.

Formation of deep water bioherms- Neumann et al (1977) proposed a hypothesis for the initiation and formation of deep water coral mounds and also pointed out that these mounds may be encountered in various sizes, reflecting their age and stages of formation. Figure 7 is a photograph of a small coral aggregation, probably in the early stages of mound formation and Figure 8 shows a well developed mound. These areas of coral aggregation and mound formation provide a rich habitat for many deep water organisms and as shown by Petuch (2002) are home to striking numbers of unique molluscan taxa, many of which may be new to science.

In their outline of some main factors and possible modes of formation of the deep sea bio-accumulations in the Florida Straits Neumann et al. (1977) hypothesised that the first stage of the process most likely begins by attachment of a single organism (or a small group of organisms) to an exposed rock surface (such as the case of the fan shaped sponges in Figure 7, or the *Stylaster* corals to the cone shells illustrated by Petuch (2002)) or by clustering of organisms in a "sand shadow" in lee of such attached organisms. From this point, growth of the mound most likely results as the benthic community that selectively attaches itself to the lithified substrate (1) sheds its skeletal debris by death or growth, (2) adds fecal matter filtered from the water column, and (3) most collectively, accumulates detritus by the baffling effect of the dense cover of benthic growth. It is also added that holes and pits produced by bioerosion and burrowing in and under rock surfaces also become filled with sediment that will later lithify and support the maintenance of the mound. In this type of mound formation, the

attachment of each single organism creates a positive feedback system in which each organism that chooses to attach to this substrate concentrates sedimentation here and when lithified creates more surface area for later attachment of other life. The result may be a mature, well developed coral mound that looks something like the one in figure 8 above.

The modes of formation of these large, ahermatypic coral mounds are most likely a function of local conditions such as organism attachment, microtopography, rate of deposition and bottom sediment transport (Neumann et. al. 1977). With this in mind, it may be reasonable to consider the coral thickets encountered off Bimini as similar, although much smaller, forms (possibly younger in age) of those described from the Northern Bahamas.

The gross morphology of the coral mounds, or lithoherms, on the western and eastern sides of the Florida Straits is strikingly similar (Reed et al., 2005). One major difference is that the size of the eastern mounds can reach 50 m high and 300 m long, twice as large as the average mound on the western side of the Strait. Neumann et al. (1977) concluded that the lithoherms on the eastern side of the Straits of Florida are more lithified than the lithoherms on the western side due to hydrographical processes and also suggested that the ascending water on the eastern side of the Gulf Stream (Florida Current) results in reduced pressure and increased temperature (see Figure 5) which promotes increase of supersaturation of the CO^2 system and therefore accelerated precipitation of carbonate cements.

Figure 7. Early stage of mound formation in which a few organisms attach to an exposed lithified hardground, 668 m depth in the Northern Bahamas.

Photo from Neumann et al. (1977)

Figure 8. A well developed mound at 640 m in the Northern Bahamas, densely covered by sponges and branching ahermatypic coral.

Photo from Neumann etal. (1977).

Geologic significance of deep water coral mounds in the Straits of Florida- When considering the simple contemporary model of carbonate platform development it is now known that sub-sea lithified sequences, such as those formed by lithoherms, may be a significant component of the lateral accretion of these platforms. The presence of hardgrounds and lithoherms at the margins and at the base of modern carbonate banks indicates that flanking deposits near shelf margins are volumetrically important, and through lithification, play a major role in bank-margin development.

It is now known that various types of ahermatypic coral banks commonly develop below the photic zone in oceans world wide (Le Danois, 1948; Teichert, 1958; Squires, 1959, 1961, 1965; Moore and Bullis, 1960; Allen and Wells, 1962; Stetson et. al., 1962; MacIntyre and Milliman, 1970; Maksimova, 1972; Neumann et. al., 1977; Sartori, 1980; Scoffin et. al., 1980; Mullins et. al., 1981; Reed, 2002, 2005), yet ancient bioherms are generally associated with patch reefs, lagoonal build ups, and other carbonate platform or shallow marginal environments, making the general term "reef" or "bioherm" one with shallow water affinity. In the geologic record, flanking deposits of carbonate platforms and associated lithoherms could readily be mistaken for shallower bank-margin or bank-top facies (Neumann et. al., 1977). When using biohermal build ups as indicators of depth, modern geologists should be more suspicious of using biohermal build ups as a general sign of a shallow water environment in ancient limestones. Using this hypothesis, numerous limestone deposits world wide have been re-examined and deep water origins for many of them have been proposed. Evans et al (1974)

reported 800 m thick stacked sequences of lithoherms in Mesozoic marginal facies in Morocco, and lithohermal origins have been proposed for lower carboniferous Waulsortian mound-bearing facies seen in Europe and North America (Wilson, 1975).

BATHYMETRY OF THE EASTERN SLOPE OF THE STRAITS OF FLORIDA OFF BIMINI, BAHAMAS

Within one kilometer of the western shores of Bimini, beyond the shallow reef area, the seafloor between 30-76 m consists of a continuous, vertical to overhanging wall that is 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 and Ball (1970) reported current velocities from 50-150 cm/sec to the north.

The intermediate zone of the shelf off Bimini, Bahamas, as defined by Neumann and Ball (1970), exists from 76-222 meters and is characterized by relatively low current velocities (5-10 cm/sec) when compared to its upper and lower counterparts. This zone consists of hard bedrock buried by a deposit of muddy sand at 222 m and grading into mud filled breccia of large talus blocks that have accumulated at 76m (the base of the vertical cliff) rather than in the depths below. As a result of higher current velocities below, muddy talus sediments have been deposited in this intermediate zone rather than at the base of the slope as would normally be suggested. It was also noted that here the sediment contained a high percentage of shallow water components which had tumbled down the slope and a comparably smaller percentage of pelagic components. As a

result of the relatively low current velocity, current formed structures were rarely observed at these intermediate depths, 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 to form the Bimini shelf. The slope base is a smooth, hard bedrock surface covered by a moving veneer of rippled sand (Figure 9). 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. Malloy and Hurley (1970) speculated that these large ridges with their axes perpendicular to the slope contours of the bottom cause a gross topographic effect that show the bottom as rugged and uncontourable and they warn that the bathymetric contours of this area appear "artificially smooth" due to this highly contorted topography. Figure 10 is a seismic profile produced by Malloy and Hurley (1970) south of Bimini, Bahamas and shows the presence of these asymmetrical sand ridges which are spaced about ½ nm apart.

In general, this lower zone exhibits more of the surficial features typical of a shallow, current swept bottom rather than those of the deep sea. It is this abnormally strong bottom current that restricts the accumulation of the majority of talus sediments to the shallower depths above. Here on the deep shelf, the sands are composed of pteropod fragments, foraminifera, pelecypods, gastropods, calcareous algae fragments 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.

Figure 9. The thin veneer of rippled sand over smooth bedrock surface at 538 m in Straits of Florida. Photo by Neumann and Ball, 1970.

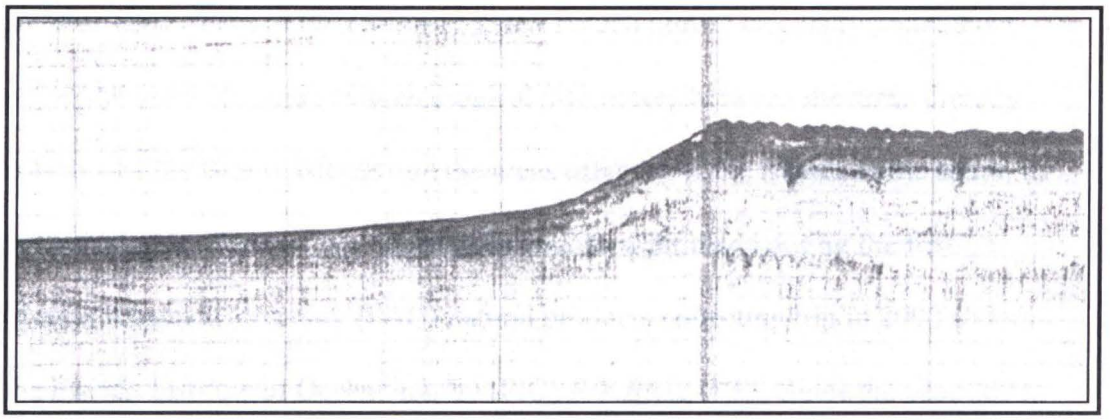

Figure 10- 3000 joule archer profile; vertical lines mark 30-min. fixes (about 4 nautical miles). Records were made using a 2-sec sweep marked off in 0.1-sec increments (40 fathoms in sea water). The profile is west (left) to east (right), just south of Bimini, Bahamas.

Petuch (2002) reported that along the northern part of the Bimini chain of islands the rubble talus slope is wider and the Bimini wall has a less steep, gradually sloping angle. Further south in the Bimini chain, in the vicinity of the study area, along the Cat Cays, Victory Cay, Ocean Cay, and Castle Rock, the Bimini Wall is much steeper and the talus slope plunges at a much sharper angle. Petuch (2002) also notes that sedimentologically, the northern and southern areas of the Bimini Shelf also differ with the area off Cat Cays and Victory Cay tending to have a substrate composed of fine carbonate mud while the areas off North and South Bimini tend to have a shell hash-carbonate gravel substrate. The two substrate types grade together off North Cat Cay.

Benthic Ecosystems in the Bimini Vicinity- Petuch (2002) originally pointed out some bathymetrical and sedimentological differences between the areas directly offshore of the Bimini islands and the areas offshore of the islands to the south, in the Vicinity of Victory Cay. These observations were made during the first Florida Atlantic University (FAU) natural products collecting trip in 2000 aboard the Florida Institute of Oceanography (FIO) *R/V BELLOWS*. Since the year 2000, only two dredges, in 2003, were carried out to the north of Victory Cay because the dredges to the south of the Bimini islands have seemed to be more productive.

North and South Bimini- In the areas immediately offshore of the Bimini Islands, the rubble talus slope seems to be wider and more extensive than to the south. Also the Bimini Wall is less steep, sloping at a much more gradual angle than to the south. The sediments here are mainly composed of a shell hash-carbonate gravel substrate with limestone rubble fragments in the 5-40 cm range. The dominant organisms in the dredges here were stalked crinoids, various echinoids, decapods, brachiopods, pteropod tests, ophiuroids, and molluscs including *Xenophora*, Murricidae, and *Conus lindae.* The skeletal components of the sediments off Bimini are a mixture of shallow water, deep water, and pelagic organisms.

Further South, Victory Cay vicinity- The talus slope off Victory Cay plunges at a much sharper angle than to the north and the Bimini Wall is much steeper. Sedimentologically, this area differs from the northern Bimini area with the

majority of the substrate here being composed of shallow water derived fine carbonate muds and less gravel sized substrate. The muds to the south of Bimini, off Victory Cay contain a high percentage of pelagic and benthic organisms including many pteropod tests, planktonic and benthic foraminifera, and mollusk shells.

Conus lindae-Stylaster laevigata community- Petuch (2002) proposed a new and unique Bahamian deep-water ecosystem, the *Conus lindae-Stylaster laevigata* community, existing in around 400 meters of water on the Bahama shelf, south of Bimini. Here, large numbers of dead cone shells (*Conus lindae* Petuch, 1987) partially buried in muddy sediments create what he refers to as a "*Conus* pavement" that serves as the main hard substrate for attachment of a number of cnidarians and poriferans. This unique ecosystem seems to thrive with life. Several species of irregular echinoids, ophiuroids, sponges and molluscs are prominently represented here. A number of new gastropod species were originally collected and described from the area by Petuch (2002) including, *Antillophos freemani, Antillophos bahamasensis, Chickcharnea fragilis, Serpulorbis squamolineatus, Vermicularia bathyalis, Persicula bahamasensis, Olivella biminiensis,* and *Polystira starretti*. The namesake of the community, *Conus lindae,* was originally described by Petuch (1987) but was first dredged alive in 2002 aboard the R/V Bellows during an FAU research cruise at a study locality off Victory Cay, Bahamas.

Petuch (2002) mentioned that while this unique deep water (300-400 m) community contains several classic deep water genera there are also several intertidal and shallow sub-tidal genera present. The presence of so many shallow water indicator species may show that this Bimini Shelf ecosystem is derived from shallow, coral reef-associated communities that existed during the Pleistocene Epoch. During the Kansan and Illinoian glacial stages sea levels may have dropped up to 250 m. At this time the Bimini Shelf area would have contained shallow water coral reef environments that would have been full of typical reef dwelling gastropod genera such as, *Serpulorbis, Vermicularia, Naticarius, Polinices, Trivia, Latirus, Persicula, Oliva,* and *Olivella*. Since the end of the Wisconsinan glacial stage (75,000-10,000 years B.P.), sea levels have been on the rise, reaching their present levels. During this time the formation and presence of the Gulf Stream with its numerous inputs and eddies has allowed water temperatures to stay warm enough at the 300-400 m depths to allow the reef-associated groups to persist, eventually evolving into entirely new species complexes.

MATERIALS AND METHODS

Three deep water surveys of the northwestern margin of the Great Bahama Bank, in the vicinity of Victory Cay (Bimini chain) were conducted during years 2002, 2003, and 2005 from the Florida Institute of Oceanography (FIO) research vessels "Bellows" and "Suncoaster". R/V Bellows is an 81 ft, steel hulled research vessel equipped with four separate working winches, the largest of which being a hydraulic trawling winch carrying 1800 m of 5/16" cable, capable of 6000 lb line pull tension which operates on a large U-frame located on the stern which is 14 ft wide and 16 ft high, capable of traveling 3 ft fore and 3 ft aft. The R/V Suncoaster is equipped with a hydraulic hydrographic winch with 1,800 meters of 3/16" cable operating on a stern-located, 16ft wide x 18 ft high, hydraulically actuated U-frame that can travel 6 ft. forward and 8 ft. aft with an operating capacity of 10,000 lbs. of tension. The winches and U-frames were used to tow a steel, fixed frame, Cape Town dredge (1ft. wide and 3ft. in depth) at depths of 200-600 meters along the Bimini shelf for collection of the benthic fauna. Dredges were pulled generally perpendicular to the strike of the slope of the Bimini wall, from the deep waters off the shelf area towards the shallower up slope areas. Occasionally dredges were pulled parallel to the dip of the slope. Once the dredged material was aboard the ship, sediment samples were taken and the molluscan components were immediately sorted and preserved in denatured ethanol alcohol until they could be further studied in the lab.

Once in the lab, the samples were taken out of alcohol, animals were removed from their shells and stored back in alcohol while all mollusk shells were dried under a fume hood. Each shell was given a label indicating dredge number and year of collection so that they could be later compared to dredge logs for locality and depth data. Once the shells were dried, they were briefly cleaned and further sorted into family groups to aid in identification. After cleaning, roughly sorting, and roughly identifying the shells (a very long process) they were labeled and ready to be imaged. Images were made of apertural, abapertural, and in some cases protoconch views of each shell. The images were made using an Optronics Magnafire Firewire digital camera. The camera was operated from a lighted platform for photography of larger specimens and through an Olympus SZX12 optical microscope which was externally lit by a Fostec, Ace I portable light source for images of smaller specimens.. Images were first captured on a PC using Olympus *MagnaFire* imaging software and further prepared using *Adobe Photoshop.* Photographic plates of all specimens were then created using *Adobe Photoshop* and *Adobe Illustrator.* After identification, the morphological characteristics of each shell were examined to determine any deviation from original descriptions. Following individual examination, the molluscan fauna was considered as a whole and ecological and biogeographical affinities were determined (see results section).

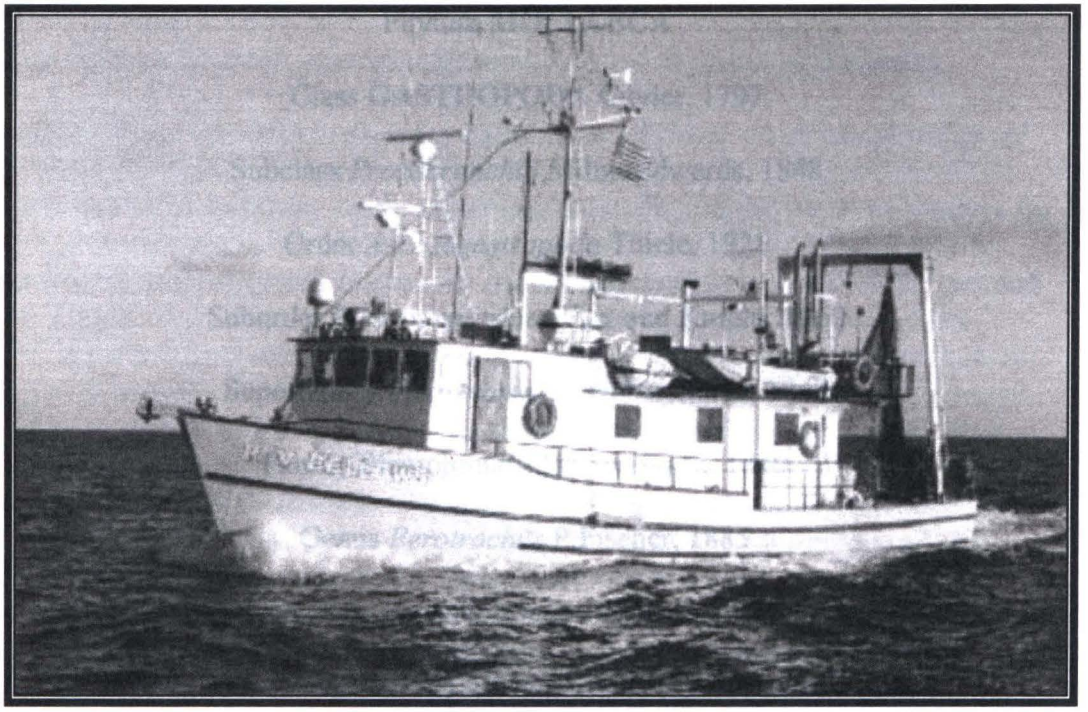

Figure 11 –Florida Institute of Oceanography Research Vessel R/V BELLOWS.

Figure 12 - Florida Institute of Oceanography Research Vessel R/V

SUNCOASTER.

SYSTEMATICS

Phylum **MOLLUSCA**

Class **GASTROPODA** Cuvier, 1797

Subclass *Prosobranchia* Milne-Edwards, 1848

Order *Archeogastropoda* Thiele, 1925

Suborder *Pleurotomariinae* Cox and Knight, 1960

Superfamily *Pleurotomariacea* Swainson, 1840

Family Pleurotomariidae Swainson, 1840

Genus *Perotrochus* P.Fischer, 1885

Subgenus *Entemnotrochus* P. Fischer, 1885

Perotrochus (Entemnotrochus) adansonianus (Crosse and Fischer, 1861)

Plate 1, figs 1, 2

Pleurotomaria adansoniana Crosse & Fischer,1861: 163-167, pl. 5, fig. 1-2; Dall, 1881; Crosse, 1882; Bouvier & Fischer, 1899; Schmalz, 1901; Woodward, 1963; Abbott & Dance, 1982; Glass & Foster, 1986

Pleurotomaria adansonianus Abbott, 1963

Pleurotomaria (Entemnotrochus) adansoniana Pisbry, 1890; Dall, 1889a: 400, pl. 37, fig. 4; Shikama & Horikoshi, 1963

Entemnotrochus adansoniana Turner, 1961; Dance, 1961; Yonge, 1973; Lain, 1985

Entemnotrochus adansonianus Cross & Morrison, 1971; Okutani, 1987, Goto & Anseeuw, 2000

Perotrochus (Entemnotrochus) adansonianus Abbott, 1974:16, pl.1, fig 3.

Description- Trochoid, spire geometrically conical in juveniles, becoming gradate. Ratio of height to diameter varies from 1:0.96 to 1:1.21. Angle of upper sides and basal periphery sharp, sometimes protruding slightly to form a carina (in juveniles); sutures clearly impressed. Apical angle varies from 67° to 83°; around 70° in the tall form and 80-85° otherwise. Aperture subquadrate, columella strait, dull porcellaneous and curled slightly outwards in mature specimens. Slit long; around 50% of total circumference, positioned above mid-whorl, upper lip hardly extending beyond lower aperture. Teleoconch sculpture with numerous spiral cords except on selenizone; base sculpted with numerous concentric spiral grooves. Umbilicus open to apex with fine axial growth striae. Color of protoconch and apical whorls is bright yellow; teleoconch white overlaid with bright red, brown or pinkish flammules and blotches which are fairly regularly spaced; base colored as teleoconch with radial flammules becoming denser toward periphery. Aperture nacreous. (Anseeuw and Goto, 1996)

Type Locality- The type locality of *P.(E.) adansonianus* it is unknown because it was never documented. It is most likely the Antilles.

Range- P.(E.) *adansonianus* is a widely distributed species that is commonly collected not only from moderately deep waters around the Bahamas and the Antilles, but also from a large area in South America extending from Guyana to

as far south as the Amazon delta in Brazil. Live specimens usually live on rocky tallus slopes or vertical walls between 68 and 320 meters depth.

Discussion- This single specimen of this species was collected dead and eroded. The aperture and slit have been badly chipped and about half of the spire is broken off. The diameter is 55 mm and a height of around 45-55 mm can be inferred. At only 55 mm, this specimen is juvenile, mature shells generally range from 75-150+ mm. The collected specimen has a coarsely beaded sculpture with many small spiral threads. The preserved color around the base is cream with irregular salmon colored patches. The narrow selenizone on the shoulder of the whorl, the subquadrate shape of the whorls, and wide open, deep umbilicus are diagnostic features of P. (E.) adansonianus.

The specimen most definitely tumbled down the Bimini Wall after death in shallower water up slope. *P. (E.) adansonianus* must be fairly common on the steep Bimini wall because we have recovered pieces or eroded shells of at least 4-5 in our dredges in the Bimini vicinity over the last couple of years.

Material Examined- BCFAU0001, one dead, broken specimen dredged from 380 meters of water, west of Victory Cay, Bahamas, 25°29.617'N, 79°18.041'W, on 23 May 2002, diameter 55.0 mm, height 28 mm.

Superfamily Fissurellacea Fleming, 1822

Family Fissurellidae Flemming, 1822

Subfamily *Emarginulinae* Gray, 1834

Genus *Emarginula* Lamarck, 1801

Emarginula tuberculosa Libassi, 1859

Plate 1, figs 9-11

Emarginula compressa Cantraine, 1835; Libassi, 1859; Jeffreys, 1883: 679, pl. 4; Dall, 1889a: 406 (listed only); Dall, 1889b: 170 (listed only); Pilsbry, 1891: 120; Dall, 1927: 113, art. 18; *non E. compressa* Cantraine, 1835.

Emarginula guernei Dautzenberger and Fischer, 1896: 490, pl. 22, figs. 8, 9.

Emarginula tuberculosa Farfante, 1947: 100, pl. 44, figs. 1-7; Abbott, 1974: 20, fig. 40.

Description- Shells large for genus, reaching up to 18 mm in length. The shell is highly sculptured, elevated, with the height being about $^{2}/_{3}$ the length; the anterior slope is strongly convex and the posterior slope can be strait to concave. Apical whorls one and a half. These whorls are generally reduced to a small pointed hook. The position of the apical whorls is variable from one high on the shell, close but a little below the summit and immediately in front of the posterior end, to a position near the base and projecting beyond the posterior end. Selenizone with numerous, rather closely set, arched lamellae which are frequently in greater numbers than the concentric cords that cross the shell. Fissure rather wide and

about $^{1}/_{6}$ the length of the anterior slope. Sculpture consists of numerous raised primary ribs radiating from the apex to the margin, secondary ribs which start some distance from the apex, alternate with them. Sometimes very fine ribblets which originate farther down from the secondary ribs intercalated between the primary and secondary ribs. Numerous concentric cords cross the surfaceof the shell forming thickened nodules where they intersect the ribs, these cords divide the spaces between the ribs into more or less square pits forming a cancellate pattern on the shells surface. Color opaque white or yellowish-brown. The margin is finely and strongly crenulated by the termination of the ribs. The shape of the aperture is ovate. Interior of shell highly polished, with the sculpture of the outside showing through as radiating concentric, transluscent lines. The selenizone is marked inside by a grooved, thickened callus.

Type Locality – Miocene (fossil) of Altavilla and Ficarazzi, Palermo, Sicily.

Range- This is a very wide ranging species, it can be found in the eastern Atlantic off Portugal and Azores and in the western Atlantic off Georgia, Florida, Bahamas, Cuba and throughout the West Indies to Brazil, also in the Pacific Ocean off western Columbia and in Galapagos; living in depths ranging from 33 to 450 fathoms (61-837 meters).

Discussion- Variations in the thickness of the shell and the strength of the sculpture are common but there is no geographical significance to these variations

because differences in sculpture and thickness are found throughout the geographic range of the species with no apparent correlation of shell morphology to any specific locality. Although the shell of this specimen is somewhat tumbled and worn and may have originated from shallower waters up slope, *E. tuberculosa* would most likely live comfortably in the warm, deep waters (here 600 meters) of the Great Bahama Bank.

At 19 mm length the Bimini specimen is rather large, the maximum size of most specimens is around 18 mm. One and a half apical whorls are present high on the shell close to but below the summit and immediately in front of the posterior end. At first glance the shell seems to consist of only ½ whorl but when viewed under high magnification another full microscopic whorl in tucked within the flaring body whorl and the apex. The Selenizone has numerous arched lamellae which are greater in number than the concentric chords crossing the shell. The terminal 6.5 mm of the selenizone constitute the 1 mm wide slit. Sculpture consists of numerous primary ribs radiating from the apex of the shell which begin to alternate with smaller secondary ribs about halfway between the apex and the margin of the shell. There are no fine riblets present between the secondary ribs. The color is opaque white. There are no marginal crenulations because the shell is somewhat tumbled and worn. The interior of the shell is polished white and in some areas stained reddish brown, most likely from being filled with mud after death. Traces of the selenizone are evident within the shell, by the presence of a raised, bifurcated groove which forms a smooth internal

callus which runs the length of the inside of the aperture, from the margin to the apex.

Material Examined- BCFAU0004, one dead specimen dredged from 600 meters of water, south and west of Victory Cay, Bahamas, 25°26.008'N, 79°18.617W, on 23 May 2002, length 19 mm, height 11.5 mm.

Subfamily *Diodorinae* Odhner, 1932

Genus *Diodora* Gray, 1821

Diodora tanneri (Verrill, 1883)

Plate 1, figs 3-5

Fissurella tanneri Verrill, 1882b: 333

Diodora tanneri Verrill, 1883: 255, pl.19, figs. 13,13a; Farfante, 1943:19, pl. 6, figs. 12-14; Abbott, 1974: 24, fig. 103

Original Description- Shell rather thin, large, reaching 50 mm, conical and moderately elevated. Slopes strait, the posterior sometimes convex; base broadly ovate and sits flat on a surface; apex anterior to the middle of the shells axis, pierced by a circular orifice. Sculpture consists of numerous, very fine, close-set radiating ribs, some beginning at the orifice and some beginning interstitially below, long ribs become increasingly stronger toward the base of the shell; spiral ribs crossed by numerous raised concentric threads forming nodules or small

scales where they intersect with radials. Color varies from uniform white to yellowish gray. The margin is very finely crenulated. Interior color is lustrous white. Internal callus is the same color as the interior, rounded, slightly thickened, and truncated behind. Muscle impression barely visible.

Type Locality- Delaware Bay, United States, at a depth of 190 meters.

Range- Delaware Bay to Florida, The Gulf of Mexico, Bahamas, south through Greater and Lesser Antilles, Barbados, 100-400 fathoms (186-744 meters).

Discussion- This is a fairly rare species, found only in depths of 185-730 meters. *D. tanneri* is quite different from other Western Atlantic *Diodora* species in having a uniquely fine sculpture and reaching a fairly large size of up to 50 mm. This species is not related to any other living forms. *D. tanneri* and stands apart from all other western Atlantic *Diodora* species in being much larger (commonly reaching 50 mm length while other *Diodora* species rarely reach 30 mm), only being found in deep waters, and in having a uniquely fine sculpture. *Diodora fluviana* (Dall, 1889) is also found living throughout the range of *D. tanneri* and in similar depths (below 200 m), but is easily told apart from *D. tanneri* by being much smaller, more heavily sculpted, and generally having variegated gray or olive-green coloration (plate 1, figs. 6-8). *Diodora sayi* Dall, 1889a is also found in deep waters off Florida, and the Antilles but is much smaller (maximum length of 30 mm) and is more heavily sculpted than *D. tanneri*.

The shell of the Victory Cay specimen is moderately thin, conical and elevated. Anterior slope is strait and posterior slope is slightly convex. The apex is located anterior of the middle of the shell and pierced by a 2.5 mm circular orifice which is nearly parallel with the anterior slope of the shell. Sculpture consists of numerous, very fine, close-set radiating ribs beginning at the orifice and extending to the margin. When examined under magnification numerous principal ribs (35-40) are intercalated with 3 somewhat finer riblets, the center one being stronger than the outer two. Ribs become faintly stronger towards the margin of the shell. The long radial ribs are crossed by numerous fine concentric threads which form small nodules at the intersection points giving the shell a somewhat scaly texture. The margin is finely crenulated and a little thickened. The color is oyster white with some olive brown staining. Internal color of shell is lustrous white. Internal callus is round and truncated posteriorly with the color matching the rest of the interior. The muscle scar is barely visible.

Material Examined- BCFAU0002, Two specimens; one freshly dead and one tumbled and eroded, dredged from 400 meters of water, west of Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002. Dimensions of figured specimen: length 40 mm, height 15 mm, width 27 mm.

Diodora fluviana (Dall, 1889)

Plate 1, figs 6-8

Fissurella (Glyphis) fluviana Dall, 1889a: 408, pl. 14, figs. 6, 6a.

Diodora fluviana Farfante, 1943: 18, pl. 6, figs. 5-8; Abbott, 1974: 24

Original Description- Shell low, conical, reticulated, white or translucent, variegated with gray or olive green lines or dots mostly radial disposed; form is variable but usually in juveniles and most adults both slopes of the cone are slightly concave near the apex; anterior slope slightly convex and posterior slope strait to a little concave and usually a little longer than the opposite, though these features may vary by locality. The base is rounded oval, symmetrical and equal at both ends, with a thin simple margin. Sculpture of slightly irregular, sudden enlargements of the shell (growth cessations), giving the effect of very narrow steps, over which some twenty moderately strong, and as many more, faint flattened radii flow. In some specimens the step-like edges are produced into low laminae, and the ribs are also stronger, producing nodulous or scaly intersections. Apex erect, truncate by the pore which is circular, simple, and margined within by a narrow, horseshoe shaped callus. Exterior dull or unpolished; interior shining, with the color rays and ribs visible through the thin shell.

Type Locality-off Bahia Honda, Cuba, in 525 meters.

Range- Southern Florida off Palm Beach, Western Florida, through the Greater and Lesser Antilles and possibly to Trinidad. Deep water, 150-1450 meters.

Discussion- The form of *D. fluviana* is variable by locality. Minor variations in the slope of the cone and the strength of the sculpture can be witnessed in specimens from different geographic localities. Variations may not necessarily correlate with geographic range. Like *D. tanneri*, *D. fluviana* is fairly rare in collections and only a small number of them have been collected since their habitat is fairly inaccessible. Although it can be somewhat variable in form, *D. fluviana* is a well defined species that is not particularly close in relationship to any other western Atlantic *Diodora.* In general *D. fluviana* differs from *D. tanneri* in being much smaller in size; more attenuate; having the step-like sculptural characterisc which *D. tanneri* does not posses; and in being colored tannish-white with radially disposed olive green dots.

At 19 mm length the specimen is very large for this species. Size usually ranges from 6-11 mm. Shell thin, conical and elevated. The slope is only slightly concave at the upper 3 mm of the apex where the anterior slope becomes strait and the posterior slope becomes strait to moderately convex. The summit is anterior to shells center, slightly curved forward and pierced by a 2.5 mm orifice that is elongate oval and centrally restricted at the apex. The base is elongate oval and widening posteriorly. Sculpture consists of 20-25 moderately strong principal ribs, which are intercalated by 2 or 3 flattened riblets. The shell is crossed by numerous concentric threads which form scaly nodules at intersections with the many radial ribs and riblets. Margin of the shell is faintly thickened and moderately crenulated. Shell color is tannish-white and variegated with olive green dots which are radially disposed. The shell is translucent and the exterior

coloration is visible from the inside of the shell. The stronger exterior sculpture forms shallow grooves on the inside of the shell and the riblets are visible as fine lines internally. The internal callus of the orifice is truncated-oval and the same color as the rest of the interior of the shell.

Material Examined- - BCFAU0003, one freshly dead specimen dredged from 400 meters of water west of Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, length 19 mm, height 9 mm, width 14 mm.

Diodora sayi (Dall, 1889)

Plate 1, figs 12-14

Fissurella alternata Say, var. *sayi* Dall, 1889a: 407 (listed only)

Diodora sayi Farfante, 1943: 8, pl. 3, figs. 1-8; Abbott, 1974: 24 fig. 92.

Original Description-Shell depressedly conical with apex completely directed forward, medium in size, genealy not exceeding 30 mm., narrower anteriorly, shell varies from thin to moderately heavy. Anterior slope short, strait or concave; posterior, long and convex. Base oblong-ovate. Orifice placed in the anteriorly directed apex; it is long, narrow and tends to be trilobated, its length being from $^1/_4$ to $^1/_6$ that of the shell. Surface dull; sculpture consists of fine, close set, nearly equall, radiating ribs which are crossed by numerous concentric threads. Color uniformly white, cream or faintly olive. In the latter case there are seven slightly

darker rays, placed three on each side and one at the front. The margin is finely crenulated, with the denticulations tending to be arranged in pairs. Interior color is the same as the exterior color; when rays are present, they show through. Internal callus of the orifice sharply truncated behind, of the same color as the inside and sometimes bounded by an olive-green, interupted streak.

Type Locality- Blake station 62, off Havana, Cuba.

Range- Shallow to deep water from southeastern Florida, Greater Antilles, along the Central American coast to Brazil. This species is generally collected alive from 20 m to about 175 m, but there are numerous records of dead shells taken from much deeper which most likely were transported down slope.

Discussion- Originally Dall considered this species a form of *Diodora alternata* Say, 1850 (=*cayenensis* Lamarck, 1822) but with closer examination it is clear that it is strikingly different from that species. *D. sayi* has a different shape altogether, and has the apex closer to the anterior end of the shell. *D. sayi* is sculpted with ribs which are all nearly equal in size while in *D. cayenesis* every fourth rib is noticeably larger. Also the oriface of *D. sayi* is much more elongate and is trilobated in shape while that of *D. cayenensis* is key-hole shaped.

The Victory Cay specimens are of medium size for the species, of depressed conical shape, with the apices pointing forward and the shells bases becoming narrower anteriorly. The structure of the shells is moderately thick. The

anterior slopes are short and strait and the posterior slopes are long and convex. The orifices are long and narrow, running 3.2 mm down the anterior slope of the shell, which measures 10.0 mm from the apex to the margin on the largest specimen (roughly $^{1}/_{5}$ the length of the shell), the orifice is .83 mm wide. The sculptures are typical, of even radiating ribs which are crossed by concentric threads. Small rounded nodes result at the intersections of the radial and spiral sculpture. The color is uniform white on the large specimen and olive green on the smaller one, although the shells are slightly eroded and the colors may be slightly faded. The margins are partially eroded but heavy marginal denticulations are still recognizable.

Material Examined- BCFAU0099, two dead and partially eroded specimens which were dredged from 113-400 meters of water, off Cat Cay, Bimini Chain, Bahamas, 25°31.197'N, 79°18.801'W, on 27 May 2002, lengths 18.8 and 16.7 mm, widths 11.7 and 10.1 mm, heights 7.2 and 7.0 mm, respectively.

Suborder Trochina Cox and Knight, 1960

Superfamily Trochacea Rafinesque, 1815

Family Architectonicidae Gray, 1850

Subfamily Architectonicinae Gray, 1850

Genus *Architectonica* Röding, 1798

Architectonica sunderlandi Petuch, 1987

Plate 2, figs 1, 2

Architectonica sunderlandi (as originally designated) Petuch, 1987: 21, pl. 10, figs. 1-4.

Original Description- Shell discoidal and moderately flattened. Spire convex with 5 whorls, each containing 5 beaded, low spiral cords, the peripheral two of which are smaller than the rest. Spiral cords contain microscopic spiral threadlets and are intersected by many radiating axial threads giving the shell its beaded texture. Protoconch depressed inside of first body whorl. Base of shell has three spiral grooves around the periphery and a nodulous rib which borders the inner wall of the umbilicus and terminates in a sulcus at the base of the columella; folds produces by the nodulous rib radiate out halfway across the base. Umbilicus very deep and bordered by a heavily nodulous rib. Columella short, thin, with a sulcus at its base; Basal margin thickened near the sulcus. Color pure cream to white with orange flammules on subsutural cord and outer peripheral chord. Base of shell and entire umbilicus pure white.

TypeLocality- Key West, Florida in250 m of water.

Range- Previously only two *A. sunderlandi* have been collected from off Key West, Florida by deep water shrimpers fishing in 250 meters of water. This report of *A. sunderlandi* collected off Victory Cay, Bahamas would extend its known range from the deep waters off Key West, Florida across the Straits of Florida, to the deep waters of the western Bahama Bank.

Discussion- The following is the original description of *Architectonica sunderlandi* from Petuch, 1987 for comparison to the description of this specimen which differs slightly from the original two specimens described from the Florida Keys: Shell discoidal, flattened, with keeled periphery; dorsum of shell sculpted with 6 low cords per whorl; subsutural cord and 2 chords along periphery larger than the central three cords; cords intersected by radiating axial grooves; base of shell smooth, without cords; periphery of umbilicus marked with radiating riblets; color orange with wide reddish-orange flamules on subsutural cord and two peripheral cords; base of shell white with pale orange area around periphery of umbilicus; early whorls purple; protoconch and postnuclear whorls magenta.

This specimen resembles *Architectonica sunderlandi* Petuch, 1987 more than any other *Architectonica* species from the western Atlantic but differs in a number of ways. Not much is known of the morphological variations and range of *A. sunderlandi* since there are 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 subspecies of *A. sunderlandi.* This shell differs in having 5 not 6 chords per whorl with the peripheral two being smaller, not larger than the central chords. The base of the original shells is smooth whereas the base of the Bahamas specimen has three spiral grooves around the periphery, and the periphery is less keeled than that of the Floridian *Architectonica sunderlandi.* The color of the Bahamian specimen is cream to white with orange spots on the subsutural chord whereas the original specimens are orange with wide reddish-orange flammules on the subsutural chord and the two peripheral chords. In the original *A. sunderlandi* the periphery of the umbilicus is pale orange, the early whorls are purple and the protoconch and postnuclear whorls are magenta but on the Bahamian shell the entire umbilicus is pure white while the early whorls and the protoconch are the same color as the rest of the teleoconch. At 17 mm in length and a height of 8 mm the Bahamian *A. sunderlandi* is close to the same size as *A. sunderlandi* from Florida and smaller than the common shallow water *A. nobilis* Röding, 1798 which would be the most similar western Atlantic *Architectonica* species to *A. sunderlandi*. *A. sunderlandi* differs from the more common, widespread *A. nobilis* in being a smaller, flatter shell, with a much less developed, smoother sculpture pattern. The Base of *A. nobilis* is heavily sculptured 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.

Material Examined- BCFAU0005, one freshly dead specimen dredged from 400 meters of water south and west of Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, length 17 mm, height 8 mm.

Superfamily Trochoidea Rafinesque, 1815

Family Trochidae Rafinesque, 1815

Subfamily Calliostomatinae Thiele, 1924

Genus *Calliostoma* Swainson, 1840

Calliostoma cf. apicinum Dall, 1881

Plate 2, figs 12-14

Calliostoma apicinum: Dall, 1881:46; 1889b:162, pl.24, figs. 3, 3a.; Pilsbry, 1890: 379, pl. 60, figs. 1, 2; Johnson, 1934:69; Quinn, 1992: 89, figs. 33, 34.

Calliostoma (Calliostoma) apicinum: Dall, 1889a: 366, pl. 24, figs 3, 3a.

Calliostoma roseolum: Clench & Turner, 1960:19, pl. 15, figs. 1, 2 (*partim*); Abbott, 1974:43 (*partim*); Quinn, 1979:26 (*partim*); Sander & Lalli, 1982: table 4; (Non *Calliostoma roseolum* Dall, 1881)

Description- Shell small (juvenille), reaching a height of 7.61 mm, width of 7.71 mm, conical, flat sided, spire angle about 55°, with a small chink-like umbilicus; nucleus of examined specimen is poorly preserved, color is white and it is slightly immersed within the first whorl. Body whorls 5.5; flat; whorls sculpted by 5 rows of evenly spaced, beaded spiral cords, the adapical 2 rows of cords being slightly stronger than the apical 3. The only hint of axial sculpture is the fine growth increments that are present on the lustrous shell surface which is visible between the spiral rows of beads. The body whorl has 7 rows of beaded chords with the two extra rows being very finely beaded, low spiral chords, one on each side of the two thickest adapical rows of beaded chords. The periphery is keeled and bordered by the lower finely beaded spiral cord. Aperture subquadrate, thin lipped with 8 faint lirae which originate on the base of the shell and run into the throat of the shell; columella strait, thickened. The base of the shell is finely crenulated and marked with an alternating brown and white band which reaches the base from the peripheral beaded cord, the rest of the base is nacreous white, sculpted by 8 low, smooth spiral lirae, the innermost 2 rows border the umbilical chink and are finely beaded, forming a tooth-like projection on the lower columella. The ground color of the shell is of greenish nacreous luster, the periphery of the whorls is marked by a thin brown band which demarcates the otherwise indistinct suture. On the two most adapical whorls, just above the sutures, the band color begins to alternate brown and white, while the rest of the raised beads are tannish white in color (Quinn, 1992).

Type Locality- True *C. apicinum* only come from off Barbados in 183 m, while the variety herein described as *C. cf. apicinum* are only found in the Bahama Islands and northwestern Cuba.

Range- Eastern and southern Straits of Florida from Bahamas to Northwestern Cuba.

Discussion- As mentioned by Quinn, 1992, true *C. apicinum* are only found in Barbados but other specimens with similar morphologies (ie. this specimen) have been collected from the Bahama Islands and Northwestern Cuba. They are not considered conspecific with the Barbados specimens and probably represent an undescribed species which is most similar to *C. apicinum*. Clench and Turner, 1960 synonymized *C. apicinum* with *C. roseolum,* stating that specimens of *C. apicinum* are simply juvenilles of *C. roseolum*. Quinn, 1992 resurrected the species name and also recognized that the specimens from Northern Cuba and the Bahamas are very similar to *C. apicinum* but should not be considered conspecific with the Barbados specimens.

This specimen most resembles *C. apicinum* but is also similar to *C. debile* Quinn, 1992 and *C. roseolum* Dall, 1881. Two defining characteristics of *C. apicinum* and *C. cf. apicinum* are the presence of eight or nine strong lirae running into the throat of the aperture and a chink-like umbilicus which generally disappears when the shells are fully mature. The Bahamas specimen is more sharply keeled than typical *C. apicinum* with a narrower aperture and a more

projected periphery, also the protoconch is white, not purplish-brown like a typical *C. apicinum*. This specimen differs from C. *debile* by having early whorls composed of five strong, beaded spiral chords rather than two; there are no distinct radial threads finely beading the basal spiral chords as in *C. debile*, the columella is thickened; and the umbilicus is chink-like. *C. roseolum* never has lirae present in the throat, does not develop the tooth like process on the columella which forms in adult *C. apicinum* and also when mature the later body whorls of *C. roseolum* become convex giving the shell a step-like appearance while mature *C. apicinum* retain flat sided body whorls.

Material Examined- BCFAU0010, One freshly dead specimen dredged from 380 meters, west of Victory Cay, Bahamas, 25°30.620'N, 79°17.961'W, on 24 May 2002, height 7.61 mm, width 7.77 mm.

Subfamily Solariellinae Powel, 1951

Genus *Solariella* S.V. Wood 1842

Subgenus *Solariella* Quinn, 1979

Solariella (Solariella) lamellosa Verrill and Smith, 1880

Plate2, figs 3-4

Margarita lamellosa Verrill & Smith, 1880: 391, 397; Verrill, 1880: 378; 1882: 530, pl.57, fig. 38; Watson, 1886: 82

Margarita aegleis Dall, 1881: 40 (*partim*)

Margarita (Solariella) lamellosa Dall, 1889a: 379; 1889b: 164, pl. 63, fig. 98 (list only; figure from Verrill, 1882); Pilsbry, 1889: 315, pl. 57, fig. 14 (description from Verrill & Smith, 1880; figure from Verrill, 1882)

Margarita (Solariella) amabilis Dall, 1889a: 378 (*partim*); 1889b: 164 (*partim*; listed only).

Solariella calatha Dall, 1927a: 128 (*partim*).

Solariella tiara Dall, 1927a: 130.

Solariella lamellosa Johnson, 1934: 71 (listed only)

Solariella (Macheraeroplax) lamellosa Abbott, 1974: 40, fig. 275.

Solariella (Solariella) lamellosa Quinn, 1979: 40, figs. 61, 62

Description- Shells attaining a height of about 9 mm, thin, bluntly conical, carinate, umbilicate, of 6 to 7 whorls. Protoconch small, glassy, slightly depressed, of about 1 whorl. There are two spiral carinae on the spire with a third appearing on the body whorl; the subsutural canal bears strong, rounded tubercules and tabulates the whorl; the 2nd carina is just below mid-whorl, and forms the periphery; the 3rd carina, on which the suture is formed, defines the base; a row of strong tubercules circumscribes the umbilicus; there may or may not be fine spiral threads in the spaces between the carinae and within the umbilicus. Axial sculpture of thin ribs on the first two whorls, becoming obsolete thereafter , remaining only as tubercules on the upper two carinae; shell otherwise with fine growth lines. Base flattened, smooth or spirally striate; umbilicus wide,

deep, and somewhat restricted within. Aperture subcircular, angulated by the carinae; lips thin and simple; columella concave, not thickened (Quinn, 1979).

Type Locality- Off Marthas Vineyard, Massachusetts in 210 m.

Range- From off North Carolina south through the Straits of Florida, and the Antillean Arc to Barbados. Living specimens are commonly dredged from 25 to 600 meters but dead specimens have been taken from as deep as 1472 m.

Discussion- Two specimens of *S. lamellosa* were collected in 2002, one on dredge #1 and one on dredge #2. *Solariella lamellosa* is one of the more common species in the Straits of Florida below 200 meters but is primarily an inhabitant of depths of 50 to 150 meters throughout its range (Quinn, 1979).

Both shells from off Victory Cay are pearly white, with nacreous apertures, and are formed by 6 whorls. There are very fine spiral threads between the carina on the body whorl and there are also somewhat stronger spiral threads inside of the umbilicus of both specimens. The axial sculpture that generally disappears after the first two whorls is present, although becoming very faint, on all whorls including the body whorl where in some instances the carinate tubercules are faintly connected by this axial sculpture; this could be because the shells are not yet full sized and as they attain the final whorl this remnant sculpture will be untraceable. The bases are flattened and spiral striate; the base of the larger specimen is highly striate while the smaller is less so.

Material Examined- BCFAU0006, 2 freshly dead specimens, dredged from dredged from muddy bottom with some small rock fragments at 400-500 meters, west of Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2002

Height	Width
6.2 mm	5.5 mm
6.1	5.3

Subgenus *Suavotrochus* Dall, 1924

Solariella (Sauvotrochus) lubrica Dall, 1881

Plate 2, figs 10, 11

Margarita lubrica Dall, 1881:44

Margarita (Solriella) lubrica Dall, 1889a:392, pl. 21, figs. 9,9a (listed only; figs. from Dall, 1889a); Pilsbry, 1889: 324, pl. 51, figs. 25, 26 (description from Dall, 1881; figs. from Dall, 1889a)

Margarita (Solriella) lubrica var. iridea Dall, 1889a: 382; 1889b: 164 (listed only); Pilsbry, 1889: 324 (from Dall, 1889a)

Solariella (Machaeroplax) lubrica Dall, 1924: 90

Solariella (Machaeroplax) lubrica lubrica Johnson, 1934: 72 (listed only)

Solariella (Machaeroplax) lubrica iridea Johnson, 1934: 72 (listed only)

Solariella (Solariella) lubrica lubrica Abbott, 1974: 41, fig. 290 (listed only; fig. from Dall, 1889a)

Solariella (Suavotrochus) lubrica iridea Abbott, 1974: 41, fig. 290a

Solariella (Sauvotrochus) lubrica Quinn, 1979: 42, figs. 68-74

Description- Shell small, reaching a height of 5 mm, bluntly conical, smooth, brilliantly nacreous when fresh, otherwise white, of about 5 whorls. Nucleus small, glassy, with very fine spiral striations, of about 1-1 1/4 whorls. Whorls inflated, smooth, with a strong subsutural ridge which breaks up into elongate beads on the last 2 or 3 whorls; the beads are crossed by 2 fine spiral threads, giving the beads a squarish cross section. Whorl rounds smoothly into the base, at the center of which is a moderate, funicular umbilicus. A ridge composed of one or two spiral threads encircles the umbilicus in most specimens; ridge beaded by strong axial plications which originate within the umbilicus and extend a short distance onto the base. Aperture circular; lips thin and simple; inner lip slightly flared over the umbilicus. Operculum thin, corneous, multispiral (Quinn, 1979).

Type Locality- BLAKE station 2, off Havana, Cuba, 1472 m.

Range- From The Straits of Florida off Miami, throughout the Caribbean, and the Gulf of Mexico between 155 and 1472 meters depth. Most likely inhabits depths of 200 to 500 m.

Discussion- Only one freshly dead specimen of *S. lubrica* was collected but it is more than likely that they are at least fairly common on the deep shelf off Bimini, Bahamas since it is a moderately wide ranging species restricted to the deep waters of the Gulf of Mexico and the Carribbean. The shell is very small and delicate therefore many most likely have been crushed in the dredge or washed through the mesh of the dredge on the way up from the bottom.

Although this species is somewhat variable in the strength of its sculpture *S. lubrica* is hard to mistake. Its conical shape and prominent coronations make it stand apart from any other *Solariella* species. The synonym *S. lubrica var. iridea* Dall, 1889 is a form that lacks the coronation at the suture or has only slight traces of it; the umbilical carina is less strong; the umbilicus is smaller; the whorls are inflated and the base is wider. The Victory Cay specimen is full sized at 5.2 mm, smooth and ivory white with brilliant nacre, and of 5 whorls. On the last three whorls, the subsutural ridge is ornamented with numerous, smooth beads which are crossed by two very fine spiral threads. There is a ridge composed of 1 plicated spiral thread encircling the deep, funicular umbilicus.

Material Examined- BCFAU0009, one freshly dead specimen dredged from muddy bottom with some small rock fragments in 400-500 meters, west of Victory Cay, .Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2002, height 5.2 mm, width 4.5 mm.

Genus *Microgaza* Dall, 1881

Microgaza rotella inornata Quinn, 1979

Plate 2, figs 8, 9

Microgaza rotella Dall, 1889a: 357 (*partim*); 1889b: 160 (*partim*); listed only); Pilsbry, 1889: 160 (*partim*)

Microgaza rotella inornata Dall, in Guppy and Dall, 1896: 323; Woodring, 1928: 435 (Both are *nomina nuda*)

Microgaza rotella form *inornata* Abbott, 1974: 42 (name invalid)

Microgaza rotella inornata Quinn, 1979: 47, figs. 74, 80

Description- Shell depressed, with whitish with irregular zigzag splotches of brown on the upper surface of the whorls; highly iridescent, of about 5 whorls; nucleus small, white, polished, of about 1.5 whorls; postnuclear whorls with faint spiral lines near the periphery; a series of radial grooves around the umbilicus crenulates the umbilical keel; occasional specimens may have a fine smooth cord just below the suture on the third and fourth whorls, but most specimens lack this character; umbilicus, wide, deep, with slightly concave walls giving the umbilicus the aspect of a spiral ramp; aperture subquadrate; outer lip thin, not reflected, forming a sharp angle with the base (Quinn, 1979).

Type Locality- Off South Carolina, in 144 m. ALBATROSS station 2314.

Range- From Cape Hatteras, North Carolina to about Miami, Florida, usually in 120-180 meters of waters but possibly as shallow as 91 m and as deep as 549 m.

Discussion- Dall first informally proposed the name *inornata* in 1896 but never published a diagnosis, description or figure. Quinn formally described the subspecies in 1979. This subspecies is found only north of Miami, Florida. Near Miami, maybe as far south as Key Largo, Florida it intergrades with the *Microgaza rotella rotella* subspecies, which is found only south of Key Largo, Florida. All specimens were collected dead and are filled with sediment, they most likely tumbled down slope from they shallower waters (120-180 meters) which is their normal bathymetric range. As a result of resting in the sediment for such a period of time the shells have become so delicate that they are hard to handle without chipping.

All specimens collected match, nearly word for word, the description given by Quinn, 1979; the size range varies from 3.5 mm to 7 mm in width; all shells are pure iridescent white, have five whorls and faint spiral lines near the periphery; the umbilicus has radial grooves, is wide, deep and slightly concave. *M. rotella rotella* differs from *M. rotella inornata* in being geographically confined to south of Miami, Florida, and in having a row of elongate beads present just below the suture line which is lacking in *inornata*. There is another similar species, *Microgaza vetula* Woodring, 1928, that was originally known only as a fossil from the Bowden Formation (Miocene, Jamaica) but has been fairly recently documented from the Straits of Florida near Cay Sal Bank (Quinn,

1979). *M. vetula* differs from *M. rotella* by being consistently smaller in size, having axial riblets on its' second whorl, in having a smaller umbilicus with its walls retreating from the margin more sharply than those of *M. rotella*, and in having spiral threads on the umbilical walls.

Material Examined- BCFAU0007, our freshly dead specimens were dredged from 400-500 meters of water, west of Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2002.

Height	Maximum Width
4.5 mm	7.5 mm
3.1	4.3
4.1	6.0

Subfamily Margaritinae Stoliczka, 1868

Genus *Calliotropis* Seguenza, 1903

Subgenus *Solarcida,* Dall, 1919

Calliotropis (Solarcida) calatha (Dall, 1927)

Plate 2, figs 5-7

Margarita (Solarcida) aegleis var. *lata* Dall, 1889a: 380 (partim); 1889b: 164 (listed only); Johnson, 1934: 71 (listed only). All are *nomina nuda*.

Solariella calatha Dall, 1927a: 128; Johnson, 1934: 72 (listed only); Abbott, 1974: 41 (listed only).

Solariella aegleis aegleis Abbott, 1974: 41 (*partim*; listed only).

Solariella (Solarcida) calatha Quinn, 1979: 9, figs. 15-20, 23-26.

Description- Shell attaining a height of 9-10 mm; broadly conical, carinated, spire high or slightly depressed, widely umbilicate, highly sculptured, of about 6 whorls, white with an underlying nacreous luster. Protoconch small, prominent, glassy, of 1½ whorls; spire bearing 2 (occasionally 3) carinae set with numerous sharp, axially produced tubercles; another similar carina becomes visible on the body whorl. Tunercles of each carina connected by a fine spiral thread; number of tubercles on lower two carinae may vary greatly but is usually around 60 on the last whorl. Upper carina separated from the suture by a narrow shelf and bears 20-30 sharp tubercles. Periphery may be formed by either or both of the lower two carinae. Base with three to four finely beaded chords, the innermost of which is somewhat stronger and coarsely beaded, defining the umbilical margin. Umbilicus very wide, deep, and strongly constricted within. Periostracum thin and brown (Quinn, 1979).

Type Locality- Off Fernandina Beach, Florida in 805 m.

Range- Generally found between 500 and 1000 meters of water from off Georgia, south through the Straits of Florida and the Yucatan Channel, and throughout the Caribbean.

Discussion- This is a highly variable species. Quinn (1979) notes that it varies not only over its whole range but within individual populations and although two specimens may seem very different there seems to always be a "connecting link" throughout a long series of specimens.

The largest specimen collected off Bimini measured 7.1 mm in width and 5.23 mm in height and the smallest was 3.3 mm wide and 3.1 mm tall. There seems to be a somewhat wide range of variability just in the small population here sampled. The number of carinae on the spire varies from 2-3; the number of tubercles per carina varies; the location of the periphery is variable; the number and strength of the cords on the base is variable; the degree of spire sculpture on the surface of the whorls varies from smooth to highly corrugated axially.

Material Examined- BCFAU0008, lot of ten freshly dead specimens which were dredged from 400-500 meters of water (some only fragmentary), west of Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2002.

Height	Width
5.0 mm	7.1 mm
4.8	6.6

4.6	6.3
4.6	6.1
4.1	5.2
4.1	5.6
4.0	5.4
3.7	4.6

Family Turbinidae Rafinesque, 1815

Subfamily Turbininae Rafinesque, 1815

Genus *Turbo* Linné, 1758

Subgenus *Marmarostoma* Swainson, 1829

Turbo castanea Gmelin, 1791

Plate 3, figs 1, 2

Turbo castanea Gmelin, 1791: 3595; Chemnitz, 1781: pl. 182, figs. 1807-1808; Abbott, 1974: 58, pl. 2, fig. 474

Turbo crenulatus Gmelin, 1791: 3595; Chemnitz, 1781: pl. 182, figs. 1811-1812

Turbo moltkianus Gmelin, 1791: 3595; Chemnitz, 1781: pl. 181, figs. 1799-1800

Lunatica granulatus Röding, 1798: 102; Chemnitz, 1781: pl. 182, fig. 1811

Lunatica tuberculata Röding, 1798 figure from Chemnitz, 1781: pl. 181, figs. 1799-1800

Turbo mammillatus Donovan, 1804

Turbo hippocastanum Lamarck, 1822: 47; Chemnitz, 1781: pl. 182, figs. 1807-

1810, 1813-1814

Trochus quadriseriatus Anton, 1838: 59

Turbo virens Philippi, 1849: 99

Aorotrema erraticum Pilsbry & McGinty, 1945: 11, pl. 2, fig. 6

Turbo muricatus Usticke, 1959: 29

Turbo castaneus versicolor Usticke, 1959: 29

Turbo venezuelensis Weisbord, 1962: 87-90, pl. 6, figs. 8-9

Description- Shell turbinate, 25 to 40 mm in length. Color orangish, greenish, brown or grayish, commonly banded with flame-like white spots. Sculpture of spiral rows of beads, sometimes with small spines on whorl shoulders. Aperture white. Callus on columella heavy. Lower lip projects downward. Operculum calcareous.

Range- North Carolina to Florida, Texas, Bahamas and West Indies to Brazil.

Remarks- Turbo castanea is a very common, wide ranging, shallow water species. Although the shell seems very freshly deposited, this specimen most definitely tumbled down the steep wall from much shallower water. It is not uncommon to bring up traces of shallow water life such as red mangrove (*Rhizophora mangle*) propagules, seagrass blades (*Thalassia testudinum*), and shallow water mollusks that have made their way down the steep Bimini Wall and are being swept along the bottom by the strong currents of the Gulf Stream. The fact that very fresh shells of shallow water molluscs and green blades of *Thalassia* are commonly

dredged shows that shallow water material can be rapidly transported far down the slope to accumulate well below their habit.

Comparison- The shell from the Bimini collection is a typical *Turbo castanea.* The coloration is orangish-brown axially banded with flame-like white spots. The shell is heavily sculpted with spiral rows of beads and rather large spines.

Material Examined- BCFAU0011, one dead specimen partially encrusted with coralline algae but well in tact was dredged from 307-472 meters of water, west of Wedge Rock, Bahamas, 25°30.165'N, 79°18.169'W, on 10 May 2003, height 26.7 mm, width 16 mm.

Family Cyclostrematidae Fischer, 1885

Subfamily Skeneidae Thiele, 1929

Genus *Ganesa* Jeffreys, 1883

Ganesa sp.

Plate 3, figs 3, 4

Description- Shell thin and moderately delicate, oval with an elevated spire. Color white, mottled with light brown. mottled with light brown. Maximum height 9.1 mm, width 7 mm. 6 rounded body whorls with slightly incised sutures. Protoconch small, glassy and nearly transparent. Early whorls rounded, with 9-11 low, smooth, spiral threads each with microscopically small threadlets between

them. Body whorl globulose, sculpted with around 20 spiral threads which contain microscopically small threadlets between them. The periphery of the body whorl is marked by one distinctly heavier, smooth, raised thread (spiral carina?) which begins where the suture terminates at the outer lip and continues around the body whorl forming the path of the future suture. All spiral threads are intersected by many small axial growth lines, giving the shell a reticulate sculpture when view under a magnification. The aperture is round and proportionally large, at 5.7 mm it is more than half of the height of the entire shell. Outer lip thin and pure white within. Columella short, moderately thickened, and with a thin chalky white callus. There is a small, narrow, chink-like umbilical opening at the top of the columella.

Discussion- Unfortunately, only one specimen has been collected and shells of the genus *Ganesa* from the western Atlantic are not commonly illustrated so I have nothing to compare this specimen with. The shell collected is fresh and in excellent shape other than a small chip on the outer lip. The shell is thin and delicate.

Material Examined- BCFAU0012, FAU dredge 012002, Bimini, Bahamas, south and west of Victory Cay, 25°26.008'N, 79°18.617'W, 600 meters, 23 May 2002, one freshly dead specimen, height 9.1 mm, width 7 mm.

Superfamily Cerithiacea Fleming, 1822

Family Turritellidae Clarke, 1851

Genus *Vermicularia* Lamarck, 1799

Vermicularia bathyalis Petuch, 2002

Plate 3, figs 5, 6

Vermicularia bathyalis (by original designation) Petuch, 2002: 63, fig. 1 C-F.

Original Description- Shell of average size for genus, uncoiled but retaining tight spiral growth form; last whorl strongly uncoiled, almost strait; turritelliform stage proportionally small, composed of only four whorls; early whorls smooth and shiny, ornamented with single large keel-like spiral chord around midbody; teleoconch whorls rounded, ornamented with twelve low, faint, evenly spaced spiral chords; strength of spiral cords varies from moderately strong to barely visible; spiral chords around midbody slightly stronger than other chords; teleoconch shell surface distinctly scaly and squamose, with scales corresponding to shell growth increments; aperture round; first three whorls of turritelliform stage white; first five whorls of teleoconch dark orange-brown; last whorls of teleoconch becoming pale cream-orange.

Type Locality- Off Victory Cay, Bahamas, 400 m.

Range- This species was described in 2002 by Petuch 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 depth). The geographic extent of this species is presently unknown beyond the type locality.

Discussion- V. bathyalis is by far the deepest dwelling *Vermicularia* known from the western Atlantic. The holotype was collected from remarkably deep water for the genus (400 m) and in 2002 two more specimens were collected from as deep as 600 m.

The Victory Cay specimens clearly display the unique characteristics of the protoconch and early whorls. The turritelloid stage is composed of 4 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 juvenille specimen. The twelve main spiral chords are very faint and hard to recognize on both specimens without the aid of a microscope however they are vaguely present. The degree thickness of the spiral sculpture seems to be a variable characteristic from shell to shell. There are three other species present in the western Atlantic; *V. spirata* (Philippi, 1836), *V. fargoi* Olsson, 1951, and *V. knorri* (Deshayes, 1843). *V. 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. bathyalis* also has twelve main chords on the body whorl while *V. knorri* has 2.

Material Examined- BCFAU0013, two freshly dead specimens dredged from 600 meters, south and west of Victory Cay, Bahamas, 25°26.008'N, 79°18.617'W, on 23 May 2002, length 7.5 mm and 36 mm.

Family Siliqueriidae Anton, 1839

Genus *Siliquaria* Bruguière, 1789

Siliquaria modesta Dall, 1881

Plate 3, figs 7-9

Siliquaria angullae Mörch, 1860

Siliquaria modesta (by original designation) Dall, 1881: 39; 1889a: 260, pl. 26, fig. 4; Agassiz, 1888: 71, fig. 296; Abbott, 1974: 96, fig. 926.

Description- Shell white, small, delicate, irregularly coiled, unattached to substrate, surface without sculpture except that formed by the rounded incremental growth lines. Apex a simple cone, which bears marks of the slit as far as can be seen, almost all o the way to the nucleus. The slit is widest near the aperture and is open continuously, with an undulated margin; apically, the slit may begin to narrow and connect, forming ovate holes which finally become fully closed after the anterior third of the shell, leaving only a trace of the slit or

selenozone. The coils rarely exceed 25 mm in length and gradually enlarge (Dall, 1881).

Type Locality- Off Havana, Cuba 150-275 m.

Range- Bermuda, Gulf of Mexico, northern Cuba, Bahamas, south through Greater and Lesser Antilles to Barbados in 150-1450 m. They prefer soft, quiet bottom.

Discussion- The specimens collected off Victory Cay are all translucent white in color, generally smoothly sculpted, and the protoconchs are broken off on all specimens. The slit stays open from the aperture all the way to about the third whorl. On the specimen figured (pl. 3, fig. 7-9) there is an indication of around 7, very faint axial striations on the final whorl.

There are two other *Siliquaria* species present in the western Atlantic; *S. squamata* Blainville, 1827 and *S. ruber* Schumacher. *S. squamata* can be found in deep waters (to 400 meters) and is easily identified by its highly squamose texture and raised spines that run the length of the spiraled teleoconch. *S. ruber* is generally found at or near the shoreline, not far from the low-water mark.

Material Examined- BCFAU0014, three specimens were collected (only one well preserved and mature) west of Victory Cay, Bimini Chain, Bahamas,

25°29.748'N, 79°18.123'W, in 476 meters on 24 May 2002, Length 20.5 mm.

9.5mm 23 mm

Family Cerithiidae Fleming, 1822

Subfamily Cerithiinae Fleming, 1822

Genus *Cerithium* Bruguière, 1789

Subgenus *Thericium* Monterosato, 1890

Cerithium (Thericium) eburneum Bruguière, 1792

Plate 4, figs 1, 2

Cerithium eburneum Bruguière, 1792: 498-499

Cerithium algicola C. B. Adams, 1845: 5

Cerithium variabile auct. non C. B. Adams, 1845

Cerithium pulicarium Philippi, 1848: 20

Cerithium fenestratum Sowerby, 1855: 860, pl. 180, fig. 100

Cerithium novaehiberniae A. Adams, 1855

Cerithium planispiratum Sowerby, 1855: 857, pl. 180, fig. 91

Thericium lymani Pilsbry, 1949: 66, pl. 1, fig. 12

Cerithium aliceae Petuch, 1987: 51-52, pl. 3, figs. 17-18

For a comprehensive list of synonomy for this species see Houbrick (1974).

Description- Shells reaching 43 mm in length, solid, stubby and elongate, structure and sculpture variable within and between populations throughout the

range. Whorls 9-12; protoconch often missing or eroded. Sculpture normally of 5-6 spiral rows of small rounded beads or tubercules, variable in number; beads slightly larger in the middle row; in some specimens, other spiral rows and associated beads are reduced or entirely lacking with only the middle row remaining. In such cases beads on middle spiral row may be large, pointed and axially drawn out to form low ribs; there may be two nodulose cords on the last whorl above the concavity of the base. In all other forms there is an over-all sculpture of fine spiral threads. Large former varices are often present but may be entirely lacking in some specimens. Varix thick, frequently present opposite the aperture. Sutures lightly impressed. Aperture oval with a short, reflected siphonal canal. Anal canal short, a distinct anal sulcus extending well within the aperture. Outer lip crenulate, usually thin. Color variable, usually white mottled with spots or blotches of shades of brown. Operculum brown, corneous, ovate and paucispiral with a well defined eccentric nucleus (Houbrick, 1974).

Type Locality- Jamaica.

Range- Common in shallow waters to a depth of 10 meters in Bermuda; the Bahamas; Florida from New Smyrna Beach south to the Keys and on the west coast north to Crystal River; gulf coast of Mexico from Vera Cruz to Yucatan; throughout the Caribbean from Central America to the Lesser Antilles and south to northeastern Brazil.

Discussion- The dredged specimen has a broken off protoconch, is rather worn from being tumbled down the slope from the shallow waters where it lived. The specimen was obviously drilled by a Naticid snail. It is on the lower size range for the species; has 4-6 spiral rows of beaded, nodulose cords; the spiral beads of the early whorls are nearly fused together forming numerous low, rounded axial ribs; there is one former varix at about half way around the body whorl, opposite of the thickened outer lip.

Material Examined- BCFAU0013, one dead, drilled specimen dredged from 564 m off the western Slope of Victory Cay/South Cat Cay, Bimini Chain, Bahamas, 25°31.197'N, 79°18.801'W,on 27 May 2002, height 15.8 mm, width 7.8 mm.

Cerithium (Thericium) litteratum (Born, 1778)

Plate 4, figs 3, 4

Cerithium semiferrugineum Lamarck

Murex litteratus Born, 1778: 327, pl. 1024, fig. 89

Murex literatus Born, 1780: 323, pl. 11, figs. 14, 15

Cerithium literatum Abbott, 1954: 154, pl. 19L

Murex litteratus Born, 1778: 327, pl. 1024, fig. 89 (refers to Lister, 1770: pl. 1024, fig. 89

Murex literatus Born, 1780: 323, pl. 11, figs. 14, 15

Cerithium semiferrugineum Lamarck, 1822: 74; Reeve 1865: pl. 6, figs. 38a, 38 b;

Kobelt, 1898: 143-144, pl. 27, figs. 6, 7

Cerithium literatum Born, 1830: 58

Cerithium angustum Anton, 1838: 66

Cerithium playagrandense Weisbord, 1962170-172, pl. 15

For a comprehensive list of synonomy for this species see Houbrick (1974).

Description- Shells reaching 34 mm, stout, stubby, heavy. Whorls 8-9, variable in structure and ornamentation. Protoconch usually missing or eroded. Basic sculpture of numerous fine spiral threads; normally with a distinct subsutural row of 9-12 sharp, prominent nodules forming an angulated shoulder and often a second smaller row of nodules (spines) on the periphery of the whorls though both may be weak or absent. There are frequently beaded and crenulated cords on the base of the shell, the cord a short distance from the periphery of the last whorl being the largest. Body whorl usually flattened or concave near the parietal side. Usually a weak varix opposite the outer lip. Aperture oval columella with heavy, enamel-like callus; outer lip frequently thick and flaring, projecting forward and strongly crenulated. Siphonal canal deep, short and dorsally reflected; anal canal deeply excavated and well defined, bordered on the parietal wall with a distinct columellar plica which defines the deep anal sinus and extends well within the shell. Color variable, usually whitish, finely mottled with brown and black spots; some forms may be entirely orange-yellow or with lighter brown blotches. Operculum tan-brown, corneous, ovate and paucispiral with a well defined eccentric nucleus (Houbrick, 1974).

Type Locality- Unknown, no locality was given for the holotype.

Range- Living from the subtidal zone to a depth of 88 meters from off Bermuda, the Bahamas, offshore of South Carolina to eastern Florida; offshore banks and reefs in the northwestern, west, and southern parts of the Gulf of Mexico, and throughout the entire Caribbean region, south to eastern Brazil.

Discussion- The only dredged specimen is very worn from being tumbled down the slope, it is also lightly encrusted by coralline algae but the sculpture is still observable making it possible to identify. The aperture is full of indurated, chalky sediment. The color is not preserved but the shell is easily identified by is shape and sculpture. At 13.5 mm, it is small for the species but retains the stalky, compressed shape. There are no former varices present; there is a row of 10 prominent (although eroded) nodules just below the suture and a second row of numerous, smaller nodules is prominent around the periphery. The outer lip is thickened, flaring, and crenulated.

Material Examined- BCFAU0016, one tumbled and eroded specimen filled with sediment, dredged from 440 m off Wedge Rock, Victory Cay, Bimini Chain, Bahamas, 25°30.449'N, 79°18.214'W, on 28 May 2002, height 13.5 mm, width 6.8 mm.

Superfamily Epitoniacea S.S. Berry, 1910

Family Epitoniidae S.S. Berry, 1910

Genus *Sthenorytis* Conrad, 1862

Sthenorytis pernobilis (Fischer and Bernardi, 1856)

Plate 3, figs. 10, 11

Scalaria pernobilis Fischer and Bernardi, 1856: 293-294, pl. 8, figs. 2, 3

Scala pernobilis Morch, 1876: 196

Pseudosthenorytis Sacco, 1891

Scala (Sthenorhytis) belaurita Dall, 1889a: 316, pl. 18, fig. 11b

Stenohyscala Boury, 1912

Sthenorhytis cubana Bartsch, 1940: 264, pl. 47, fig. 1

Sthenorhytis hendersoni Bartsch, 1940: 264, pl. 47, fig. 2

Sthenorhytis apae Bartsch, 1940: 265, pl. 47, fig. 4

Sthenorhytis pernobilis Abbott, 1974: 114, fig. 1185

Description- Shell broadly conic, milky white. Nulcear whorls; 2 rounded, smoothish, and transparent white. Following the nucleus are up to 10 globose postnuclear whorls, with 12-14 large, thin, retractively curved bladelike axial ribs which are pleated at the outer edges; the outer edges of the ribs are concavely curved and the inner edges, which join to the suture, are concavely curved. The intercostal spaces are broad and without spiral sculpture. Periphery well rounded. Base short, well rounded and marked by the continuation of the axial ribs which

here become curved anteriorly and flatten to form a nearly continuous surface on the parietal wall. Aperture circular. Peristome thickened and reflected, widest near the base of the inner lip, and the posterior angle, and narrowest on the parietal wall. Operculum circular, black with 5 or 6 whorls.

Type Locality- Island of Marie Galante, near Guadeloupe, Lesser Antilles.

Range- Deep waters off North Carolina to southeastern Florida, to Barbados, entire Caribbean.

Discussion- This species is occasionally dredged from 90 to over 1450 meters of water. It is the only member of its genus in the western Atlantic and is very distinguishable from its other sympatric Epitoniids in being a remarkably broad, and heavy shell with no umbilicus and having an aperture which is offset from the axis of the shell by around 40 degrees.

The size, shape and sculpture of the specimen dredged in 2005 are very typical of the species. There are 9 globulose whorls following the protoconch which is partially broken off. The body whorl has 14 thin, bladelike ribs with the largest projecting over 7 mm off the body. The aperture is perfectly round, well thickened, smooth and glossy white. This specimen was collected live, when placed in a container it exuded a large amount of purple fluid. This was also noticed by Dall (1889a) in a specimen taken by the U.S. Fish Commission.

Material Examined- BCFAU0095, one live specimen dredged from 390 m off Victory Cay, Bimini Chain, Bahamas, 25° 30.362 N, 79° 18.086 W, on 12 June 2005, height 35.8 mm, width 26.5 mm.

Family Xenophoridae Philippi, 1853 (Troschel, 1852)

Genus *Xenophora* G. Fischer, 1807

Subgenus *Tugurium* P. Fischer, 1876

Xenophora (Tugurium) caribaeum (Petit, 1856)

Plate 4, figs 5-7

Xenophora caribaea Petit, 1856: 248, pl. 10, figs. 1-2; Dall, 1889a: 291; Abbott, 1974: 143, fig. 1574

Description- Shell conical, reaching 90-100 mm in width (not including attached objects); umbilicated and light in structure; whorls 8-8.5 regularly increasing in size; cape extending well below the body whorl and irregularly scalloped along its margin; color milky-white with base of body whorl cream; spire extended forming an angle of about 85 degrees; aperture subquadrate, basal margin strongly sinuous in outline; sculpture of very fine growth lines on the base which develop into fine ridges within the umbilicus; outer surface of the shell is sculpted with fine, obliquely set ripple-like marks; base of shell has a strongly marked depression which margins the suture; periostricum thin; attachment of foreign objects limited to small shells, shell fragments and other small objects.

Type Locality- Island of Marie Galante, near Guadeloupe, Lesser Antilles in 35-135 m.

Range- South Carolina through the West Indies to Brazil, Gulf of Mexico. Commonly dredged from 150-600 meters.

Discussion- Xenophora (Tugurium) caribaeum was one of the most common catches throughout the years 2002 and 2003 as they were recovered from nearly every dredge that surfaced. If X.(*T.) caribaeum* were not so well camouflaged to blend in with the rubble on the bottom they would be a very conspicuous member of the deep water ecosystem of Bimini, Bahamas because they are present here in large numbers. It was originally pointed out by Dall, 1889 that X.(*T.) caribaeum* seem to be selective in the orientation and the material chosen for attachment to the outer shell. This is very evident in the Bimini collection, cemented objects seem to be restricted to thin fragments of bivalve shells, all with their concave surface pointing up. Dall also hypothesized that in this species the cementation of foreign objects must be just a useless habit or involuntary trait because often the placement of the few small shells seems inconvenient and of no protective value. This practice in *T. caribaeum* must be reminiscent of a time when it was usefull, and it is assumable that this species is of later development than others such as *Xenophora conchyliophora* (Born, 1780). The well developed "cape" or palatal

extension may possibly aid the deep-water species in creating more surface area for support on softer bottoms Clench and Aguayo, 1943.

The subgenus *Tugurium* differs from the genus *Xenophora* in being umbilicate and possessing a well developed "cape" or palatal extension that is absent in *Xenophora*. The margin of the shell is generally scalloped and they usually only have a few objects cemented to their outer shell surface while shells of *Xenophora* are generally fully covered in objects that have been cemented to the outer shell. The *T. caribaeum* collected off Bimini range in size from 15-70 mm and also the color varies slightly in some. Some specimens are light to darkish-brown and one is cream becoming pale-orange around the body whorl. All specimens collected have only a few attachments, most of which are attached around the shells periphery. Attachments to *T. caribaeum* from the Victory Cay locality consist only of thin, light fragments of bivalve shells and some have what seems to be the small individual calcareous blades of *Halimeda* algae that has washed down the slope from shallow water. The attachments on most of the specimens are broken off when they reach the surface, signifying only loose cementation.

Material Examined- BCFAU0017, over 30 specimens, dead and alive, were dredged from as deep as 511 meters off Victory Cay, Bimini Chain, Bahamas, 25°29.370"N, 79°18.243"W, in the years 2002-2005.

		Max width	

	Height	(excluding attachments)	Whorls
Largest specimen	39.9 mm	68.8 mm	8
Average specimen	26.3 mm	50.2 mm	7
Smallest specimen	5.7 mm	8.6 mm	5

Suborder Gymnoglossa Gray, 1853

Family Melanellidae Bartsch, 1917

Genus *Niso* Risso, 1826

*Niso interupta (*Sowerby, 1834)

Niso interrupta var. albida (Dall, 1889a)

Plate 4, figs8, 9

Eulima interupta Sigsby, 1834: fig. 9

Niso ægleës Bush, 1885: 465, pl. 45, figs. 10, 10a; 1885: 83.

Niso interrupta var. albida Dall, 1889a: 330, pl. 18, figs. 5, 6.

Niso interupta albida Abbott, 1974: 129, fig. 1414

Description- Shell 22 mm in length; elongate, acutely conical; 14 polished, shiny whorls which are white with yellowish-cream coloration below the sutures which fades to white below the periphery of the whorls; nucleus missing from the Bimini specimen; early whorls pure white; periphery of whorls slightly rounded; there are numerous traces of former outer lips in the form of thin varices, about

two per whorl, which are prominent on the last 5 whorls; sutures slightly incised; umbilicus very deep, open all the way to the early whorls, funnel shaped, and bounded by a sharp, raised keel; aperture obliquely ovate, almost diamond shaped, coming to a point at the top and bottom and slightly rounded on the sides; shell axially sculpted by numerous microscopically small growth lines which appear as tiny scratches. There is a trace of thin yellowish brown periostracum.

Type Locality- Santa Lucia, West Indies.

Range- South Carolina through the West Indies to Brazil, Gulf of Mexico, west coast of North and Central America.

Discussion- The genus *Niso* contains a variety of shells that display only a trifling difference in form but can be highly variable in color with all specimens obtained from the east coast of North and Central America possibly derived from a single species (Dall, 1889). The western Atlantic *Niso* differ only by minor variations in form but more distinctly by variations in color which can be correlated with locality. *N. interrupta* was originally described by Sowerby from the tropical eastern Pacific (Gulf of California to Panama). The variety *albida* is typically white with traces of color at the verical angles.

N. interrupta is very similar to *N. herdersoni* Bartsch, 1953 except that has 14 body whorls and it's color is mostly white with only traces of cream coloration at its verical angles while *N. herdersoni* has 15 body whorls and is

colored with squarish brown blotches just above and below a brown-lined suture and has a slender brown line bounding the umbilicus.

Material Examined- BCFAU0018, one freshly dead specimen in nearly perfect condition was dredged from 400 meters west of Victory Cay, Bimini Chain, Bahamas, 25°28.082'N, 79°18.393'W, on 23 May 2002, height 22 mm, width 9.6 mm.

Family Eratoidae Gill, 1871

Subfamily Eratoiinae Gill, 1871

Genus *Erato* Risso, 1826

Subgenus *Hespererato* Schilder, 1932

Hesperato sp.

Plate 4, figs 10, 11

Diagnosis – Shell bright white to semi-transparent, moderately elongated, distinctly angled periphery, shoulder concave, 4 strong columellar plates

Description- Shell much larger than the common *E. maugeriae*, averaging 8-10 mm in height; shell pure white, smooth, semi-transparent, with distinctly angled periphery and concave shoulder, all whorls, including protoconch are covered with bright white glazy callus; outer lip thickened, curled in, and has a row of 13-17 evenly spaced small teeth; upper end of the outer lip well shouldered and

elevated to almost the same height as the apex; apex bulbous and rounded; spire elevated but low and consisting of three whorls; columella strait, roughly parallel to the axis of coiling, and marked by 4-5 elevated folds, 4 anterior-most plates are the strongest, blade-shaped and always present, the 5th fold closest to the parietal end of the shell can be weak or absent; aperture narrow, elongated with broad and short siphonal canal; the only hint of axial sculpture are very thin growth lines best visible on the shoulder.

Type Locality- Victory Cay, Bimini Chain, Bahamas.

Range- Only known from the type locality in 472 meters of water.

Discussion- H. maugeriae Sowerby, 1832 and *H. martinicencis* Schilder, 1933 are the only two *Erato* species currently recognized from the western Atlantic to the best of my knowledge. The *Erato* shells collected from off Victory Cay most closely resemble *H. maugeriae* in overall shape but seem very different in a number of ways. The shells differ from typical *H. maugeriae* in being always pure, ivory white; having 4-5 heavy columellar plications, having a lower more rounded spire; having a more elevated outer lip; having a distinctly sharp angled periphery and concave shoulder; and living in much deeper water (to 500 meters). *H. muageriae* is tan with pinkish or yellowish undertones (not white); has less distinct columellar plications; has a more elevated, pointed spire; the outer lip is generally flush with the broadly rounded shoulder; and it inhabits much shallower

water (maximum 120 meters). *Hesperato martinicensis* is most common around Martinique island and throughout the Lesser Antilles, is usually even smaller than *H. maugeriae* has more labial teeth which are placed closer together than in *H. maugeriae*, and is uniquely colored with a yellow to reddish spire and green to pink anterior extremity.

Material Examined- BCFAU0019, 7 specimens collected alive and freshly dead from 400-600 meters of water south and west of Victory Cay, Bimini Chain, Bahamas, 25°30.165'N, 79°18.169'W, in May 2002 and May 2003 .

Height	Width
7.9 mm	5.1 mm
8.6	5.5
8.9	5.3
9.0	6.0
9.1	6.0
9.5	5.9
9.6	6.6

Family Triniidae Troschel, 1863

Genus *Niveria* Jousseaume, 1884

Subgenus *Cleotrivia* Iredale, 1930

Niveria (Cleotrivia) candidula (Gaskoin, 1836)

Plate 4, figs 12, 13

Cypraea bitou Adanson, 1757: 73, pl. 5, fig. 3.

Cypraea candidula Gaskoin, 1836: 201

Cypraea approximans Gaskoin, 1836: 201

Cypraea olorina Gaskoin, 1836: 201

Trivia subrostrata var. *alba* Tryon: 1885

Trivia candidula Dall ,1903: 136

Cypraea arctica var. *alba* Dautzenberg and Fischer, 1912: 167

Trivia bitou Pallary, 1920: 44, fig. 159

Description- Shell ovato-globose, columellar side rather ventricose, entirely snow white in color. Base somewhat flat. Aperture rather narrow, curved posteriorly. Columellar groove extending from one end of the shell to the other, rather broad, most so at the anterior extremity, not deep. Teeth even, somewhat numerous, small on the edge of the outer lip, on which there are about twenty two and on the columella about thirteen, which converge towards the center. Ribs rather prominent; some few terminate on each side of the shell, the rest pass continuously across it from the edge of the lip, and terminate in minute

denticulations at the inner edge of the frontal groove; false ribs a few. Anterior and posterior beaks of the columella divergent and slightly projecting: extremities produced and obtuse: marked denticulations between the anterior beaks. Spire scarcely visible, or forming a small blunt protuberance. No impressed dorsal line. Margin on the outer lip only and rather thick (Cate, 1979).

Type Locality- Mexico

Range- North Carolina to Florida; Cuba; Bahamas; throughout the Antilles to Barbados; British Guiana to the Amazon River; Veracruz, Mexico to Guatemala.

Discussion- Only one specimen was collected in the years of dredging off Victory Cay, it is pure white, there are 20 prominent ribs crossing the inside of the outer lip and 12 ribs crossing the inside of the columella which converge toward the center. The spire is faintly visible and forms a small blunt anterior protuberance. No dorsal sulcus.

Little has been published on the depth range of the species although, Dall, 1889 reported T*rivia candidula* living at 640 fathoms in the Yucatan Strait, far deeper than the locality near Bimini. *Niveria (Cleotrivia) leucospaera* (Schilder, 1931) may be confused with this species but it is known to form a slight dorsal sulcus, it may come flesh-colored or yellowish, has a much more deep and broad fossula, and typically is restricted to the gulf coast of Florida to Tampa and throughout the Gulf of Mexico to Veracruz, Mexico.

Material Examined- BCFAU0020, South and west of Victory Cay, Bimini Chain, Bahamas, 25°27.332'N, 79°19.223W, 500 meters, 23 May 2002, one single freshly dead specimen, height 11mm, width 8.2 mm.

Subgenus *Niveria* Jousseaume, 1884

Niveria (Niveria) nix (Schilder, 1922)

Plate 4, figs 14, 15

Cypraea nivea Sowerby, 1832:122, pl. 7, fig. 38

? Cypraea grando Potiez and Michaud, 1838: 481

Trivia nix Schilder, 1922: 103, 111

Niveria aquatanica Cate, 1979: 67, fig. 78

Pseudotrivia dumaliensis Cate, 1979: 40, fig. 42

Description- Shell fairly large for genus, thickly formed, somewhat roundly ovate. Terminals only just projecting, mostly posteriorly, off center to the left. Dorsum convexly elevated. Base long, though fairly broad centraly, convex, ovate. Aperture strait, narrow, with an abrupt curving left adapically. Columella strait, deeply concave, becoming even deeper and broader as a fossula in front. Outer lip fairly wide, convex. Shell ribbing comparatively coarse, numerous overall, characterized by having 22-26 riblets crossing the inside of the outer lip with a weak dorsal longitudinal medial furrow; dorsal ribbing from either side

margin, terminating at medial furrow as thickened, flattened pustules; ribs continuing from either side: to the left over base, crossing columella as weak to nearly obsolete lines on inner adaxial edge; to the right over ventral surface of lip, terminating as bold, sharp denticles at apertural edge. Shell color pellucid, off-white (Cate, 1979).

Type Locality- Original type locality data from the Hugh Cuming collection listed this shell from "India," the data is obviously false as was most of the type locality data for shells described from the Hugh Cuming collection.

Range- Florida and the West Indies to Brazil.

Discussion- Niveria nix was fairly commonly dredged throughout the years 2002-2003. Nearly twenty dead specimens were taken, some fresh, some chipped and encrusted as though they had rolled down the slope and been resting on the bottom for some time. *N. nix* is the largest and most globular of the white *Niveria* species found in the Western Atlantic.

All of the *T. nix* collected off Victory Cay were for the most part, typical in size and shape. The strength of the dorsal sulcus has some minor variation from one shell to the next. Also, the smaller shells appear a little more elongated while the larger, mature shells become very globose. The shells are all white in color.

Material Examined- BCFAU0021, about 20 dead specimens were dredged from 400-500 meters west of Victory Cay, Bimini Chain, Bahamas, 25°29.748'N, 79°18.123'W, during May 2002 and May 2003.

	Length	Width
Largest specimen	10.9 mm	9.0 mm
Average specimen	9.6	7.7
Smallest specimen	8.7	7.1

Superfamily Naticacea Gray, 1840

Family Naticidae Gray, 1840

Subfamily Naticinae Gray, 1840

Genus *Natica* Scopoli, 1777

Subgenus *Natica* Scopolli, 1777

Natica perlineata Dall, 1889

Plate 5, figs 1, 2

Natica (?castrensis var.*) perlineata* Dall, 1889a: 294

Natica perlineata Abbott, 1974: 159 (listed only)

Description- Shell with 5 whorls; moderately thin, light, smooth with the only indication of sculpture being the many microscopic growth lines; nucleus large and lucid; coloration consisting of very fine, slightly waved transverse brown

striations with a faint or obsolete white band near suture which intercepts the brown striations just before they reach the suture; whorls are extremely rounded giving the shell a globose shape; suture well marked; spire low but elevated; umbilicus fairly small, open, and partially covered by a thick callus which extends anteriorly, thickening the short columella; the brown striations cease abruptly at the periphery giving way to a pure white base, callus, umbilicus and aperture; there is a distinct white band extending from the outer suture, about a quarter-whorl back from the lip, over the periphery to the base, "as if the color glands had taken a resting spell for a short time" –Dall; this band marks a cessation of growth.

Type Locality- Off Havana, Cuba in 217 m.

Range- Florida Strait, Northern Cuba, West Indies to Barbados. 150-500 meters.

Discussion- On the large specimen, the distinct white band that extends over the periphery is met by another, wider, more distinct white band that follows the suture line spirally all the way to the lip of the shell also the early whorls are light brown and become tan on the body whorl; the smaller shell is lighter in color than the large one and the brown axial bands are faint; the third *N. perliniata* dredged is eroded and discolored. *N. perlineata* is most similar to *N. castrensis* Dall, 1889 but differs mostly in coloration. *N. castrensis* typically has an opaque white band in front of the suture with irregular brown flammules, a peripheral series of

distant, small, obscure brown spots, a pure white base, callus, umbilicus, and aperture with the remainder being translucent white with a network of extremely fine lines and spaces forming spirally directed, triangular white markings on a brownish ground with the apices of the triangular marking pointing toward the aperture. *N. castrensis* clearly has a more intricately developed color pattern that was said by Dall to resemble that of *Conus gloriamaris* Chemnitz, 1777.

Material Examined- BCFAU0022, three freshly dead specimens dredged from as deep as 472 meters west of Wedge Rock, Bimini Chain, Bahamas, 25°30.165'N, 79°18.169'W, 2003 and 2003.

	Height	Width
Large specimen	23.0 mm	22.9 mm
Small specimen	9.5 mm	9.5 mm

Subfamily Polinicinae Gray, 1847

Genus *Polinices* Montfort, 1810

Polinices bahamiensis (Dall, 1925)

Plate 5, figs 3, 4

Euspira bahamensis Dall, 1925: 107

Polinices bahamiensis Abbott, 1974; 155, fig. 1684

Description- Shell small, white, globose, spire moderately depressed, of three and a half well rounded whorls, suture deep and heavily incised giving the spire a channeled appearance; surface smooth except for possibly two or three smooth spiral striae, directly in front of the suture and more or less obsolete on the later whorls and many very fine growth lines; aperture ovate, narrow behind, outer lip sharp, inner lip nearly strait, not calloused, but united by a layer of enamel over the body with the outer lip; umbilicus large, funicular (Dall, 1925).

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Type Locality- Grand Bahama Bank

Range- Restricted to the Grand Bahama Bank.

Discussion- Two dead specimens were collected from 600 meters of water on our first dredge of the year 2002 and no more have been collected by us since. This species was also dredged by FAU in 2001 and reported by Petuch, 2002. The specimen illustrated was obviously preyed upon by another Naticid snail, it has a perfectly incised drill hole on the apertural side. There is no indication of the smooth spiral striae on the early whorls of either specimen.

Material Examined- BCFAU0023, two freshly dead specimens dredged from 600 meters of water south and west of Victory Cay, Bimini Chain, Bahamas, 25°26.008'N, 79°18.617'W, on 23 May 2002, height 6.5 mm, width 5.9 mm (shell figured), height 7.2 mm with broken spire, width 6.7 mm (eroded specimen).

Family Cymatidae Iredale, 1913

Genus *Distorsio* Röding, 1798

Distorsio perdistorta Fulton, 1938

Plate 5, figs 5, 6

Distorsio perdistorta Fulton, 1938: 55, pl. 3, figs. 3, 3a

Distorsio horrida Habe, 1961: 46, pl.23, fig. 3

Distorsio perdistorta Abbott, 1974: 166, fig 1774

Description- Shell size can reach 75 mm; whorls distorted; color whitish with orange-brown cords and ribs; aperture with bizarre, arrangement of the teeth; siphonal canal partially twisted; sculpture is coarse and reticulated; parietal shield glossy, oblong, and weakly sculpted with reticulated, raised threads; outer lip is smoothish instead of strongly denticulated as in *D. clathrata*.

Type Locality- Off Kii, Japan.

Range- The expansive range of *D. perdistorta* includes the deep waters, 300-600 meters, of Florida, Gulf of Mexico, Caribbean, Barbados, Madagascar, and Japan.

Discussion- D. perdistorta is an uncommon deep water species. Two baddly broken specimens were dredged between 2002 and 2003 and in 2005 a juvenile specimen was dredged alive. *D. perdistorta* is most similar to *D. clathrata* but

differs in having an oblong shaped parietal shield instead of oblong , a smoothish outer lip instead of heavily denticulated; It is also commonly found with a thick, hairy, periostricum.

Material Examined- BCFAU0024, one live specimen and 2 broken specimens were dredged between 2002 and 2005 west of Victory Cay, Bimini Chain, Bahamas, 25°29.748'N, 79°18.123'W, in 360-476 meters. Live specimen is juvenile, height 20.9 mm, width 12.3 mm.

Family Bursidae Thiele, 1925

Genus *Bursa* Röding, 1798

Subgenus *Colubrellina* P. Fischer, 1884

Bursa finlayi McGinty, 1962

Plate 5, figs 7, 8

Original Description- Shell rather large, thin but strong, evenly rounded whorls, relatively slender spire and pronounced sharp heavy nodules at the shoulder. Whorls 7, plus a white naticoid nucleus of about 4 whorls. Early nuclear whorls sculptured with fine axial riblets and 3 spiral threads, the riblets disappearing first, then the spiral threads, leaving the final 1/3 whorl smooth. Shell sculpture consists of beads and nodules arranged in spiral rows, the shoulder bearing a row of heavy pointed nodules with a second and lesser row just below at the periphery. Rows of beads and sharp nodules vary in size, the rows of small and heavy beads often

alternate. Entire surface of shell covered with very fine cancellate sculpture. Varices unevenly spaced, not in line, about 2/3 of a whorl apart. Color straw, with diffused markings of light brown. Aperture ovate, with a flush of delicate orchid within, and the parietal wall has some brown between many white folds.

Type Locality- Rocky bottom at 210 m off Sombrero Key Light.

Range- Southeastern Florida, Pourtales Plateau, Cuba and the Bahamas.

Discussion- This species is most similar to *B. tenuisculpta* Dautzenberg and Fischer, 1906. *B. Finlayi* lives in deeper water and has a larger and more remarkably spinose shell. The Bimini specimen closely resembles McGintys original description in many ways but displays some subtle differences. The Bimini specimen only has 5 main body whorls instead of 7 but is fairly small for the species and may be juvenile. The early nuclear whorls of the Bimini specimen are smooth and are not sculpted with any fine axial riblets or threads; at best they have a granular texture, although the sculpture does become abruptly evident on the final nuclear whorl. The Bimini specimen is heavily sculpted with spiral beads and nodules with the shoulder bearing the heaviest row of nodules with a second, lesser row of just below at the periphery. The entire shell is covered by a very fine cancellate sculpture. The shell has 8 varices that are unevenly spaced, about 2/3 of a whorl apart. The color is pale straw to light brown. The aperture is ovate,

colored white, with a small, thin glazy callus. The parietal wall has some brown coloration between the upper white folds.

Material Examined- BCFAU0025, one specimen dredged alive from 410 meters south and west of Victory Cay, Bimini Chain, Bahamas, 25°29.758'N, 79°18.462'W, on 24 May 2002, length 50 mm, width 28 mm.

Superfamily Tonnoidea

Family Ranellidae Gray, 1854

Subfamily Pisanianurinae Waren & Bouchet, 1990

Genus *Pisanianura* Rovereto, 1899

Pisanianura grimaldii (Dautzenberg, 1889)

Plate 5, figs 9, 10

Hindsia grimaldii Dautzenberg, 1889: pl. 2, fig. 4

Anura clathrata Dautzenberg and Fischer, 1906: 25

Pisanianura grimaldii Warén and Bouchet, 1990: 64, figs. 126, 127, protoconch figs. 94, 95, radula figs. 25, 26, jaw fig. 55, operculum fig. 68; Henning and Hemmen, 1993: 130, pl. 26, fig. 1

Description- Size 21.2 mm in height, 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, sinusigerous whorls, brown in color; shell

color ivory white; aperture ovate, coming to points at the ends; outer lip thin, sharp; parietal area with a medium white glaze beneath the thick periostracum through which the spiral sculpture is visible; anal canal lacking; siphonal canal very short, broad and twisted to the 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. There are four primary, or largest, cords with the central two being the heaviest. Axial sculpture of numerous raised costae which produce small, rounded nodes at the intersections with the primary spiral cords giving the shell a beaded, lattice-like surface. The axial sculpture becomes obsolete below the periphery of the body whorl. Periosticum thick and brown.

Type Locality- Azores, eastern Atlantic in 1278 m: Monaco Expeditions station 112.

Range- This is the first record of *Pisanianura grimaldii* from the western Atlantic ocean, the typical range is as follows; NE Atlantic (S. Morocco, Azores, S. Madeira), SW Indian Ocean (N. Mozambique), SW Pacific (New Caledonia).

Discussion- The collection of this specimen of *P. 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 which obviosly can remain suspended in the water column for a great amount of time before settling and

maturing. This species has been documented alive from as deep as 2200 meters (Henning and Hemmen, 1993). Recognizing the fact that only one specimen has been recovered in the previous four years of dredgings 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 most likely that this is a freak specimen which rode the north equatorial current across the Atlantic Ocean and settled far out of place. The description given above is of the specimen taken off Wedge Rock, Bahamas, for an original description of the species see Dautzenberg (1889) or Henning and Hemmen (1993).

Material Examined- BCFAU0026, one freshly dead specimen dredged from 580 meters off Wedge Rock, Bahamas, 25°29.137"N, 79°18.944"W on 10 May 2003, height 21.2 mm, width 13.6 mm.

Family Tonnidae Peile, 1926

Genus *Eudolium* Dall, 1889

Eudolium crosseanum Monterosato, 1869

Plate 5, figs 11, 12

Dolium crosseanum Monterosato, 1869: 228, pl.12, fig. 1; Turner, 1948: 178, pl. 81, figs. 1, 2; Abbott, 1974: 168, pl. 6, fig. 1787

Dolium bairdii Verrill and Smith, 1881: 299; Verrill, 1884: 253, pl. 29, fig. 2a-b

Dolium bayrdi Paetel, 1888: 221

Eudolium testardi Osima, 1943: 132, pl.4, fig.3

? Eudolium lineatum Osima, 1943: pl. 5, fig. 1

Eudolium thompsoni McGinty, 1955: 80-81, pl. 1, figs. 5-6

Description- Shell 21 mm in height, subglobulose, moderately thin shelled but strong with 4 rounded body whorls and 3 large nuclear whorls; the color is pure white with a light brown nucleus; sutures moderately incised; spire well elevated; apex consists of three rather large, brown, nuclear whorls with raised, darker colored, spiral threads; the brown color of the nucleus gives way to the white color of the teleoconch abruptly at the end of the third nuclear whorl; only minor indication of columellar thickening; non umbilicate; aperture oblong ovate; outer lip not thickened and the inner edge is smooth and translucent; sculpture unique, consisting of numerous alternating spiral ridges of three sizes which are crossed by axial threads producing small nodes at each crossing giving the shell a distinct nodular, finely cancellate, sculpture; the thickest, or primary, spiral threads alternate with smaller, secondary, threads throughout the shell, at the center of the body whorl, the secondary threads contain a single row of yet smaller, tertiary, threads between them, towards the anterior margin, the primary threads begin to alternate with two rows of secondary threads; anterior canal open and turned to the left; there is a thick, light-brown colored periostricum.

Type Locality- The type of *E. crosseanum* is from off Palermo Sicily, and the holotype of the synonymous *D. bairdii* Verrill and Smith, 1881 was taken from

Fish Hawk station 945 in 379 meters of water, 84.5 miles south-west of Martha Vineyard, Massachusetts.

Range- Most all members of the genus *Eudolium* are found world-wide from the deep waters off Delaware throughout the Caribbean, Mediterranean, South Africa, Japan, to Southeastern Asia, *Eudolium crosseanum* also has a very wide range of distribution and is very common in many localities. *E. crosseanum* can be found in the Mediterranean Sea, the Azores and south to South Africa in the eastern Atlantic and from off New Jersey south through the West Indies to Barbados in the western Atlantic.

Discussion- In the years 2003 and 2003, four broken specimens were recovered, none of them have the nucleus or the outer lip in tact, this can be attributed to the distinctly thin structure of the shell. Two specimens are small, around 8 mm, and two are about 26 mm. All specimens are remarkably thin shelled and delicate. The defining thickened and reflected outer lip is not present on any but all have a thickened body callus in which the outer body sculpture is visible through. The nucleus is absent in all specimens and none have more than three body whorls still intact.

E. crosseanum is easily distinguishable from other *Eudolium* species by its light weight, and characteristic reticulate sculpture of alternating spiral ridges and cords which are crossed by very fine axial threads. There are two other species

Eudolium auclades Tomlin, 1927 and *Eudolium solidior* Dautzenberg and Fischer, 1906 that may be present in the Western Atlantic.

Material Examined- BCFAU0027, four dead and eroded specimens with broken lips and missing protoconchs, collected south and west of Victory Cay, Bimini Chain, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, in 400-600 meters. Lengths range from 9-26 mm.

Family Columbariidae Tomlin, 1928

Genus *Columbarium* von Martens, 1881

Subgenus *Peristarium* Bayer, 1971

Columbarium (Peristarium) electra Bayer, 1971

Plate 5, figs 13, 14

Columbarium (Peristarium) electra Bayer, 1971: 176-178, figs. 39d, 41; Abbott, 1974: 170 (listed only)

Original Description- Shell elongate fusiform, with elevated spire and long, narrow, tapered siphonal canal; color white; whorls 9, regularly increasing in size; nuclear whorls about 1.5, bulbous, smooth and glossy, not clearly delimited from the postnuclear whorls except by the initiation of a series of obscure peripheral nodes which become more prominent as the whorls increase in size; each node is situated om a low, rounded axial ridge; the reidges are at first weak but become

stronger on the second and third post nuclear whorls, then gradually decrease in prominence until they are merely low, broad axial undulations, 14 in number on the body whorl; peripheral nodes low and blunt on the later whorls, where they lie about midway between sutures; 14 nodes occur on the body whorl, one on each axial rib; growth line present on the last four postnuclear whorls; faint spiral lines begin on about the fourth postnuclear whorl, becoming more distinct on the following whorls where they appear as narrow bands of slightly different texture only slightly raised from the adjacent shell surface; on the spire there are three of these major lines above the periphery, separated by much fainter ones; three spiral lines follow the periphery and are more distinctly raised where they pass over the peripheral nodes; below the nodes there is one principal spiral; on the body whorl there are five distinct spirals below the periphery and another eight on the siphonal canal, fading out toward its end; columella long, strait, imperforate, not plicated; interior surface of outer wall smooth; parietal wall without a distinct lip, smooth and spiral sculpture obliterated; the operculum is ovate-unguiculate, with apical nucleus; the radula has an arched tricuspid rachidian plate flanked by a triangular, claw-like lateral on each side (Bayer, 1971).

Type Locality- Straits of Florida SSE of Key West in around 600 meters.

Range- Restricted to deep waters of the Straits of Florida.

Discussion- The original specimens came from the Florida Strait SSE of Key West. This specimen shows that *C. electra* are present in the deep waters on both sides of the Straits of Florida. In the subgenus *Peristarium,* Bayer (1971) placed three western Atlantic species: *P. electra* (type species), *P. merope* Bayer, 1971, and *P. aurora* Bayer, 1971. *P. electra* is fairly similar in appearance and sympatric with to the other two species described by Bayer, 1971 but can be told apart from at first glance mainly in being far less spirally sculpted and having much weaker axial ridges.

The Bimini specimen is very comparable to the originals described by Bayer, 1971. Although the long, narrow siphonal canal and the nucleus are missing, the many other distinct characteristics of this species make it easily identifiable. At first glance the highly elevated spire with the prominent, distinctly shaped, peripheral nodes strongly stand out. With a closer look the specimen was further identified by the presence of the three spiral lines that follow above the periphery. The nucleus is broken off at the beginning of the first body whorl. Judging by the diameter of the scar where the spire was broken, the nucleus of the Bimini specimen is comparably large as in the holotype and other specimens described.

Material Examined- BCFAU0028, one dead specimen with broken siphonal canal, dredged from around 500 meters depth, south and west of Victory Cay, Bimini Chain, Bahamas, 25°27.332'N, 79°19.223W on 23 May 2002. Height of

broken specimen is 15 mm (height would be closer to 24 mm with the siphonal canal), diameter at periphery 6.49 mm.

Superfamily Muricacea da Costa, 1776

Family Muricidae da Costa, 1776

Subfamily Muricinae da Costa, 1776

Genus *Siratus* (Jouseseaume, 1880)

Siratus yumurinus (Sarasua and Espinosa, 1978)

Plate 6, figs 1, 2

Murex (Murex) yumurinus Sarasua and Espinosa, 1978: 3, figs. 1 A-D

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

Description- 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 porcelanous 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 posses 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; juvenilles 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. (Translated from Sarasua and Espinosa, 1978).

Type Locality- Bahía de Mantanzas, Cuba

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

Discussion- M. yumurinus is most similar to *M. cailleti* Petit, 1856, *M. cailleti* differentiates itself by having the varices less elevated, the base more bulky, more pronounced sutures, and the subsutural area well marked with spiral ridges. In

general, *M. yumurinus* has a greater number of spines, and the 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 of two whorls.

M. yumurinus was collected from the Victory Cay locality during an FAU cruise in 2001 and is illustrated by Petuch (2002). Petuchs illustration shows a specimen with no spines or siphonal canal, it was collected dead and had been tumbled. During the FAU cruise in 2002 two specimens were collected, one dead and one alive, the dead specimen is in the same condition while the live specimen is in great shape and can be compared to the holotype. The shell from off Cat Cay has a nucleus of 2 bulbous, porcelanous whorls which are followed by 7 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 our 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 on the body whorl only. The siphonal canal is a well developed and there is a former canal present which was broken off; there are also two smaller spines at the base of the siphonal canal, a characteristic which is common in

juvenille specimens (Sarasua and Espinosa, 1978). The shell is spirally sculpted with numerous, evenly spaced, low cords which alternate in size and posses a faint caramel color, the only color on the shell other than the pale cream-white base coloration. Of 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, 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.

Material Examined- BCFAU0030, one live specimen was taken from 564 meters of water south and west of South Cat Cay, Bahamas, 25°.30.053'N, 79°19.107'W, on 27 May 2002. The specimen measures 66.5 mm from the apex to the tip of the long siphonal canal and 45.2 mm from the apex to the base of the aperture, with a maximum width of 27.1 mm across the body whorl.

Subfamily Ocenebrinae Cossmann, 1908

Genus *Poirieria* Jousseaume, 1880

Subgenus *Paziella* Jousseaume, 1880

Poirieria (Paziella) pazi (Crosse, 1869)

Plate 6, figs 3, 4

Murex pazi Crosse, 1870: 99, pl. 1, fig. 4; Crosse, 1869: 183.

Murex (Phyllonotus) pazi Dall, 1889a: 199, pl. 15, fig. 1.

Bathymurex Clench and Farfante, 1945

Dallimurex Rehder, 1946

Poirieria pazi Abbott, 1974:185, fig. 1939

Description- Shell rather small, from 30 to 47 mm in length, somewhat translucent and provided with numerous longspines. Whorls 7-8.5, the first whorls being angular and the last ones being less so. Color milky to oyster white, the first whorls generally being of a dark gray. Spire extended. Suture deeply impressed, rather irregular and interrupted by smalls spines at the varices of the whorls above. Aperture ovate to sub-circular, porcellaneous white. Parietal lip reflected over the body whorl, smooth and thick. Palatal lip with a smooth margin but possessing within, a series of fine and regular denticles on adult specimens. Siphonal canal rather short and narrow and slightly curved back from the aperture. Palatal side has a long recurved spine; the columellar side is flattened and smooth, but supports the previous siphonal canals which remain in spiral

arrangement. Axial sculpture consists of 5-6 low varices on each whorl which are armed with a very long, open and backwardly recurved spine on the shoulder and two or three much smaller scale-like spines below. The shoulder spine when first formed opens into the aperture, but when growth is resumed, the opening is closed and grown over. In addition, there are numerous fine growth lines. On the siphonal canal there is a long recurved open spine following each varix. Spiral sculpture consists of fine ridges which connect the spines on the varix with the corresponding spines on the next varix. Periostracum absent. Operculum of a light yellowish-brown, unguiculate, pointed below, with an apical nucleus, and with numerous fine growth lines. Nuclear whorls 1.5, rounded glassy, the first whorl developing in a plane oblique to that of the second (distinctly bent to one side).

Type Locality- Lesser Antilles, exact location not recorded.

Range- Eastern Florida, the Bahamas to Cuba and Honduras in depths of 365-618 meters.

Discussion- P. pazi is unique in form in the western Atlantic Ocean, being most similar to *Paziella actinophorus* Dall, 1889 *in* Bayer, 1971, but differing mainly in that it develops a row of spines around the base of the body whorl which never develops in *P. actinophorus*, and in sometimes developing denticles inside of the outer lip, a characteristic also never encountered in *P. actinophorus*. 5 specimens of *P. pazi* were collected in 2002, 2 were alive and 2 were dead but in excellent

condition. The two live specimens were nearly twice as large as the dead ones that were collected.

The figured specimen, from off Victory Cay, has 6 rows of long, strait spines per each of its 7 body whorls, they are almost perfectly aligned axially and are open on the animals right side, facing the aperture; the base of the shell has three smaller spines representing former siphonal canals which are arranged spirally; the nuclear whorls are rounded and smooth; the color is white with some grayish staining and the inside of the aperture and the parietal callus are glazy-white with no denticles formed inside of the shells lips. On all of the Bahamian specimens collected the body whorl forms a somewhat angular periphery because there is a trace of a second row of wanting spines that are indicated as nodes behind the long, sharp spines which are present on the body whorl. This characteristic is noticeable in the photos of Clench and Farfante (1945) but not mentioned in the description.

Material Examined- BCFAU0031, four specimens dredged (2 alive, and 2 dead) from 400-600 meters of water west of Victory Cay, Bahamas, 25°28.735'N, 79°19.084'W, on 24 May 2002.

Height (nucleus to tip of siphon)	Width (body whorl only)
41.8 mm	17.2 mm
33.1	15.7

24.0	12.2
19.4	9.4

Family Coralliophilidae Chenu, 1859

Genus *Coralliophila* H. and A. Adams, 1853

Coralliophila caribaea Abbott, 1958

Plate 5, figs 15, 16

Murex plicatus non Wood, 1818:124, no. 56

Coralliophila brevis non Blainville, 1832

Coralliophila caribaea Abbott, 1958: 66-67, pl. 1, figs. 1g, h, text-fig. 3; Abbott, 1974: 193, fig. 2029

Ringicula cruzensis Usticke, 1969: 30, pl. 6, fig. 1247

Original Description- Shell 15-26 mm in length, moderately heavy, somewhat triangular in shape, strongly plicate, whitish except for a purplish aperture, with numerous fimbriated spiral threads. Whorls about 8, angulated at the shoulder. Nuclear whorls 3, glossy white, regularly increasing, with two fine, beaded spiral cords just above the suture and with numerous fine, slanting axial ribblets. Spire high, generally flat-sided, and with an angle of 30-40 degrees. Spiral sculpture of numerous, crowded, raised, finely fimbriated cords, those at the periphery and at the base of the shell much larger. Shoulder flattish, sometimes without spiral threads. Axial sculpture of about a dozen rounded plications which form rounded

nodules at the periphery. Aperture elongate-triangular, gradually narrowing at the base, usually white with a taint of purple, rarely pure white. Spiral ridges within the aperture on the body whorl are usually absent. Umbilicus slit-like, rarely well open. Operculum corneous, elongate, opaque wine-red, with a marginal nucleus. Radula apparently absent. Verge small, short and with a small terminal prong. Seminal groove open. Proboscis and sides of foot suffused with brownish gray.

Type Locality- Vera Cruz, Mexico.

Range- Off South Carolina to Florida and to Brazil. Bermuda.

Discussion- Coralliophilids are commonly found in shallow waters at or near the base of seafans and around corals. This specimen most definitely tumbled a long way down the slope wall from the shallow reefs to the deep water where it was collected. Although it has traveled a long way down slope, its sturdy, thick shell only shows minor signs of erosion other than the broken anterior canal.

The Bimini specimen is similar in overall size and shape to the original description. The shell has a smooth, glassy protoconch followed by 5 heavily sculpted whorls. There are numerous heavy, raised axial ridges on each whorl, 11 on the body whorl decreasing in strength as they near the lip and slightly thickened at the shoulders; spiral sculpture consists of numerous spiral threads on each whorl, there are 4 distinctly thicker threads on the body whorl which each have 3-5 smaller threads between them. The sutures are distinct and slightly

incised. Shell color is pure white and the inside of the aperture is completely white with no hint of purple and has no spiral ridges within.

Material Examined- BCFAU0029, one dead, partially eroded specimen with broken anterior canal, dredged from around 472 meters, off Wedge Rock, Bimini Vicinity, Bahamas, 25°30.165'N, 79°18.169'W, on 10 May 2003, height 18.75 mm with broken siphonal canal, width 15.75 mm.

Superfamily Buccinacea Rafinesque, 1815

Family Columbellidae Swainson, 1840

Genus *Mitrella* Risso, 1826

Subgenus *Astyris* H. and A. Adamas, 1853

Mitrella (Astyris) diaphana (Verrill, 1882)

Plate 7, figs 1, 2

Astyris rosacea (pars) Verrill, 1880: 408 (*non* Gould)

Astyris diaphana Verrill, 1882: 513, pl. 58, fig. 2; Dall, 1889a: 191, pl. 35, fig. 9; Abbott, 1974: 200, fig. 2119

Original Description– Shell thin, delicate, translucent, white, nearly smooth, elongated, with a long, tapering, acute spire. Whorls eight, broadly and evenly rounded; suture somewhat impressed, but not deep, frequently narrowly channeled and on some whorls it may be accompanied by a fine subsutural

groove(s). Surface, except anteriorly and on the canal, destitute of spiral lines, and of any indication of ribs, but covered with very close, almost microscopic lines of growth which give the surface a dull appearance when dry; on the canal and extending to the anterior part of the body whorl are a number of distinct spiral lines, becoming faint opposite the middle of the aperture; fine microscopic spiral striations sometimes appear on the lower whorls. The nucleus is fairly large, rounded, depressed and spiral but somewhat mammillary. Aperture small, oblong-ovate; outer lip sharp edged with a distinct thickening a little ways back from the margin when adult; surface of inner lip usually smooth but in some adult specimens there can be 4-5 small, transversely oblong tubercules back from the margin and a larger conical tubercule at the base of the canal. Columella sigmoid, a little excavated in the middle, and with a distinct raised spiral fold at its inner edge, anteriorly; canal short, open, very slightly curved. Color pale-straw to white.

Type Locality- Off the Coast of New England (Martha's Vineyard and Chesapeake Bay) at 120-890 meters depth.

Range- Eastern United States from Rhode Island to Florida, northern Gulf of Mexico, western Bahamas.

Discussion- The specimens collected near Bimini somewhat resemble *M. raveneli* (Dall, 1889) and possibly *M. nycteis* (Duclos, 1846) but favor *M. diaphana* over

M. raveneli by being higher spired, more slender, with a longer siphonal canal and living in deeper water and favor *M. diaphana* over *M. nycteis* mainly by being larger, not so slender, having more rounded whorls, being pure white in color and in living in much deeper water. *M. diaphana* has also been confused with *M. rosacea* (Gould, 1841), *M. diapana* differs from the latter in being more slender and elongated, a far more delicate shell, being only faintly spirally sculpted, being mainly white in color, and lacking any indication of axial sculpture on the early whorls.

Mitrella diaphana, like many deep water molluscs, is moderately variable in shape in sculpture. Verrill, 1882 originally noted that the shells stoutness and length can be considerably variable, the degree of spiral sculpture, protraction of the spire, and characteristics of the columella and our lip are also know to vary. The Bimini specimens vary from the original description of *M. diaphana* in being on average, larger and pure transluscent-white in color with only minor indications of pale-straw staining. There is no prominent varix behind the outer lip of any of the Bimini specimens. The teleoconch of all specimens is marked by microscopically fine spiral striations which become most evident just below the sutures; there are numerous fine growth lines and an overall polished smooth appearance. The anterior half of the last whorl has 8-12 small grooves. The sutures are always distinct and always possess a fine subsutural groove. In some specimens, there is a distinct, raised, fasciolar fold running nearly vertically along the length of the inner lip but in others it is absent or only partially developed.

The outer lip is somewhat reflected and smooth within with only a minor indication of thickening behind.

Material Examined- BCFAU0032, six specimens dredged from 380-450 meters depth south and west of Victory Cay, Bahamas from 23-27 May 2002.

Height	Width
14.7 mm	6.0 mm
13.4	5.5
13.4	5.5
13.3	5.5
13.2	5.5
12.0	4.9

Family Buccinidae Rafinesque, 1815

Subfamily Photiinae

Genus *Chickcharnea* Petuch, 2002

Chickcharnea fragilis Petuch, 2002

Plate 6, figs 5, 6

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

Original Description- The shell is small and fragile; color is translucent and overall the shape resembles an inflated, *ptychosalpinx*-type buccinid with rounded shoulders, deeply impressed sutures and elevated spire whorls. The subsutural area is slightly flattened producing a scalariform spire; first postnuclear whorl sculpted with 12 strong spiral chords; body whorl smooth and silky with strong spiral chords confined to the subsutural area and the anterior third; siphonal canal short, stubby, open and flaring, ornamented with four large spiral chords and numerous fine spiral threads; columella smooth, strait, without any placations or ornamentation; parietal region and columella glossy; interior of shell smooth and glossy; protochonch proportionally very large, bulbous, dome-like, glossy, polished, flattened at tip, and composed of 2½ whorls; entire shell pure white; periostracum thin, pale brown.

Type Locality- Carbonate mud bottom, 400 meters depth, off Victory Cay, Bimini Chain, Bahamas.

Range- Known only from the type locality.

Discussion- Only 3 specimens of *C. fragilis* have ever been recorded, all from the type locality from 2001-2002. As a result of the lack of specimens, very little is known about the possible variations in size and sculpture that this species may posses. At first glance *C. fragilis* may seem very similar to *Ptychosalpinx globulous* (Dall, 1889) or *Liomesus stimpsoni* (Dall, 1889). It differs from *P.*

globulous mostly in lacking the large, sharp edged, prominent fasciolar placation 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 more or less smooth body whorl instead of coarse spiral chords.

This single specimen collected in 2002 shows some variation from the descriptions of the holotype and paratype. Most obviously it is over ten millimeters larger than any of the others collected, expanding the known size range to 15-35+ mm. Also instead of having low spiral chords confined to the subsutural area and the anterior third of the body whorl, the entire shell is sculpted with many faint, low spiral chords (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 chords present on the holotype but does have numerous fine spiral threads which terminate apon intersection with the thickened, glazy callus that covers the parietal region. The parietal region, columella, and interior of the shell are glossy white and smooth. Finally, this specimen is covered by a thin light-brown periostracum unlike the other two specimens which lacked any trace thereof.

Material Examined- BCFAU0033, one freshly dead specimen collected from 400-480 meters of water west of South Cat Cay, 25°29.791'N, 79°18.478'W, on 24 May 2002, height 35.5 mm, width 21 mm.

Genus *Antillophos* Woodring, 1928

Antillophos bahamasensis Petuch, 2002

Plate 6, figs 7, 8

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

Description- Shell small for genus, elongated and narrow; spire high, protracted, shoulders rounded; suture deeply impressed, producing distinctly rounded spire whorls; body whorl and spire whorls consisting of openly reticulate sculpture composed of 16-18 thin longitudinal costae per whorl and 12-14 strong spiral cords on body whorl and 8-10 spiral chords on spire whorls; very thin, thread-like cords present between some pairs of large spiral cords; intersection of large spiral chords and longitudinal costae producing low beads; anterior tip of shell and siphonal canal encircled by three large spiral cords; spiral whorls with two to three large varices per whorl; body whorl without varices; outer lip very thick and wide; protoconch proportionally large, bulbous, shiny, composed of 2½ whorls; columellar area smooth with single large placation at anterior end and a single small denticle at posterior end; interior of aperture with 14-16 large cords; shell color tan with three darker tan bands and with spire whorls being darker tan; outer lip and siphonal canal white; interior of aperture and columellar area white (Petuch, 2002).

Type Locality- 400 meters depth off Victory Cay, Bahamas.

Range- Endemic to the deep waters off the Bahamas.

Discussion- A. bahamasensis is very similar in size, shape, and general color to *A. bayeri* Petuch, 1987 from the western and southern Caribbean although *A. 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 in preferring to live in much deeper water. Originally, *A. bahamasensis* was thought to have only a single columellar denticle, which further differentiated it from *A. bayeri* but it is now known that *A. bahamasensis* may have as many as 5 columellar denticles. Although *A. bahamasensis* is sympatric with *A. freemani* (Petuch, 2002). Petuch (2002) noted that *A. bahamasensis* seems to be much less common in the deep waters off Victory Cay than *A. freemani*. The FAU dredgings of 2002 and 2003 support this statement, there were three *A. freemani* collected and only one *A. bahamasensis* collected.

This specimen is roughly the same size as the others collected by Petuch in 2001 but displays some minor sculptural variation. The body whorl has 18 longitudinal costae and 14 spiral cords which 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 which 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 5

randomly sized plications instead of 1, 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, smooth, and composed of 2½ whorls which have a single, brown, spiral thread at their center; the body whorl is whitish-tan colored 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.

Material Examined- BCFAU0034, one freshly dead specimen dredged from 432 meters of water due west of South Bimini Island, Bahamas, 25°42.189"N, 79°20.496"W, on 9 May 2003, height 21 mm, width 9.7 mm.

Genus *Antillophos* Woodring, 1928

Antillophos freemani Petuch, 2002

Plate 6, figs 9, 10

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

Description-Shell of average size for genus, elongated, narrow; spire very protracted, scalariform; shoulders rounded; suture very impressed, producing extremely rounded whorls; spire whorls ornamented with 14-16 large, prominent axial costae; body whorl encircled with 12-14 large spiral cords; spiral whorls encircled with 5 large cords; 2-3 finer secondary cords present between primary

cords on spire whorl and body whorl; siphonal canal encircled by four large spiral cords; intersections of primary cords with axial costae producing large, prominent rounded beads; spire whorls and body whorl with scattered large , rounded varices, usually 2-3 per whorl; outer lip wide, thickened, expanded; siphonal canal small but distinctly constricted and narrow; protoconch proportionally large, bulbous, shiny, composed of 2 whorls; columella completely smooth without denticles; large, prominent placation present at anterior end of columellar area; interior of aperture with 14-16 large cords; shell color pure white or pale cream-white in some specimens with 3 very narrow, broken, pale tan bands around body whorl, with one around shoulder, one around midbody, and one around anterior end; some varices on spire whorls with small, pale tan patches.

Type Locality- 400 meters 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*. *A. 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 this specimen collected in 2002 there are 16 large, primary spiral cords on the body whorl, each pair being separated by a single, smaller, secondary thread and two yet smaller, tertiary, finer spiral threads; there are 15 axial costae and three heavy, varices on the body whorl and two to three thick varices per 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; shell color pure white, stained gray with no indication of additional color bands or patches. Two other broken specimens were dredged in 2002, both are larger than the whole shell that was recovered but they also both have broken off spires and only the body whorl left. They can be easily 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.

Material Examined- BCFAU0035, one freshly dead specimen and two larger, broken specimens dredged from 410 meters of water, south and west of Victory

Cay, Bimini Chain, Bahamas, 25°29.758'N, 79°18.462'W on 24 May 2002, height 19.5 mm, width 7.7 mm.

Family Fasciolariidae Gray, 1853

Subfamily Peristerniinae Tryon, 1880

Genus *Latirus* Montfort, 1810

Subgenus *Hemipolygona* Rovereto, 1899

Latirus (Hemipolygona) macmurrayi (Clench and Aguayo, 1941)

Plate 7, figs 3-6

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

Description- Shell solid and strong, elongate-fusiform, can be openly umbilicate or non-umbilicate, somewhat extended. Whorls 7-9, regularly increasing in size and very moderately convex. Spire extended and acute, forming an angle of around 42°. Palatal lip simple with a series of low costae and below them a few pustulations well within the aperture. Parietal wall thickened, with a thin white callus. Aperture elongate oval in shape Columella short but continued into a backwardly recurved canal. Suture distinctly impressed. Umbilicus imperfect, variable, sometimes flared and funnel shaped (as in holotype) or with only very thin pseudoumbilicus. Outer lip thin and finely lirate within. Sculpture of 8-9 strong and rather bold rounded axial costae crossed by numerous small spiral

threads numbering six on the body whorl; fine sculpture consisting of fairly strong growth lines crossed by numerous spiral threads, both visible to the unaided eye. Nucleus usually corroded but when present it is smooth and glassy, of two whorls, large and bulbous. Color variable, off white to dark brown usually pale-straw to yellowish brown, sometimes with a solid colored base and numerous light brown spiral bands encircling the entire shell.

Type Locality- Off Matanzas, Cuba in 347 meters.

Range- Northern Cuba and the Florida Straits.

Discussion- Although this species seems to be somewhat range restricted, 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 is the holotype (illustrated by Petuch, 1987) or it may be narrow and nearly absent as in the specimens illustrated and in Petuch, 2002: 65, figs. 2i and 2j. The subgenus *Hemipolygona* was erected in 1899 by Rovereto to include only two species; *L. macmurrayi* and *L. maderensis* Watson, 1897 from the eastern Atlantic off the Madeira Islands. The two species are similar in form but *L. macmurrayi,* in relationship to *L. maderensis*, is proportionally longer, can have 2 more whorls, and lacks the very strong spiral costae of *L. maderensis*. Of the western Atlantic species, *L. macmurrayi* seems most similar in shape and form to *Latirus angulatus* (Röding, 1798) but is not as

broad, has less distinct axial costae, less spiral sculpture and lives in much deeper water.

A total of four specimens were collected in 2002, all with the same general shape but there were two color forms. Three of the specimens have 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 a large and bulbous two whorled nucleus still in tact which 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.

Material Examined- BCFAU0038, BCFAU0039, four specimens freshly dead and well preserved, dredged from 564 meters of water, west of South Cat Cay, Bahamas, 25°.30.053'N, 79°19.107'W, in May 2002.

Color Form	Height	Width
Pale yellow with spiral banding	36.1 mm	13.3 mm
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

Subfamily Fusininae Swainson, 1840

Genus *Harasewychia* Petuch, 1987

Harasewychia amphiurgus (Dall, 1889)

Plate 6, figs 11, 12

Fusus amphiurgus Dall, 1889a: 171

Fusinus amphiurgus Abbott, 1974: 230, fig. 2526

Harasewychia amphiurgus Petuch, 1987: 101

Description- Shell small, 8 whorled, yellowish, translucent, with spiral touches of reddish brown; nucleus bulbous, polished, smooth, brownish, consisting of two whorls; spiral sculpture of fine, sharp, distinct, incremental lines; 9-10 narrow, rounded sub-equal axial ribs with wide interspaces on body whorl; spiral sculpture on the periphery of two primary threads which are stronger than any others; there are smaller secondary threads between some of the primary threads; aperture rounded; outer lip internally lirate; siphonal canal slender and well differentiated.

Type Locality- Gulf of Mexico in 185 meters.

Range- Deep waters of the Gulf of Mexico, Florida Keys, and western Bahamas.

Discussion- The genus was commonly referred to as *Fusus.* The genus *Harasewychia* erected by Petuch, 1987 includes at least seven other strictly deep water Fusinid species, the type being *Harasewychia harasewychi* Petuch, 1987.

This shell is similar to the sympatric *H. alcimus* (Dall, 1889). *H. amphiurgus* principally differs from *F. alcimus* in being more heavily sculpted by primary ribs with finer secondary ribs between whereas in *alcinus* there are fewer ribs which are more stout and coarse; *H. amphiurgus* is also a more slender shell with a longer siphon and has two unique, heavy spiral threads at its periphery. The shell is fairly eroded and most likely tumbled down from shallower water.

Material Examined- BCFAU0036, one dead and semi-eroded specimen dredged from 400 meters, south and west of Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, height 10.4 mm, width 3.8 mm.

Subgenus *Heilprinia* Grabau, 1904

Fusinus (Heilprinia) halistreptus (Dall, 1889)

Plate 7, figs 7, 8

Fusus halistreptus Dall, 1889a: 168, pl. 35, fig. 7

Fusinus halsistreptus Abbott, 1974: 230, fig. 2527; Petuch, 2002: 65, fig. 2H

Description- Shell pure white (some mature specimens may have brown coloration on the later axial ribs and on the siphonal canal), of about ten whorls;

early whorls with 10-12 faint transverse ribs which become nearly obsolete in the later whorls; lines of growth elevated, sharp, fluted and reticulated by the spiral sculpture giving the surface a rasp-like character, they are also gathered into a distinct frilled band just in front of the suture which they cut obliquely; spiral sculpture of numerous fine threads and on each whorl three to five stronger ones, more prominent and sharp edged on the axial ribs; aperture small, obliquely ovate, surrounded with an elevated border; outer lip delicately lirate within, inner lip perfectly smooth with a distinct siphonal fasciole in the callus at the posterior of the aperture; siphonal canal long, straight, slender, subcylindrical, bordered internally by a continuation of the thickened, white parietal callus.

Type Locality- Little Bahama Bank in 618 meters.

Range- Gulf of Mexico, eastern Florida, Florida Strait, Bahamas, West Indies.

Discussion- Dall noted that this species was commonly collected on sandy bottoms. A very defining feature is the gathering of the growth lines into a distinct frilled band just in front of the suture which they obliquely cut; this peculiar feature stands out readily on juvenile and mature specimens. This species most closely resembles *Fusinus schrammi* Crosse, 1865, from off the coast of North Carolina to Florida, being about the same size and in general similar in looks but otherwise being more attenuated, with more rounded and full whorls which are

not angulated by a prominent peripheral thread. The gathered oblique lamellae along the sutures of *F. halistreptus* are a defining feature.

Five specimens were collected in total in 2002, of which only one is fully mature, of this specimen it matches exactly, feature for feature with the original description; the hell consists of 10 whorls, the axial ribs are stained with a light brown color just above and below the periphery of the final two whorls and on the siphonal canal, and the parietal area is covered by a thick, glazy callus. The smaller specimens are all pure white with 6-8 whorls, thin lipped, and have traces of thin, light brown periostracum.

Material Examined- BCFAU0037, 5 specimens dredged from 400-564 meters of water, west of South Cat Cay, Bahamas, 25°.30.053'N, 79°19.107'W, in May 2002.

Height	Width
76.7 mm	23.2 mm
59.8	17.75
27.8	8.7
24.3	7.3
19.1	5.8

Superfamily Volutacea Rafinesque, 1815

Family Olividae Latreille, 1825

Subfamily Olivinae Swainson, 1840

Genus *Oliva* Brugguière, 1789

Subgenus *Strephona* Mörch, 1852

Oliva (Strephona) bahamasensis Petuch and Sargent, 1986

Plate 7, figs 9, 10

Oliva (Strephona) bahamasensis Petuch and Sargent, 1986: 125, pl. 20, figs. 15-18

Original Description- Shell of medium size for subgenus, thick and heavy, inflated and fusiform in shape, spire elevated; protoconch large; color bright yellow to pale-canary yellow, overlaid with numerous red-brown zig-zags that run the entire length of the shell; some specimens with zig-zags coalescing into triangles; sutures distinctly channeled with large purple-red flammules along the edges running onto the shoulder; interior of aperture pale yellow-orange; columellar area with 13-15 thin, weak plicae.

Type Locality- 200 meters depth off the north coast of Grand Bahama Island, Bahamas.

Range- Bahamian deep water endemic.

Discussion- O. bahamasensis is similar to *O. drangi* Schwengel, 1951, and *O. barbadensis* Petuch and Sargent, 1986, two other deep water olives from the eastern Caribbean, but is noticeably more inflated and stockier, has only very weak columellar placations, and characteristically has a bright yellow color. This account 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 western Atlantic.

This dredged specimen matches the description by Petuch and Sargent with little if any variation. The shell is solid and thick with an overall fusiform shape; protoconch large; edge of suture around body whorl with purple-red flammules running onto the shoulder; interior of aperture of Bimini specimen is white instead of pale-yellow orange, columellar area has 15 thin, weak plications, the anterior four being the strongest.

Material Examined-BCFAU0044, one freshly dead specimen dredged from 500 meters of water off Wedge Rock, Bimini Vicinity, Bahamas, 25°28.500"N, 79°18.766"W, on 10 May 2003, height 42.85 mm, width at shoulder is 18.5 mm.

Genus *Olivella* Swainson, 1831

Subgenus *Macgintiella* Olsson, 1956

Olivella (Macgintiella) watermani McGinty, 1940

Plate 7, figs 11, 12

Olivella watermani McGinty, 1940: 64, pl.3, figs. 4,5; Abbott, 1951: 114, pl. 7, figs. 5a-b; Olsson, 1956: 206, pl. 15, figs. 10,10a; Abbott, 1974: 236, fig. 2566.

Original Description- Shell generally small, solid, subelliptical or lens-shaped, the sides showing a regular elliptical or moderately convex contour tapering towards the ends, the anterior-apertural margin somewhat wider. Whorls 4-6 between deep sutures with the wall of the preceding whorl being strongly and concavely etched opposite of the sutural canal. Spire moderately low, in some cases slightly depressed with it's apex forming a small, knob-like projecting nucleus. Outer lip thin, widely apressed to the body whorl at the sutural junction and there forming a drawn out posterior canal. Inner side of outer lip smooth or with a series of indistinct, raised, spiral cordlike thickenings. Parietal callus very heavy, well developed posteriorly and spreading upward toward the suture. Pillar structure formed by a large fold below and set with 5-7 short but strong lirations along the parietal wall above separated by a shallow to deep columellar constriction from a series of 4 or 5 lower plaits on the base of the columella. Fasciole wide and divided by an incised line, its upper segment narrow. Color glossy white,

sometimes with three obscure bands of pink, orange, or yellow spots or flammules on the body whorl. Operculum thin, chitonous.

Type Locality- Gulf of Mexico.

Range- Common from 50 to 200 meters in the Florida Keys, Gulf of Mexico, Bahamas to Brazil.

Discussion- At least 4 specimens have been collected from the deep waters off Bimini, all have been collected freshly dead with the shells still smooth and polished. Two have been inhabited by worms and two are empty. These shells most likely rolled down from somewhat shallower water although they have been reported from as deep as 300 meters.

All the shells have smooth, white nuclear whorls with deeply incised sutures that are concavely etched on the preceding whorl opposite of the sutural canal; the upper columellar plaits are very faint and the lower are somewhat stronger; the strength of the medial columellar constriction is somewhat variable from shell to shell, sometimes being shall but prominent and sometimes being very noticeably deep; there are no traces of spiral, cordlike thickenings inside of the outer lip on any of the shells; all shells have a pure white columella and very thick parietal shield, the body whorls are all cream to pale yellow in color with orange-brown flammules at the posterior and anterior margins of the body whorl which become more faint as they meet towards the middle of the whorl.

Material Examined- BCFAU0045, 4 specimens dredged from 400-450 meters of water west of Victory Cay, Bahamas, 25°28.735'N, 79°19.084'W, on 24 May 2002.

Height	Width
18.4 mm	7.5 mm
12.6	5.2
12.6	5.2
8.7	3.8

Family Mitridae Swainson, 1831

Subfamily Mitrinae Swainson, 1831

Genus *Mitra* Lamarck, 1798

Subgenus *Mitra* Lamarck, 1798

Mitra (Mitra) swainsonii antillensis Dall, 1889

Plate 8, figs 9, 10

Mitra Swainsoni Broderip, 1835: 193; Reeve, 1844, pl. I, fig. 4; Agassiz, 1888: 70, fig. 293

Mitra swainsonii var. antillensis Dall, 1889a: 158, pl. 38, fig. 7

Mitra (Mitra) swainsonii antillensis Abbott, 1974: 237, fig. 2595

Description- Shells commonly reach 75 mm in length and about ¼ as wide; the aperture is about ½ as long as the entire shell; shell has 10 ten whorls which are generally smooth except for 5 or 6 weak spiral threads on the upper ¼ of the whorls; columella with 4 oblique spiral folds, the uppermost being the strongest; color is grayish-white with a light brown to olive periostracum; siphonal canal moderately wide, elongated, and slightly recurved dorsally; parietal canal straight and shallow.

Type Locality- 770 meters off Grenada.

Range- Rare from North Carolina to Florida and throughout the West Indies, usually at 60-150 fathoms (110-275 meters) depth.

Discussion- The specimen appears to have been dead for some time, the shell is in nearly perfect shape but has a number of small, circular encrustations, probably early colonization by a hydrocoral like *Stylaster*.

The shell is nearly all white in color except for some orange-brown staining on the early whorls. There is no trace of periostracum left on the shell. The shell consists of ten whorls, the sculpture is somewhat worn from being tumbled but is mostly smooth and there are only traces of two spiral threads on the uppermost part of each whorl, just below the sutures. Numerous faint spiral threads appear on the anterior-most part of the body whorl which can be traced

around the underside of the shell to where they meet the thick, glazy callus which possesses four heavy plications.

Material Examined- BCFAU0055, a single specimen dredged from 430-440 meters of water off Wedge Rock, Bimini Vicinity, Bahamas, 25°30.470'N, 79°18.380'W, in 2003, height 89.5 mm, width 25.0 mm.

Mitra (Mitra) barbadensis (Gmelin, 1791)

Plate 8, figs 11, 12

Voluta barbadensis Gmelin, 1791: p. 3455

Voluta striatula Schröter, 1804; Lamarck, 1811.

Mitra santomensis Félix-Alves & Fernandes, 1988: 6-13, pl. 1, figs. 1-3, 1A-3A

Mitra barbadensis Abbott, 1974: 237, fig. 2593

Description- Shells reaching up to 40 mm in length; slender, with the aperture wide anteriorly and ½ the length of the entire shell. The species is characterized by its yellow-brown color which may occasionally have a speck of grayish-white; aperture is tan within; columella has five slanting folds; the sides of the spire are almost flat; weak spiral threads are commonly present, especially in early whorls

Type Locality- Barbados "in oceano americano"

Range- A common outer reef species in southeastern Florida and the West Indies to Brazil. Bermuda.

Discussion- The shell is freshly dead with color and sculpture well preserved. It appears to have been killed by a crab because the outer lip, being the only damaged portion of the shell, is freshly broken off leaving the kind of wound that is commonly repaired by gastropods who survive attacks of that sort.

The shell is average in length for a full grown adult. The color of the early whorls is white, the body whorl is yellow-brown, and there are thick olive colored bands on the anterior portion of the two whorls just before the body whorl. Inside of the aperture appears to be mostly white, although it is mostly chipped off. The columella only has only developed 4, slanting folds; the spire is nearly flat sided and the entire shell is sculpted with numerous fine spiral threads, about 10 on the early whorls and over 25 on the body whorl. The spiral threads from the body whorl terminatre abruptly when they reach the columella which is smooth and pure white. The shell also has extremely fine, threaded axial sculpture which gives the shell a micro-cancellate appearance when viewed under 15x magnification.

Material Examined- BCFAU0057, one specimen dredged from 400 meters of water off Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, length 20.0 mm.

Subgenus *Nebularia* Swainson, 1840

Mitra (Nebularia) straminea A. Adams, 1853

Plate 8, figs 5, 6

Mitra straminea A. Adams, 1853: 132; Sigsby: 1874: pl. 25, fig. 561;
Cernohorsky 1976, p. 465, fig. 1

Mitra malleti Sigsby: 1852: 58, pl. 2, figs. 1 a-b

Mitra multilirata A. Adams, 1853: 135

Mitra fluvimaris Pilsbry and McGinty, 1949: 13, pl. 1, fig. 5

Mitra saldanha Matthews & Rios, 1970

Mitra straminea Abbott, 1974: 237-238, fig. 2599

Description- Shell of 7-8 whorls, length 20-28 mm, fusiform in shape, white with some brown staining. Body whorls slightly shouldered giving the shells spire a step-like appearance, whorls sculpted with 14-18 spiral cords. Aperture narrow and more than half the length of the entire shell. Columella with a thickened glazy white callus and 4 folds, the posterior-most being the strongest.

Type Locality- Unknown.

Range- 4-330 meters of water off Florida to Puerto Rico.

Discussion- Of all the Bimini dredges, only a single worn specimen was colleted. Because this species was commonly collected by SCUBA diving at night on the shallow reefs of Victory Cay I am lead to believe that it is most likely that the specimen was tumbled down from much shallower water although the depth range of this species is fairly large. They have been collected alive at least as deep as 128 meters (A. Adams, 1853).

The shell is mostly white in color but has traces of light brown coloration at the posterior portions of the whorls, just below the sutures. The sculpture is prominent with 6 spiral threads per early whorl and 16 spiral threads on the body whorl which are heavily worn, nearly flush with the shell. The callus is thick, white, glazy, and has three prominent placations and a fourth, anterior, developing plication. This shell resembles a juvenile *Mitra swainsonii* but can be differentiated by being a thinner, more spirally sculptured shell; having a less elevated spire with flattened spire whorls and sutures which are less promenent.

Material Examined- BCFAU0053, a single specimen dredged from 430-440 meters of water off Wedge Rock, Bimini Vicinity, Bahamas, 25°30.470'N, 79°18.380'W, in 2002, height 40.5 mm, width 11.0 mm.

Family Costellariidae (Swainson, 1840)

Genus *Nodicostellaria* Petuch, 1987

Nodicostellaria styria (Dall, 1889a)

Plate 8, figs 1, 2

Mitra (Costellaria?) styria Dall, 1889a: 159, pl. 15, fig. 6

Vexillum (Costellaria) styria Abbott, 1974: 239, fig. 2619

Description- Shells reaching at least 20 mm in length; pale yellowish white or pinkish, may have a faint peripheral brownish band, or mottled white; elongate fusiform, acute; cancellately sculptured; nucleus is elongate, pointed, glassy, smooth, and about 3.5 whorls; the teleoconch is made up of 10-14 subconvex whorls with a distinct but not channeled suture; sculpture of 18-25 flexuous, narrow, even, axial ribs and 6-10 thin, even, spiral threads creating a cancellate texture which may be nodulate at the intersections of the spiral and axial sculpture; there are three well defined plaits on the columella, mature individuals may have two more weak plaits anterior of the three strong ones (Dall, 1889a).

Type Locality- Off Havana, Cuba in 217 meters.

Range- Deep waters (60-666 meters) of the Gulf of Mexico, Florida, West Indies and Barbados.

Description- The strength of the spiral and axial sculpture is variable from specimen to specimen and some shells are more attenuate than others making this a fairly variable species. The variations in shell morphology are possibly related to maturity and in some cases can be correlated with geographic locality (Dall, 1889a).

The specimen collected was very freshly dead. Little is known about the bathymetric range of this species but it seems to have a wide depth range and is most likely a part of the living deep water fauna off Victory Cay, Bahamas. The Victory Cay specimen is well preserved; has a smooth, glossy, 3.5 whorled protoconch followed by only 6 body whorls which have around 18 raised axial ribs and 5 spiral threads on the early whorls, and 20 axials and 12 spirals on the body whorl; the intersection of the spiral threads and axial ribs creates a cancellate texture on the shell; there are three well developed plaits on the columella and a fourth, less developed plait anterior to the other three.

Material Examined- BCFAU0056, one dead specimen dredged from muddy ooze in 500 meters of water south and west of Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, height 11.4 mm, width 3.8 mm.

Family Turbinellidae Swainson, 1840

Genus *Exilia* Conrad, 1860

Exilia meekiana (Dall, 1889)

Plate 8, figs 7, 8

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

Description- Mature shells reaching 26 mm in length and 8.2 mm in width; elongate-fusiform in shape, thin, pale white or brownish in color; nucleus blunt, globulose, and consisting of about one whorl; 6-7 postnuclear whorls which are a little rounded; the second, third, and fourth whorls of the teleoconch posses 8-10 sharp, high, axial ribs which become mostly obsolete by the fifth whorl; whorls also show fine spiral threads, most distinct on the posterior half of the whorl, one of which may be stronger than the rest, angulating the ribs where it crosses them; aperture elongated; outer lip smooth and sharp; siphonal canal is about half as wide and nearly as long as the aperture and is slightly recurved; the parietal wall of mature specimens has an extremely thin, inconspicuous glaze but is not callused; the columella is moderately flexuous with three high, narrow, oblique plaits of which the posterior is the strongest. See Bayer, 1971 for detailed descriptions of the operculum and radula.

Type Locality- Off Morro Light, Cuba in 450-730 meters.

Range- Deep waters (440-1100 meters) of the Gulf of Mexico, Cuba, Jamaica, and the Bahamas.

Description- 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 fossils from upper Missouri. The genus was originally placed under the subfamily Fasciolariinae. Bayer, 1971 placed the shell in the Turbinellidae based on shell morphology and biology and moved the shell to the genus *Teremachia* Kuroda, 1931.Because the genus *Teremachia* is a strictly a southwestern pacific genus, the shell was later referred back to the genus *Mesorhytis* until Kantor, Bouchet, and Oleinik (2001) synonomised the genus *Mesorhytis* with the genus *Exilia*, placing the shell in it's current taxonomic position as *Exilia meekiana*.

This species was described by Dall from only a "couple" dead specimens collected aboard the Blake in the late 19th century, Bayer (1971) collected one alive aboard the R/V Gerda off the southwestern coast of Jamaica in 1970, some specimens have since been dredged alive from shallower water (30-60 meters) off Miami and the Florida Keys by Kevin and Linda Sunderland of Ft. Lauderdale, Fl (personal communication) and two specimens were dredged aboard the R/V Bellows in 2002 off Victory Cay, Bahamas. This is the first known record of *E. 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 thousands of gastropods in the tropical western Atlantic during the Deep-Sea Biology Program of the Rosenstiel School of Marine and Atmospheric sciences that only two specimens were collected, making a grand total of four specimens in all up until the year 1971.

The specimens collected aboard the Bellows are only approximately half the length of full sized specimens; they are fairly thin and delicate, pure white in color. Of the unbroken specimen: there is a blunt and globose protoconch that persists for only one whorl, there are 6 postnuclear whorls which are rounded and have about 10 raised axial ribs on the 2^{nd}, 3^{rd}, and 4^{th} whorls which abruptly become obsolete on the 5^{th} whorl where the sculpture becomes dominated by 5-6 fine, spiral threads which are restricted to the posterior part of each whorl, none of the spiral threads appear to be stronger than the rest, they are all nearly equal in thickness and are fairly faint mainly visible under magnification, the outer lip is smooth and sharp, the parietal wall is finely glazed but there is no visible callus; the columella has 3 distinct, narrow, oblique plaits which rise at nearly right angles from the columella. The broken specimen differs from the whole specimen in being larger (predicted altitude if protoconch was present: 15.5 mm), having a more inflated body whorl, and a much more developed spiral sculpture 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 which appear just below the suture on the body whorl only as small raised nodes. Dall, 1889 commented that the point at which the axial sculpture of the shell becomes obsolete is variable

from shell to shell which is apparent when both Bahamas specimens are compared, also the degree of spiral sculpture is a variable characteristic as can be seen in the two Bahamas specimens. Bayer, 1971 also observed that as the shells mature, the body whorls become slightly more inflated, outer lips become more flared and anterior canals are more distinctly recurved.

E. meekiana most resembles *E. chaunax* (Bayer, 1971) from west of St. Lucia, Lesser Antilles, but differs most in having no axial ribs on the body whorl, having 5-6 subsutural spiral cords rather than one, and having larger, more distinct columellar plaits. Another species, *Exilia costatus* (formerly *Mesorhytis costatus*) Dall, 1890, was dredged from 687 fathoms off St. Kitts, Lesser Antilles. *E. costatus* is distinctly different from *E. meekiana* and *E. chaunax* mostly in having a more developed sculpture of numerous spiral threads and raised axial costae on the entire shell.

Material Examined- BCFAU0054, two dead specimens was dredged from 400-450 meters depth west of Victory Cay, Bahamas, 25°28.735'N, 79°19.084'W, on 24 May 2002.length 12.9 mm, width 5 mm.

	Height	Width
Full specimen	12.9 mm	5 mm
Broken specimen	13.4	5.4

Family Volutidae Rafinesque, 1815

Subfamily Lyriinae Pilsbry and Olsson, 1954

Genus *Enaeta* H.and A. Adams, 1853

Enaeta reevei Dall, 1907

Plate 8, figs 3, 4

Voluta guttata Reeve, 1849: pl. 22, fig. 56 (*non* Dillwyn, 1817)

Enaeta reevei Dall, 1907: 353

Description- Shells usually around 12.5 mm, thick shelled and smoothish with weak axial ribs; color whitish with light yellow specks; outer lip thickened within with two dentifications posterioly; anterior section of columella with 3 small teeth; siphonal canal slightly reflected.

Type Locality- Honduras

Range- Honduras, Panama, Cuba: Havana Province, Bahamas, where they commonly inhabit shallow sandy environments just offshore.

Discussion- Three specimens were collected from two different dredges in 2002 which were most definitely transported down the slope wall after death in shallower water.

E. reevei is very similar to *E. cylleniformis,* another West Atlantic species. The two can be told apart by *E. reevei* having a smoother, more slender shell with fewer spire whorls which are more protracted and therefore have more elongate axial ribs. *E. cylenniformis* has much wider body whorls and a periphery that is angulated by the coarse axial ribs which thicken at the shoulder, above the shoulder to just below the suture of separating the

Material Examined- BCFAU0052, freshly dead specimen dredged from around 400 meters of water south and west of Victory Cay, Bahamas, 25°29.758'N, 79°18.462'W, length 12.7 mm.

Subfamily Scaphellinae Swainson, 1832

Genus *Scaphella* Swainson, 1832

Subgenus *Scaphella* Swainson, 1832

Scaphella (Scaphella) sp. nov.

Plate 9, figs 5-10

Scaphella (Clenchina) gaudiati Petuch, 2002: 65, figs. 2K, 2L, 2M, 2N, 2Q.

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

Description- Shell moderately small for the genus, only known to reach 48 mm in length, fusiform, moderately thin structured and light; protoconch large with the diameter reaching 2.0 mm, white and bulbous, of only 1 whorl, rounded, usually with a worn appearance, and slightly flattened ; teleoconch of 5 whorls, sculpted with numerous fine spiral threads which become nearly obsolete on the body whorl, sculpture on early whorls of 9-10 low even spiral cords which may appear to be finely reticulated by the growth increments of the shell; the body whorl shows 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 nodules evenly spaced along the shoulder of the last two whorls but there are never knobs on the early whorls or on young shells; aperture elongate-elliptical; outer lip thin; glaze of parietal wall variable from absent to a thin white glaze to a thickened white callus, there is no correlation between shell size and callosity; columella is strait, recurved dorsally, usually darkened in color, with two to four well developed plications, the number of columellar plications is variable with no correlation between shell size and number of plications; the color is highly variable, ranging from pure ivory-white to pale yellow to pinkish to orange, never having any traces of spots or stripes. Periostracum variable in thickness, brown.

Type Locality-Off Victory Cay, Bimini Chain, Bahamas in 400-600 meters of water.

Range- Only known from the type locality.

Discussion- This is a highly variable 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 and the smaller shells had no glaze at all, strangely enough the largest specimen has no glaze either. 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 never 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 I am treating them separately for now until more is known about the taxonomy of *Scaphella* in the Western Atlantic. This species is also similar to *Scaphella neptunia* Clench and Aguayo 1940, collected in 644 meters of water off Jamaica, and also resembles *Scaphella gaudiati* Bail and Shelton, 2001, a species collected off West Guadeloupe. It differs from *S. neptunia* mostly in having more sculpted early whorls, never having a calcarella extending above the second whorl, and being usually a solid color instead of having brownish bands or bars. It differs from *S. gaudiati* in being much smaller in size, being a thinner shell, having only 5 body whorls instead of 6, having a

sculpture in the early whorls of fine spiral cords, having a thin outer lip instead of a thick one, having 2-4 columellar plicae instead of two, and being much different in color.

Material Examined- 8 specimens that were collected from a number of dredges carried out off Victory Cay, Bahamas, from 2002-2005, in 380-480 meters of water

State of shell collected	Height	Width
Live	37.9 mm	14.3 mm
Dead w/ 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, juvenille	18.0	8.1
Freshly dead, juvenille	12.0	5.7

Scaphella (Scaphella) atlantis Clench, 1946

Plate 9, figs 1, 2

Scaphella (Aurinia) atlantis Clench, 1946: 53, pl. 29, fig. 5

Description- Shell large, reaching about 100 mm in length, fusiform and rather thin; there are seven moderately convex whorls; color is uniform yellowish-ivory with 15 spiral rows of dark brown spots; the aperture is elliptical and somewhat lengthened; suture lightly indented; outer lip thin, parietal wall thinly glazed; columella strait with three very strongly developed plicae; siphonal canal rather broad and strait. Sculpture: nuclear whorl smooth, remaining whorls have a finely reticulated pattern with the spiral lines being strongest; sculpture becomes obsolete on the body whorl. There are no axial costae on the mid-whorls although the shoulder is slightly angled. The nuclear whorl and calcarella are small and partially submerged within the second whorl.

Type Locality- Off Punta Alegre, Camagüey, Cuba in 385 meters.

Range- Previously only known from the northern coast of Cuba, this collection 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) and there were "a few" other specimens that may have been *atlantis*. Since the original account, I am 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 to my understanding that another shell has ever been collected that matches exactly the holotype of *S. atlantis*. The true identity of *Scaphella atlantis* still remains unknown and many malacologists place it in synonomy with *Scaphella dohrni*, as it is most definitely similar to the latter species. In a very conservative work, Weaver and du Pont, 1970 placed a number of species in synonomy with *S. dohrni* including; *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 but as of now not enough is known about the biology, ecology, and biogeography of the separate populations to be fully confident with the taxonomic placement of the *Scaphellas*.

Of the two *Scaphella atlantis* collected off Victory Cay, the larger specimen is fairly mature but still not full grown at only 66.5 mm, the shell is moderately thin, and consisting of 6 whorls; the color is nearly ivory white with a faint yellow undertone and 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 strait with three strong plicae and a very faint fourth developing; the nucleus is a smooth, finely pointed calcarela which is immersed within the first whorl; the

early whorls have a finely reticulate sculpture which is strongest on the first whorl and becomes obsolete after the third whorl; on the later whorls the only trace of sculpture are the numerous fine growth increments on the body whorl; there is a faint trace of nodulations on the penulatimate and body whorl giving the shoulder a slightly angled profile.

Material Examined- BCFAU0040, two specimens dredged from 450-476 meters of water off Victory Cay, Bahamas, 25°29.748'N, 79°18.123'W, in May 2002 and July 2005.

Height	Width
66.6 mm	26.0 mm
46.0	18.0

Scaphella (Scaphella) sp.

Plate 9, figs 3-4

Description- Shell comparatively small for genus, fusiform, and moderately solid; spire somewhat protracted; nuclear whorl smooth with a small, polished calcarella extending above but depressed within the second whorl; early whorls have numerous, fine spiral threads becoming most prominent above the shoulder and are nearly obsolete on the body whorl; only visible sculpture on the body whorl is fine axial growth increments; under magnification, above the shoulder faint traces

of spiral cords may be barely visible; shoulders smooth, with no trace of nodulations; teleoconch consisting of 5 smooth whorls, anterior portion of the whorls moderately convex, shouldered, and concave above the shoulder to toward the suture; sutures regular, moderately incised; aperture elliptical and $^{2}/_{3}$ of the length of the shell; outer lip thin; parietal wall with a light glaze; columella strait with three distinct plicae and a fourth anterior one forming, the central two plicae being the strongest; siphonal canal rather broad and strait, not arching; base color pale-ivory with 10 wide yellowish-brown spiral bands circling the entire shell;

Range- This form is only known from the deep waters of the Bahamas off Victory Cay.

Discussion- Only a single, freshly dead, specimen was collected in 2001 aboard the R/V Bellows. This species lives with the previously described species (*S. atlantis*) in the deep waters off Victory Cay, Bahamas and in many ways resembles it but has enough differences to be considered separately. In general, the shell resembles a cross between *Scaphella gaudiati* Bail and Shelton, 2001 and *Scaphella gouldiana* Dall, 1887, having a mix of features resembling each. It differs from *S. gaudiati* in being a smaller, lighter shell; being of 5 whorls instead of 6; having minor surface sculpture which is not present in the holotype of *S. gaudiati*, and in being less shouldered on the whorls. The shell differs mainly from *S. gouldiana* in being smaller, more thin-shelled, more protracted, less convex and more rounded in shape, and in having no traces of axial costae at the

shoulders and in having a nucleus with a projecting nucleus which is immersed within the first body whorl.

Material Examined- BCFAU0000, one specimen collected from around 400 meters of water in 2001 aboard R/V Bellows, off Victory cay, Bahamas, length 48 mm, width 15.8mm.

Scaphella (Scaphella) bermudezi (Clench and Aguayo, 1940)

Plate 9, figs11, 12

Aurinia bermudezi Clench and Aguayo, 1940: 89, fig. 2

Scaphella (Aurinia) bermudezi Clench, 1940: 56, pl. 30, fig. 6

Scaphella (Clenchina) dohrni Weaver and du Pont, 1970: 300, pl. 57, figs. A-B

Description- Shell medium in size, about 60 mm in length, fusiform and rather solid. Whorls six, slightly convex. Color ivory to yellowish with around 8 spiral rows of dark brown rectangular bars. Aperture elliptical and somewhat lengthened. Spire acute and moderately protracted. Suture lightly indented. Outer lip thin, parietal wall thinnly glazed. Columella slightly arched and supporting 5 strong plicae. Siphonal canal rather broad and slightly arched dorsally. Sculpture: nuclear whorl smooth, succeeding whorls with a very fine reticulated pattern, the spiral lines being stronger, the sculpture becoming more or less obsolete on the body whorl. From the fourth to the last whorl there is a series of small and fine

axial costae forming nodes at the whorl shoulder. Nuclear whorl small with the calcarella and the first whorl partially submerged in the second whorl.

Type Locality- Bahía de Cochinos, Las Villas, Cuba, in 330-350 meters.

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 resembling *S. bermudezi* (or the *bermudezi* form of *S. dohrni* according to Weaver and DuPont?) was collected off Victory Cay. It seems fit for now to refer this specimen to *S. bermudezi* because it differs in a number of ways from the other *Scaphalla* forms collected off of the Victory Cays. In general this specimen is thick shelled; has 4 heavy columellar plicae; has numerous low, rounded nodes around the shoulder of the last two whorls; has a color pattern of 8 spiral rows of dark brown axially drawn out bars; and the protoconch is broken off. Of the other *Scaphella* forms from the Victory Cay locality, this one resembles *Scaphella atlantis* in having a similar color pattern of axially extended brown dots or bars but it is more thick shelled, with heavy nodes at the shoulder of the last two whorls, and less inflated than *S. atlantis.* The overall shape and sculpture of this specimen highly resembles that of *Scaphella sp. nov.* (pl. 8, figs., 5-10) in being elongate fusiform, rather small in size, with heavy, rounded nodes at the shoulders, and very fine spiral sculpture around the body whorl. When first comparing the overall shape and sculpture of this

specimen with that of *Scaphella sp. nov.* I was tempted to refer to this specimen as a color form of it but the specimens of *Scaphella sp. nov.* never have any traces of the barred color pattern, none are thick shelled, and none have such heavy columellar plicae as this specimen.

Material Examined- BCFAU0075, ne dead specimen, with protoconch missing, dredged from around 400 meters of water in off Victory cay, Bahamas, length 38.3 mm., width 15.2 mm.

Family Cancellariidae Forbes and Hanley, 1853

Subfamily Admetinae Troschel, 1865

Genus *Admete* Kröyer, 1842

Admete cf. microscopica Dall, 1889

Plate 10, figs 1, 2

Description- Shell minute, four whorled; upper whorls glossy white, last two whorls ivory; nucleus inflated, glassy, polished, remaining whorls shouldered near the suture; whorls spirally sculpted with subequall rather coarse threads crossed by evident little elevated lines of growth; early whorls are crossed by small rounded axial ribblets, axial sculpture becomes nearly obsolete on the body whorl; umbilicus indistinct; aperture elongate-oval; outer lip not internally lirate, not thickened; the inner lip moderately callus with two faint folds present fairly deep

within at about the middle of the columellar region; periostracum not present on this specimen.

Discussion- Only one *Admete* specimen was recovered in the three years of dredgings off Victory Cay. Most western Atlantic *Admete* species are confined to colder northern waters from Greenland through the northeastern United States, however there are a couple of species that are found in the more tropical waters of the Florida Straits and the Gulf of Mexico such as *Admetula vossi* Petit, 1976 and *Admetula bayeri* Petit, 1976, *Admete nodosa* Verril and Smith, 1885 *Admete smithii* Dall, 1889, *Admete agassizii* Dall, 1889, and *Admete microscopica* Dall, 1889.

The specimen dredged from off Victory Cay seems most similar to *A. microscopica* but it is over twice the size of a typical *A. microscopica* and it not yet fully mature; the outer lip is very thin and irregular and there is no evidence of columellar thickening or callus formation yet, a typical feature of mature *Admete* species. This specimen differs further from *A. microscopica* mainly in being only four whorled; fully white, not gray to whitish, in color; having less distinct axial sculpture; having no umbilicus; having an elongate, rather than round aperture; and in not being lirate within the outer lip.

Material Examined- BCFAU0041, one specimen collected dead from 500 meters of water off Victory Cay, 25°27.332'N, 79°19.223W on 23 May 2002, length 11 mm, width 6.1 mm.

Family Marginellidae Fleming, 1828

Subfamily Marginellinae

Genus *Persicula* Schumacher, 1817

Persicula bahamasensis Petuch, 2002

Plate 10, figs 3, 4

Persicula bahamasensis Petuch, 2002: 65, figs. 2O, 2P

Original Description - Shell of average size for genus, very elongated, cylindrical, slender; shoulder rounded; spire uncallused, depressed and forming a shallow pit; aperture narrow, widening slightly at anterior end; anterior end of columella with 5 plications, with posteriormost being smallest and anteriormost being largest and the others in between grading sequentially in size; edge of lip thickened; inner edge of lip with 26-28 small denticles; labial denticles extend into aperture as ribs; anterior end of columella with large, distinct fasciole, corresponding to 2 largest anterior columellar plications; shell color uniformly pure white, with transluscent, porcellaneous appearance.

Type locality- Victory Cay, Bimini Chain, Bahamas at 400 meters depth.

Range- Only known from type locality.

Discussion- This species was first collected off Victory Cay in 2001 on an FAU research cruise aboard the R/V Bellows and was subsequently described by Dr. Petuch (2002).

Of all the known *Persica* taxa from the western Atlantic, *Persicula bahamasensis* is the only pure white, unicolored species. *P. bahamasensis* is also the only known *Persicula* to have an uncallused, depressed spire. The very elongated, cylindrical shape is also unique to this species. There is only one other known species, *Persicula muralis,* from the Netherlands Antilles, that is equally elongated but the shell of *P. muralis* is adorned with bright color patches and dots, making it easily separable from the pure white *P. bahamasensis*. *P. bahamasensis* is also the deepest dwelling *Persicula* species, living at depths of at least 400meters while the other known species are found in depths of only 0-100 meters.

There seems to be very little variation within the lot of *Persicula* specimens collected between 2002-2005. They are all pure white in color, equally elongated and cylindrical, with equally depressed spires, narrow apertures, and large distinct fascioles corresponding to the largest anterior-most columellar plications. The only variations being that the number of columellar plications varies from 3-5, and the strength of the dentition of the outer lip is very weak to undetectable in my specimens.

Material Examined- BCFAU0042, a lot of five specimens which were collected in 2002 and 2005 from 360-440 meters of water off Victory Cay, Bahamas, 25°30.449'N, 79°18.214'W.

Height	Width
8.8 mm	4.7 mm
8.8	4.7
8.4	4.6
8.1	4.5
5.8	3.8

Genus *Hyalina* Schumacher, 1817

Hyalina avenacea (Deshayes, 1844)

Plate 10, figs 5, 6

Description- Shell of average size for genus, elongate, slender and mildly fusiform; spire protracted; shell of 4, smooth, polished, convex whorls; body whorl is mildly shouldered; nucleous bulbous and rounded; outer lip curled in and smooth within; aperture narrow posteriorly and flaring open anteriorly; columella with 4 strong, blade-like plications with the middle two being the strongest; color of mid whorls is pure white or olive-gray fading to rusty orange toward the sutures and outer lip; there is a unique, thin, white band that spirals along the base of the sutures and at the end of the body whorl it continues down the margin of

the outer lip around the base of the shell and forms a pure white, apertural fasciole as it continues spiraling into the aperture of the shell

Type Locality- Unknown.

Range- Commonly found from shallow water down to 750 fathoms off North Carolina to both sides of Florida and to Brazil.

Discussion- Two specimens were collected in the same dredge from near Victory Cay. Both have the same shape, being uniquely fusiform and high spired but they are different in color. There is a pure white specimen and an olive-grayish one. In both specimens the unique white band along the suture lines is prominent and visible. *Hyalina* are common in shallow and very deep water, since both of these specimens were collected dead it's hard to assume whether they tumbled from shallow water or if they were living in the deep water off Victory Cay. They were only collected in one dredge haul, the first one of 2002, which was located somewhat far from all of the other hauls (see dredge line map) and we haven't collected any more of them since.

This shells are most similar to *Hyalina avenacea* but differ from the typical form in being somewhat higher spired, having a slightly shouldered body whorl, and a unique coloration with a distinct white band that follows the sutures and outlines the outer lip.

Material Examined- BCFAU0043, two dead specimens dredged from 600 meters of water south and west of Victory Cay, Bahamas, 25°26.008'N, 79°18.617'W, on 23 May 2002. The largest specimen measures 15.4 mm in length and 6.5 at its maximum width.

Superfamily Conacea Rafinesque, 1815

Family Conidae Rafinesque, 1815

Genus *Conus* Linné, 1758

Subgenus *Lindaconus* Petuch, 2002

Conus (Lindaconus) lindae Petuch, 1987

Plate 11, figs 1-8

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

Description- Shell shape variable, ranging from elongate to stocky in the same population, solid, broad across the shoulder; spire variable, ranging from flat and slightly sloping to elevated with slightly canaliculated whorls; shoulder distinctly rounded; body whorls shiny, highly polished, with waxy feel; aperture narrow; protoconchs consistently very large, bulbous, rounded, and composed of two whorls; shell color variable within each population and ranging from pure white to white with very faint pink mottlings, to pinkish-white with multiple rows of dark pink dashes and dots to pale pinkish-rose, overlaid with two bands of

salmon-pink dots arranged with one above mid-body and one below mid-body near the anterior end; color of shoulder and spire whorls variable, ranging from pure white to white with pale pink flammules to pale cream-tan with multiple rows of darker tan dots and dashes;; interior of aperture white; periostracum of variable thickness, smooth, opaque to translucent, dark yellow-tan in color; anterior columellar placation somewhat variable being better developed and more prominent in mature specimens (Petuch 1987, 2002).

Type Locality- 240 meters 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. It was recognized the subgenus contains taxa similar to the subgenus *Floraconus* Iredale 1930 which contains shells from Australia and South Africa. *Lindaconus* was erected to represent similar shells from the western Atlantic which 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 placation which may be variable in prominence as in *C. lindae*.

C. 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. All grades of color and shape variations have been collected from the population near Bimini, yet a population reported from around 50 miles north of Bimini yielded all pure white shells.

Material Examined- A lot of over 50 shells, most collected dead and only 5 collected alive, which were dredged from 350-481 meters of water at numerous

stations (see dredge logs for detailed information) off Victory Cay, Bahamas, from 2002-2005.

Family Terebridae H. and A. Adams, 1854

Genus *Terebra* Bruguière, 1789

Subgenus *Myurella* Hinds, 1845

Terebra (Myurella) floridana Dall, 1889

Plate 10, figs 13, 14

Subula floridana Dall, 1889: 63 Listed as (Terebra: section Subula: floridana)

Terebra floridana Dall, 1889: 63

Terebra (Myurella) floridana stegeri Abbott, 1954: 39-40, pl. 2, figs. 5-6

Terebra (Myurella) floridana Abbott, 1974: 259, fig. 2837

Description- Shells usually from 50-80 mm in length, very long and slender; color light yellow to yellowish-white; sutures are lightly impressed; just below the suture on each whorl is a row of 17-23 oblong, slightly slanting, smooth axial ribs; below the axial ribs and separated from them by an impressed line is a similar row of much shorter, axial ribs; the lower $^1/_3$ of the whorls is marked by 3 or 4 raised, spiral threads only; columella has a single, strong fold near the bottom.

Type Locality- Near Key West, Florida in 50 fathoms (91.5 meters).

Range- From off South Carolina to Southern Florida and Brazil, they generally inhabit depths between 10 and 236 meters of water.

Discussion- All *Terebra* specimens collected had undoubtably tumbled down from shallower water. They all were dead and had broken lips, were filled with sediment and in many cases had coralline growth on them.

The specimens collected off Victory Cay are pure white in color with only faint remnants of yellow coloration, possibly due to lying dead on the bottom for an extended period of time. The shells are pure white; each whorl has a row of at least 20 smooth axial ribs just below the suture which is separated by a groove from another equal row of axial ribs which is followed anteriorly by a row of 3-4 spiral threads taking up about ½ of the whorl which has also very faint axial sculpture.

Material Examined- BCFAU0048, two specimens were brought up in the year 2002 from between 440-476 meters off Victory Cay, Bahamas, 25°30.470'N, 79°18.380'W.

Whorls	Height
26	62.9 mm
18	26.6

Terebra evelynae Clench and Aguayo, 1939

Plate 10, 11, 12

Terebra evelynae Clench and Aguayo, 1939: 196, pl. 29, fig. 1

Original Description-Shell exceedingly slender, imperforate and solid. Whorls 25 remaining (loss of 5 whorls) almost flat and tapering to a very sharp summit. Color consisting of two bands of light brown with a narrow band of white at the whorl periphery. The bands of brown may be somewhat blotched or evenly disposed. Spire slender and forming a very acute point. Angle of spire 7°. Aperture subovate, small and with the palatal edge slightly sinuous in profile. Parietal wall rather thickly glazed. Palatal lip simple with a rather deep notch (the canal) at the base. Columella thickened and inclined slightly. Sculpture on the early whorls of 10-12 fine axial threads, slightly sinuous which on the later whorls become less pronounced and coalesce on the last few whorls giving way to strong and irregular growth lines. Spiral threads are also present on the later whorls. Subsutural depression rather pronounced on the early whorls which broadens and becomes less strong on the last four whorls. Sutures slightly impressed.

Type Locality- Off Havana, Cuba.

Range- Northern Cuba and southern Gulf of Mexico to the Straits of Florida in 290-460 meters of water

Discussion- All specimens were collected dead with chipped lips, most were well eroded with the sculpture worn away. It is possible that *T. evelynae* is living in the deep waters off Victory Cay, as they were originally collected from similar depths off of northern Cuba.

All specimens are similar with only a small amount of variability. In our samples, the color is mostly pure white with remnants of pale yellowish coloration but there is no indication of brown coloration; the color may have faded with time, the sculpture has also been slightly eroded with time. On the later whorls the spiral threads become barely visible and the fine threads become restricted to the upper half of the whorls; the parietal region of all specimens is glazed by a thin white callus; all outer lips are broken off; each shell has a single dentification and all shells are all missing their nucleus.

Material Examined- BCFAU0047, four specimens were recovered from two different dredges in the year 2003 from between 432-472 meters off Victory Cay, Bahamas, 25°42.189"N, 79°20.496"W, the largest measures 55.5 mm in length.

Whorls	Height
18	53.5 mm
20	49.0
18	44.0
13	35.3

Family Turridae Swainson, 1840

Subfamily Turriculinae Powell, 1942

Genus *Cochlespira* Conrad, 1865

Cochlespira radiata (Dall, 1889)

Plate 12, figs 1, 2

Pleurotoma (Ancistrosyrinx) radiata Dall, 1889a: 78-79, fig. 12, Abbott, 1974: 265, fig. 2924

Cochlespira (Ancistrosyrinx) radiata cubana Clench and Aguayo, 1940: 94, pl. 15, fig. 1

Description- Shell colored white with pale brown mottlings or diffusely very pale brown; nucleus of two whorls, the first very small, round, obliquely set, and partially immersed. Apex sharp with 9-10 sharp, peripherally keeled, dentate whorls following; towards the final whorls the dentifications become spinous and more or less posteriorly directed; spiral sculpture anteriorly of numerous, separated fine threads. There are around 26 sharp, short, subtriangular spines on the carina of the body whorl. Halfway between the keel and the carina there is an elevated second keel which is never undulate of denticate. The sinus is prominently indented about $^{1}/_{8}$ of a turn. Canal long, narrow, rather open, and slightly curved at the tip. The entire surface of the shell has a polished appearance.

Type Locality- Yucatan Strait in 640 fathoms (1171 meters).

Range- Off North Carolina and Florida, the Gulf of Mexico and the West Indies.

Discussion- This species has been dredged from 150-1200 of water on sandy and rocky-rubble bottoms. Dall (1889a) noted that the animal is whitish or pale-straw in color and has a smooth, slightly flattened, oval tipped penis which is of proportionately enormous size and placed on the right side behind its head. There is also a similar fossil from the Eocene of Mississippi, *Cochlespira columbaria* (Aldrich, 1886).

C. radiata is most similar to *C. elegans* (Dall, 1881) but differs in being less sculpted with only faintly visible axial growth lines, being not so elongated, and in having fewer but more elongated spines. The Bimini specimen fits Dall's description well, although it is pure white in color, maybe because it was collected dead, and it is also 2 mm longer than any that Dall mentioned, although they have been reported as large as 32 mm in length. The protoconch is in tact, with two whorls, the first being very small and obliquely set. There are 10 body whorls following the nucleus, each with numerous sharp dentifications, 22 on the body whorl, and there is a prominent 2nd keel behind the periphery of each whorl.

Material Examined- BCFAU0058, one dead specimen dredged from 481 meters of water off South Cat Cay, 25°29.791'N, 79°18.478'W, height 20.7 mm, width 8 mm.

Genus *Leucosyrinx* Dall, 1889

Leucosyrinx verrillii (Dall, 1881)

Plate 13, figs 3, 4

Pleurotoma (Pleurotomella) Verrillii Dall, 1881: 57

Pleurotoma (Leucosyrinx) Verrillii Dall, 1889a: 75, pl. 5, fig. 5

Pleurotoma sigsbei Dall, 1881: 57; Dall, 1889a: 76, pl. 11, fig. 10

Pleurotoma talismani var. attenuata Locard, 1897: 162

Pleurotoma talismani var. curta Locard, 1897: 162

Pleurotoma devestitum Locard, 1897: 169-171, pl. 6, fig. 19-23

Pleurotoma talismani var. elongata Locard, 1897: 162-163, pl. 5, fig. 26-27

Pleurotoma talismani Locard, 1897: 160-163, pl. 5, fig. 20-25

Surcula gradata Thiele, 1925

Leucosyrinx janetae Bartsch, 1934: 11-13, pl. 3, figs. 3, 11-12

Leucosyrinx verrillii Abbott, 1974: 263, fig. 2898

Description- Shell eleven whorled, thin, large, bluish-white, with an acute spire and long twisted canal; nucleus thin, smooth; next three or four whorls smooth, shining, with a spiral row of little polished knobs just behind the suture; later whorls covered with numerous raised, polished knobs at the shoulder just behind the suture; knobs on later whorls are more axially drawn out with a more pinched appearance, there are around twenty one on the last whorl; entire shell covered with hardly raised spiral flattened threads which are about equal in size and about

four per millimeter; suture faintly impressed; subsutural band concave; posterior notch broad, shallow, rounded; siphonal canal elongate and twisted.

Type Locality- BLAKE station 41, northwest of Cuba.

Range- South Carolina, Florida, Gulf of Mexico to Yucatan Channel, Cuba, Greater and Lesser Antilles to Brazil; from 274 to 2910 m (live 1342 to 2910 m).

Discussion- The specimen dredged from off Victory Cay is tumbled and somewhat eroded, only about half of the maximum size recorded for the species (36.0 mm), and has a broken lip. The shell is 10 whorled, thin, pure white with an acute spire and long twisted siphonal canal; nucleus broken off; first four adapical whorls polished and shining with numerous raised nodes at the shoulder; nodes at the shoulder give whorls an angular periphery; nodes become more pinched on the later whorls; later whorls sculpted with numerous fine spiral threads above and below periphery; sutures faintly impressed; area between sutures and periphery of whorls distinctly concave; siphonal canal long, twisted, sculpted with around 18 low, thin spiral threads. This shell was compared to *Splendrillia lissotropis* by Dall, which it does resemble. For comments and comparison see the discussion section for *Splendrillia lissotropis.*

Material Examined- BCFAU0080, one partially eroded specimen with broken outer lip dredged from around 400 meters of water of Victory Cay, Bimini Chain, Bahamas, height 16.7 mm, width 5.3 mm.

Subfamily Turrinae Swainson, 1840

Genus *Polystira* Woodring, 1928

Polystira staretti Petuch, 2002

Plate12, figs 5, 6

Polystira staretti Petuch, 2002: 70, figs. 3L, 3M, 3N

Original Description- Shell small for genus, elongated, with rounded shoulder; siphonal canal long, same length as spire; body whorl ornamented with six large, prominent raised cords; subsutural cord and cord around shoulder largest in size; spire whorls ornamented with 2 large cords and one small cord that borders the suture; areas between cords with distinct raised growth lines, producing chevron effect; siphonal canal ornamented with numerous fine, threadlike cords and one single large cord just anterior of the siphonal canal- body whorl juncture; aperture proportionally small, oval in shape; shell color pure white.

Type Locality- Off Victory Cay, Bimini Chain, Bahamas, in 400 meters.

Range- Only known from the type locality.

Discussion- Of the known western Atlantic *Polystira* species, *P. starretti* most closely resembles *P. lindae* Petuch, 1987 from the southern Caribbean. *P. starretti* differs from *P. lindae* in having six large chords on the body whorl instead of five, in having two large chords on the spirewhorls instead of three, in having the distinctive chevron pattern of growth increments between the cords, and in having the single large cord around the posterior end of the siphonal canal. *P. staretti* may also be mistaken for *P. tellea* (Dall, 1889), a defining difference being that *P. staretti* always has a more faint spiral sculpture of more or less evenly disposed, numerous spiral cords which can vary in thickness and has one distinct raised cord anterior of the siphonal canal-body whorl juncture whereas *P. tellea* generally has two raised cords below the suture and lacks the one raised cord anterior of the siphonal canal-body whorl juncture. *P. tellea* is also larger in size, reaching over 100 mm whereas *P. staretti* is generally less that 40 mm in length. *P. starretti* differs from *P. albida*, another common western Atlantic deep water polystira species, in never reaching the large size (over 100 mm) reached by *P. albida*, being less sculpted, and in having a much shallower sinus. In the three years of dredgings off Victory Cay, only three *P. starretti* were collected, and in prior dredgings reported by Petcuh (2002) only around four were recovered. *Polystira staretti* has never been collected alive.

The shells collected in 2003 are large in comparison to the holotype and paratypes, the largest of which being 39.8 mm. It resembles the original description by Petuch (2002) in having precisely 6 prominent, raised cords on the

body whorl with the subsutural cord and cord around the body whorl being the strongest; there are 11 spire whorls each with numerous evenly disposed cords and one prominent raised cord anterior of the siphonal canal-body whorl juncture; the areas between the cords have numerous fine growth lines producing a chevron texture; the siphonal canal is ornamented with numerous fine, threadlike spiral cords; the aperture is proportionally small and oval in shape, and the color of the shell is pure white; there are also two or three very fine spiral threads in between each of the thicker spiral cords which cross the raised, obliquely set axial growth increments (chevrons) and become more numerous and better distinguishable on the later body whorls (starting at around the fifth). The largest specimen still has the nucleus intact; it is fairly large, of one whorl, glossy white, and bulbous in shape.

Material Examined- BCFAU0090, three specimens dredged from 400-511 meters of water off Victory Cay, 25°29.370"N, 79°18.243"W, in May 2003.

Height	Width
39.8 mm	10.3 mm
28.9 (broken siphon)	8.9
27.1 (broken protoconch)	9.1

Polystrira tellea (Dall, 1889)

Plate 12, figs 3, 4

Pleurotoma albida var. *tellea* Dall, 1889a: 72-73.

Polystira tellea Abbott, 1974: 266, fig. 2939

Description- Maximum height can reach 90 mm; color is grayish white; sculpture of numerous spiral cords which can vary in thickness, generally the two just below the suture are heaviest; the number of spiral cords increases from early whorls to body whorl, early whorls may only have two spirals while proceeding whorls increase the number of spirals until finally, on the body whorl there are up to ten primary spirals with numerous finer threads in between; there is a finely reticulated sculpture created between the heavier spirals by fine axial growth increments which produce a chevron-like texture from the early whorls.

Type Locality- Unknown.

Range- Off Florida to Louisianna.

Discussion- This species most resembles *P. albida* Perry, 1811 differing primarily, in having a sculpture that is not so distinct or smooth but more faint; having more numerous spiral cords and threads; having a more shallow anal notch that is set higher on the shoulder and more shallowly V-shaped than in *P. albida*;

having the minute axial fimbrications or chevrons which are not present in *P. albida*; and is usually without any trace of an umbilical chink. For comments on resemblance to *P. staretti* see the discussion section of *P. staretti* above. The specimens dredged from off Victory Cay are fairly small in size; all have the distinct sculpture of numerous spiral threads with two heavier, raised threads anterior of the sutures; there is a shallow, V-shaped anal notch on the antrior edge of the outer lip, and all have broken protoconchs.

Material Examined- BCFAU0059, three dead specimens dredged from 440-511 meters of water off Victory Cay, Bahamas, 25°29.370"N, 79°18.243"W, in 2002 and 2003.

Height	Width
60.0 mm	18.3 mm
54.5	15.7
29.5	8.5

Subfamily Clavinae Powell, 1942

Genus *Drillia* Gray, 1838

Drillia havanensis Dall, 1881

Plate 13, figs 5, 6

Pleurotoma (Drillia) havanensis Dall, 1881: 67-68

Drillia havanensis Dall, 1889a: 93, pl. 11, fig. 5

Original Description- Shell somewhat variable, small, white, the first six whorls rather slender, giving a subcylindrical appearance, the latter whorls, if any, enlarging more rapidly; whorls about eight, of which about two are nuclear; nucleus large white, smooth, unsculptured, forming for the shell a rather blunt button-like apex; succeeding whorls marked by a transverse sculpture of twelve to (on the last turn) eighteen narrow, oblique, flexuous ribs, which begin as little sharp nodules at the suture, are evanescent over the notch band, then continue to the next suture, or in the last whorl become evanescent at its anterior third; these ribs are crossed by a variable number of rather sharp revolving threads, with wider interspaces, usually three or four in number (on the older whorls) to sixteen (on the last whorl), beginning just in advance of the band; the first two are the most prominent and angulate the riblets where they cross them, producing little raised points; the succeeding threads are a little enlarged where they cross the ribs, but do not form points, and are as usual closer together on the anterior part of the canal; on the band is no sculpture except the lines of growth and an occasional faint indication of revolving striae; the number of riblets and threads with their respective sharpness and prominence of the nodules are somewhat variable; the band is somewhat excavated, tending to give a turreted appearance in older shells; notch broad, not deep; outer lip thin, produced forward; siphon strait, anteriorly attenuated, with very little callus; lines of growth well marked all over the shell.

Type Locality- Blake sta. 16, 262 fms (479 m); sta. 19, 310 fms (567 m); off Havana, 450 fms (823 m); Yucatan Strait, 640 fms (1171 m).

Range- Yucatan Strait , Gulf of Mexico, Cuba, southern Straits of Florida.

Discussion- Of the three specimens dredged off Victory Cay, two are full grown and one is juvenile. The two full grown shells match Dalls original description precisely but are a little more attenuate and have more spiral threads than the specimen figured in Dall, 1889a (pl. 11, fig.5); these traits were recognized as variable by Dall in the original description from 1881. The juvenile specimen is six whorled and doesn't yet have the wider body whorls which appear as the shell matures so it looks long, slim, and cylindrical with a large, bulbous, polished nucleus. All specimens are pure white.

Material Examined- BCFAU0081, three freshly dead, well preserved specimens dredged from around 400 meters off Victory Cay, Bimini Chain, Bahamas.

Height	Width
11.4 mm	3.8 mm
11.4	3.8
6.4	1.9

Genus *Inodrillia* Bartsch, 1943

Inodrillia acova Bartsch, 1943

Plate 13, figs 9, 10

Inodrillia (Inodrillara) acova Bartsch, 1943: 115-116, pl. 9, fig. 1; pl. 11, fig. 2; pl. 15, fig. 8

Type Locality- Eolis sta. 343, off Sambo Reef, Florida, 110 fms (201 m).

Range- East coast of Florida, Florida Keys, Straits of Florida in 137-247 meters.

Material Examined- BCFAU0082, two freshly dead specimens dredged from around 400 meters of water off Victory Cay, Bimini Chain, Bahamas, height16.3 mm, width 5.5 mm (both specimens)

Genus *Spendrillia* Hedley, 1922

Splendrillia lissotropis (Dall, 1881)

Plate 13, figs 7, 8

Pleurotoma (Mangilia) lissotropis Dall, 1881: 58-59

?Pleurotoma (Mangelia) hypsela Watson, 1881: 433; Watson, 1885: 341, pl. 21, fig. 4

Drillia lissotropis Dall, 1889a: 91, pl. 11, figs. 3, 4

Drillia (Drillia) (lissotropis var.) scissurata Dall, 1890: 36-37

Original Description- Shell small, slender, somewhat bluntly tipped, with six whorls shining with the luster of parffine; nucleus rather large, bullate, smooth, translucent, shining; remaining whorls with transverse, stout, shouldered ribs (on the last whorl 11) becoming obsolete anteriorly, and succeeded by a few (four or five) revolving riblets at the anterior extreme of the canal; suture appressed; lines of growth not evident; whorls rather inflated in appearance; notch very slight; aperture small and unusually short; pillar very short, strait and pointed.

Type Locality- Blake sta. 20, off Bahia Honda, Cuba 220 fms (402 m).

Range- Off both coasts of Florida, Gulf of Mexico, Cuba, Panama to Brazil, Barbados; also as a fossil in the Caloosahatchie beds of Florida (Dall, 1890).

Discussion- Dall pointed out that this shell is notable for its peculiar tranlucent waxy texture. The specimen dredged from off Victory Cay is badly eroded so I can not comment on the waxy texture but it is notable that this is a fairly large specimen, 1 mm longer that any in the references I can find.

Material Examined- BCFAU0083, one eroded specimen dredged from around 400 meters of water of Victory Cay, Bimini Chain, Bahamas, height 8.1 mm, width 3.3 mm.

Genus *Cymatosyrinx* Dall, 1889

Cymatosyrinx pagodula (Dall, 1889)

Plate 13, figs 13, 14

Drillia pagodula Dall, 1889a: 90, pl. 13, fig. 6

Cymatosyrinx pagodula Abbott, 1974: 276 (listed only)

Description- Shell white, slender, with a glassy, rounded, two whorled nucleus; whorls 8-9, strongly ribbed; spiral sculpture of extremely fine, wavy, close-set, incised lines which may sometimes be obsolete near the suture; axial sculpture of (on the penultimate whorl 9-11) nearly strait, stout ribs extending from the suture over the periphery and lost at the base; fasciole not well marked; suture distinct, somewhat appressed, undulated by passing over the ribs; surface more or less lustrous; color white, usually spirally banded with rich yellow brown; aperture short, narrow, with hardly any canal; posterior notch large and deeper than wide; outer lip thin, not internally lirate; siphonal canal very short.

Type Locality- Several stations off Havana, Cuba in 119-175 fms (218-320 m).

Range- Off West Florida, Gulf of Mexico, Cuba, Great Bahama Bank, Greater and Lesser Antilles to Brazil.

Discussion- This shell resembles *Splendrillia fucata* (Reeve, 1845), but differs in being much more slender, having a less impressed fasciole, having a spiral sculpture of finely engraved lines, and in having an aperture which is smaller and much more narrow. The Victory Cay specimen is pure white with no indication of yellow-brown banding although it is eroded and the colors may have worn. The spiral sculpture is also only very faintly visible on the body whorl. Due to the degree of erosion not much can be said in comparison of the shell to a typical form.

Material Examined- BCFAU0084, one eroded specimen dredged from around 400 meters of water of Victory Cay, Bimini Chain, Bahamas, height 9.4 mm, 3.6 mm.

Genus *Compsodrillia* Woodring, 1925

Compsodrillia acestra (Dall, 1889)

Plate 12, figs 9, 10

Drillia acestra Dall, 1889: 87, pl. 10, fig. 7

Compsodrillia acestra Abbott, 1974: 277, fig. 3138

Description- Shell long, slender, white in color with pale-olive periostracum; nine whorls with a smooth, rounded two whorled nucleus; sutures well marked, incised, bordered anteriorly by 5-7 (on the later whorls) close-set fine, even spiral

threads which sculpt the shouldered body whorls; the body whorls have numerous close set, strong, subequal, flat spiral threads which are narrowly channeled in between, there are two of these spiral threads on the apical whorls increasing in number on the penultimate whorl and increasing again in number on the body whorl where they becomelittle more widely separated and may also have one or two fine threads in between each; there is an axial sculpture of raised ribs which may vary in number and strength in different specimens; anal notch deep and strong, outer lip thin and contracted around the canal; Sinus shallow with the center located in the middle of the shoulder slope; siphonal canal moderately wide and short, without distinct fasciole, strait and recurved (Dall, 1889).

Type Locality- off Morro Light, Havana, Cuba in 732 meters.

Range- Florida Straits, Florida Keys, West Indies, Campeche Bank, Mexico, Panama, North Havana Province, Cuba, Sao Paulo, Brazil.

Discussion- The series of flattened spiral threads that appear just below the suture of each whorl are a very distinct, defining characteristic of this shell. Dall mentioned another variety of this shell but was hesitant to separate it as a distinct species, being aware of the variability of axial and spiral sculpture of this shell. *C. acestra* is very similar to *C. tristicha* Dall, 1889, which is found primarily in the Gulf of Mexico at depths to around 200 meters. *C. tristicha* lacks the distinct subsutural band of low spiral cords which is so prominent in *C. acsestra.*

The color of the Bimini specimen is nearly white but with a very faint, yellowish undertone. The subsutural, flattened spiral threads are very distinct and defining, occurring just as originally described. The axial ribs are distinct and rounded but variable in size from one to the next, there are 12 on the penultimate whorl a 15 on the body whorl. The notch is very deep and strong, the outer lip is thin and the inner lip is smooth and colored pure milky white. The nucleus is very small, smooth and of one whorl.

Material Examined- BCFAU0062, one freshly dead specimen dredged from 400 meters of water offshore of Victory Cay, Bahamas, 25°28.477'N, 79°17.632'W, on 23 May 2002, height 24.6 mm, width 6.9 mm.

Compsodrillia tristicha Dall, 1889

Plate 12, figs 11, 12

Drillia tristicha Dall, 1889a: 88-89

Compsodrillia tristicha Abbott, 1974: 277, fig. 3137

Original Description- Shell white, elongated, acute, with a rounded vitreous white two-whorled nucleus and nine succeeding whorls; spiral sculpture of three principal strong threads, enlarged where they pass over the ribs, four more on the base of the last whorl, about eight somewhat weaker ones on the canal, and a single one in front of and marginating the suture; interspaces are wide, and upon

them and over the fasciole are wound numerous fine, sharp, undulating, secondary spiral threads; all of these cross (on the penultimate whorl) fourteen even, rounded, narrow riblets, with narrower interspaces, which start at the anterior edge of the fasciole, cross the whorl, and fail on the canal; suture distinct, wavy; fasciole obscure, not excavated; whorls rounded; varix stout, thick and rounded; aperture narrow, notch strongly marked, rounded; outer lip thin, without lirae; inner lip with a thin, smooth, elevated callus; canal distinct, rather long and narrow, not recurved; pillar strait.

Type Locality- USFC sta. 2377, 2399 and 2402, NE Gulf of Mexico, between Mississippi Delta and Cedar Keys Florida in 111-210 fms (203-384 m).

Range- Gulf of Mexico, SW Florida, Great Bahama Bank, Brazil.

Discussion- This record serves as the first of this species from the Great Bahama Bank although it has been collected in Brazil and probably lives throughout the Greater and Lesser Antilles. This shell greatly resembles *Compsodrillia acestra* (Dall, 1889), for comparison see the discussion section under *C. acestra.* Both specimens are typical in form, varying little if at all from the original description.

Material Examined- Two freshly dead specimens dredged from around 400 meters of water of Victory Cay, Bimini Chain, Bahamas, heights 12.8 mm and 10.9 mm, widths 4.7 mm and 4.0 mm, respectively.

Subfamily Mangeliinae Fischer, 1887

Genus *Kurtziella* Dall, 1918

Kurtziella serga (Dall, 1881)

Plate 13, figs 1, 2

Pleurotoma (Drillia) serga Dall, 1881: 65-66

Pleurotoma (Mangelia) acanthodes Watson, 1881: 433-435; Watson, 1886: pl. 23, figs. 3a-d

Pleurotoma corallina Watson, 1881: 435-436; Watson, 1886: pl. 23, figs. 1a-d

Pleurotoma serga Dall, 1886: pl. 9, fig. 4

Mangilia serga Dall, 1889: 114, pl. 9, fig. 4

Mangilia serga var. elongata Locard, 1897: 233, pl. 11, fig. 7-12

Defrancia hispidula Locard, 1897: 233

Lyropleura talismani Locard, 1897: 233

Acmaturris vatovai Nordsieck, 1971

Kurtziella serga Abbott, 1974: 281, fig. 3247

Description- Shell small, dull, slender, yellowish-white, eight-whorled; nucleus small, transluscent, shining, passing into the sculpture of the adult gradually, in two and a half nuclear whorls, which show first minute transverse wrinkles on the periphery of the second whorl; succeeding whorls transversely sculpted by 8-12 slightly oblique, angular riblets, which pass entirely over the whorls, and only become obsolete on the canal; theses are crossed first by (on the upper whorls)

two or (on the last whorl) nine rounded threads which rise to sharp points on reaching the summits of the riblets, and are perfectly distinct in the interspaces; secondly by finer intercalary revolving threads, which pass without change over the riblets, usually three or four between each pair of primary threads; these also cover the notch band, and extend over them as well as the primaries, the lines of growth are raised in microscopic granules, or lamellae which under strong magnification produce a very peculiar scabrous texture on the surface of the shell; the strongest primary riblet is the posterior one, just in advance of the somewhat steeply declining and poorly defined notch band (selenizone); aperture narrow, notch deep, outer lip thin, produced; columella and body whorl usually uncallused; siphonal canal strait and slightly dorsally recurved; sutures moderately incised (Dall, 1881).

Type Locality- Pourtalès Terrace, 818 meters.

Range- Florida Strait, West Indies, Bermuda, Yucatan.

Discussion- Dall, 1889 gives record of collection of *K. serga* in the "bed of the Gulf Stream" as deep as over 800 meters while there are also records of this species collected off Bermuda in over 2000 meters of water (Watson, 1881). The Bimini specimen was dredged from 500 meters, where it rested in a mixed silty-muddy sediment composed of foraminiferal – pteropod ooze, there were also small limestone fragments in the same dredge.

The Bimini specimen is of average size, white in color, fusiform, high spired, with bluntly angulate whorls; the nucleus is chipped but there appear to have been two smooth whorls, followed by 6 more angular body whorls; the whorls sculpted by numerous curved, slender axial ribs which are broadly rounded; spirally, there are 2 primary spiral cords on the teleoconch whorls and 9 on the body whorl which form small nodes at the intersections of the axials, there are also numerous fine lirae and microscopic growth lines, forming a dense scabrous (microcancellate) sculpture on the entire shell; siphonal canal short, strait, and slightly recurved; there is a thickened white callus within the aperture.

Material Examined- BCFAU0063, one dead specimen dredged from 500 meters off water off Victory Cay, 25°27.332'N, 79°19.223W, on 23 May 2005, height 9.7 mm, width 3.3 mm.

Subfamily Daphnellinae Casey, 1904

Genus *Daphnella* Hinds, 1844

Daphnella pompholyx Dall, 1889

Plate 12, figs 7, 8

Mangilia (Daphnella) pompholyx Dall, 1889: 104, pl. 36, fig. 4

Daphnella pompholyx Abbott, 1974: 288, fig. 3406

Description- Shell small, thin, inflated, elongate fusiform in shape; the color is translucent white with faint olive-brown axially directed streaks; nucleus sinusigerous, of 3 whorls, brown; body whorls rounded and concave below the suture producing a band of oblique sculpture at the shoulder; overall body sculpture finely reticulate; spiral sculpture of fine, close set, raised threads of alternating thickness which are nearly uniformly destributed all over the shell; axial sculpture of somewhat finer, but even in size, raised threadlets; whorls 5, rounded; aperture large, more than half the length of the entire shell; outer lip thin, transparent, rather strait in the middle and contracting suddenly toward the suture; columella strait, long, not recurved.

Type Locality- Near Barbados in 188.5 meters.

Range- Lesser Antilles, Bahamas toBarbados.

Discussion- D. pompholyx is very similar to *D. reticulosa* Dall, 1889, but differs mainly in having a brown nucleus, a different sculpture with no axial costae on the early whorls, being larger, thinner, and not having a distinctly recurved siphonal canal.

The shell dredged off Victory Cay is extremely fragile and the outer lip and anterior portion of the siphonal canal are chipped off. The shell is juvenile and it appears that the outer lip has been stripped back almost half of a whorl

because the entire fasciolar area is completely smooth, very thin, and nearly translucent. It is even hard to handle the shell because it is so delicate.

Material Examined- BCFAU0064, one specimen dredged from 600 meters south and west of Victory Cay, Bahamas, 25°26.008'N, 79°18.617'W, on 23 May 2002, height 6.5 mm, width 3.9 mm.

Order Cephalaspidea P. Fischer, 1883

Superfamily Acteonacea Orbigny, 1842

Family Acteonidae Orbigny, 1842

Genus *Acteon* Montfort, 1810

Actaeon danaida Dall, 1881

Plate 10, figs 7, 8

Actaeon danaida Dall, 1881: 96; Dall, 1889a: 49, pl. 17, fig. 12

Description- Shell elongated, moderately pointed, polished, white, and having about six slightly rounded whorls; sutures well incised, distinct; nucleus of one fairly large whorl, white, pitted (possibly by erosion?); spire sculpture of (on the spire) six, or (on the last whorl) over twenty five punctate grooves, more crowded anteriorly, but with two or three coarser than the rest, just in advance of the suture; between these original grooves in the latter half of the last whorl intercalary single or double grooves appear, which are seldom quite as deep as the

originals and at first are not punctate but at last, especially near the anterior extreme of the shell, become nearly as well marked as the original series; axial sculpture consisting only of lines of growth which produce the peculiar punctate sculpture as they cross the spiral grooves; outer lip thin, simple, somewhat bent in the middle, passing imperceptibly into the thin twisted columella, which is slightly reflected and bears one inconspicuous, very oblique fold; parietal region with a thin layer of callus; aperture rounded in anteriorly, rather narrow, pointed posteriorly; never any trace of an umbilical chink (Dall, 1881).

Type Locality- Off Tortugas in 620 meters.

Range- Off Georgia to south of Dry Tortugas, Florida; Bimini, Bahamas; Algoas, Brazil.

Discussion- This is the first record that I have seen of *A. danaida* from the eastern side of the Florida Straits so this account may serve as a range extension of the species. It is most likely found throughout the Florida Strait and the West Indies in the proper depth of water.

A single specimen was dredged from off Victory Cay, Bahamas. The specimen is very freshly dead, it may have even been alive when taken(?). It matches the original description by Dall remarkably, without any variation, almost like Dall was looking at this very specimen when writing the description. Most likely this is not a highly variable species. The shell is similar in shape and

size to *Actaeon finlayi* McGinty, 1955, the principle difference being that *A. finlayi* is sculpted axially and spirally by a series of raised threads whereas *A. danaida* is sculpted by punctate grooves, also *A. finlayi* can have a minute umbilical chink which is never formed in *A. danaida*. At first glance or without magnification the details of the two shells may not be so evident but once they are viewed under magnification they are easily told apart. Both *Actaeon danaida* and *Actaeon finlayi* have been recorded at lengths of slightly over 11 mm.

Material Examined- BCFAU0044, one freshly dead specimen was dredged from 400 meters of water, west of Victory Cay, Bahamas, 25°28.082'N, 79°18.393'W, on 23 May 2002. Height 7.1 mm, width 3.9 mm.

Genus *Ovulacteon* Dall, 1889

Ovulactaeon meekii Dall, 1889

Plate 10, figs 9, 10

Ovulactaeon meekii Dall, 1889a: 43, pl. 33, figs. 3-4; Abbott, 1974: 312, fig. 3911

Description- Shell with the outline of a small *Cyprea*, widest in its posterior third, white polished with fine, distinct, impressed incremental growth lines and the faintest trace of spiral incremental markings; in older specimens there may be a depressed line or sulcus indicating the position of a previous growth stage (lip); the apex of mature specimens is perforate with the body whorl rounding over the

perforation making the spire invisible because it is actually inverted; the aperture is very narrow, curved with the profile of the shell, and extending beyond the summit; the outer lip is internally thickened, simple and smooth; the parietal callus is narrow with a sharply defined, abrupt outer margin and the inner margin raised sharply up, parallel with the outer lip with which it is continuous at the extremities; the flattened part of the callus is widest anteriorly, polished but not smooth, but the raised edge is without teeth or transverse striation of any sort. The extremities of the aperture are elevated to follow the profile of the body of the shell (Dall, 1889a).

Type Locality- Off Havana, Cuba in 823.5 meters.

Range- Off Georgia, off Fernandina, Florida, eastern and western Straits of Florida; the north coast of Cuba; Pernambuco, Brazil.

Discussion- The genus *Ovulacteon* is completely unique and holds only this one species. Originally, *O. meekii* was compared to juvenile Cypraeidae because the characters of the aperture are moderately similar but in *Ovulacteon* the outer surface of the shell is not polished like those of Cypraeidae.

The Victory Cay specimen exactly matches Dall's original description word for word. One additional observation is made though, the polished callus has a noticeably different texture than the rest of the shell; polished but not smooth. When viewed under 80x magnification it is evident that the surfaces of the callus

and the inner and outer lip surfaces which are "polished but not smooth" have a microscopically pitted texture.

Material Examined- One specimen dredged from 500 meters of water off Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2002, height 5.3 mm, width 3.1 mm.

Family Ringiculidae Philippi, 1853

Genus *Ringicula* Deshayes, 1838

Ringicula nitida Verrill, 1873

Plate 10, fig 15

Ringicula nitida Verrill, 1872-3: 16; Dall, 1881: 97; Dall, 1889a: 43, pl. 37, fig. 3; Abbott, 1974: 313, fig. 3915

Ringicula leptocheila Brugnone, 1873; Agassiz, 1888

Ringicula pulchella Morlet, 1880: 158-159, pl. 5, fig. 6; Valdés & Héros, 1998, fig. 2I

Ringicula peracuta Watson, 1883: 292-293, Watson 1886: pl. 47, figs. 11a-b

Ringicula blanchardi.non Dautzenberg & Fischer, 1896

Ringicula pirulina Locard, 1897: 87-88, pl. 14, fig. 1-4; Valdés & Héros, 1998: fig. 2g

Ringicula ventricosa Locard, 1897: pl. 14, fig. 5-6

Ringicula gianninii Nordsieck, 1974

Description- Shell reaching 7.5 mm in height, with 5 rounded moderately inflated whorls, overall shape of an unbroken shell resembling a miniature *Cassis* or *Phallium*; texture smooth, with a simple thickened outer lip and with 2 distinct spiral ridges on the columella the anterior being the largest; no tooth in the parietal region; there may be surface sculpture which is variable in elevation and extent of the spiral grooving from one shell to the next; on mature specimens, the outer lip is thicker in the middle and anteriorly than elsewhere and there is a well defined area on the base, anterior to the juction of the outer lip and the body, which is distinctly grooved.

Type Locality- Off Martha's Vineyard, Grand Banks in 183-915 meters.

Range- Off Maine to the Gulf of Mexico; Antilles; Bermuda; also as a fossil from the Italian Pliocene. Fairly common below 200 meters in the bed of the Gulf Stream.

Discussion- The Bimini specimen is missing the entire outer lip and is extremely delicate to the point of being hard to handle, possibly a result of a long resting period in the muddy ooze that it was collected from. There is anther wide ranging *Ringicula, R. semistriata* Orbigny, 1842, that occurs throughout the western Atlantic also. *R. semistriata* differs from *R. nitida* in being generally smaller, having only 4 whorls, and in having 3 distinct columellar plications. It has been

noted by Verrill, 1882 and by Dall, 1881 that the specimens from mortropical latitudes often are larger than any collected from the more northern latitudes.

This specimen is fairly large for the species and I would expect it to have a mature thickened lip if the lip was present. There is a small, smooth nucleus followed by 5 smooth, rounded whorls; the sutures are incised and rough; there are two strong columellar ridges; on the anterior-most extremity of the body whorl there are 5 very faint spiral grooves which appear to continue beneath the small, thickened, white parietal callus; the entire shell is polished ivory white in color

Material Examined- BCFAU0049, one broken specimen dredged from 500 meters of water off Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2005, height 4.5 mm, width 2.2 mm.

Family Acteocinidae Pilsbry, 1921

Genus *Acteocina* Gray, 1847

Subgenus *Coleophysis* Fischer, 1883

Acteocina (Coleophysis) perplicatus Dall, 1889

Plate 10, figs 16, 17

Tornata (Coleophysis) perplicatus Dall, 1889a: 45-46

Acteocina (Coleophysis) perplicatus Abbott, 1974: 313

Description- Shell ivory white with a very thin translucent epidermis, of 1 and a half whorls, marked only with delicate lines of growth and a few faint incised spirals near the columella; anterior half of the shell wide and rounded, posterior half narrowing toward the apex with the sides somewhat compressed or flattened; outer lip thin, strait except at its anterior most region where it expands a bit before rounding to the rather thick and twisted columella; there is a deeply notched posterior sinus that arches over and forms a carina which revolves toward the apex; apex truncated and carinated by the line which forms the outer boundary of the path of the posterior sinus; there is very little or no trace of a body callus; columella thick with a large horizontal fold and a minute chink behind it; aperture as long as the shell, strait and narrow posteriorly and wide and somewhat oblique anteriorly.

Type Locality- Off Bahia Honda, Cuba in 402 meters

Range- Florida Strait; Cuba; Barbados; West Indies.

Discussion- This is a very unique-looking shell which is typical but somewhat rare in the deep waters of the Florida Strait. The shell morphology may be somewhat variable from specimen to specimen.

The Bimini specimen is pure ivory white and consists of 2 strait sided whorls and an elevated but truncate and concave apex with a very small nucleus which is slightly depressed within the postnuclear whorl; the entire shell is

microscopically sculpted with fine axial growth lines and there are also numerous, very fine spiral striations making the texture of the shell appear very finely cancelate, but only when viewed under high magnification; the spiral sculpture is most evident just below the suture where there is a slight impression formed by the slightly concave shoulder; there are very faint traces of a few incised spirals near the columella but they are hardly evident; the columella is thick, twisted anteriorly, and marked by a thick fold and a small chink; the posterior sinus is deeply notched and forms a carinate line that spirals the shell subsuturaly; there is no body callus evident; the aperture runs the entire length of the shell and is strait and narrow posteriorly becoming wider anteriorly when the columella begins to twist.

Material Examined- BCFAU0050, one specimen dredged from 500 meters of water off Victory Cay, Bahamas, 25°27.332'N, 79°19.223W, on 23 May 2005, height 8.0 mm, width 3.6 mm.

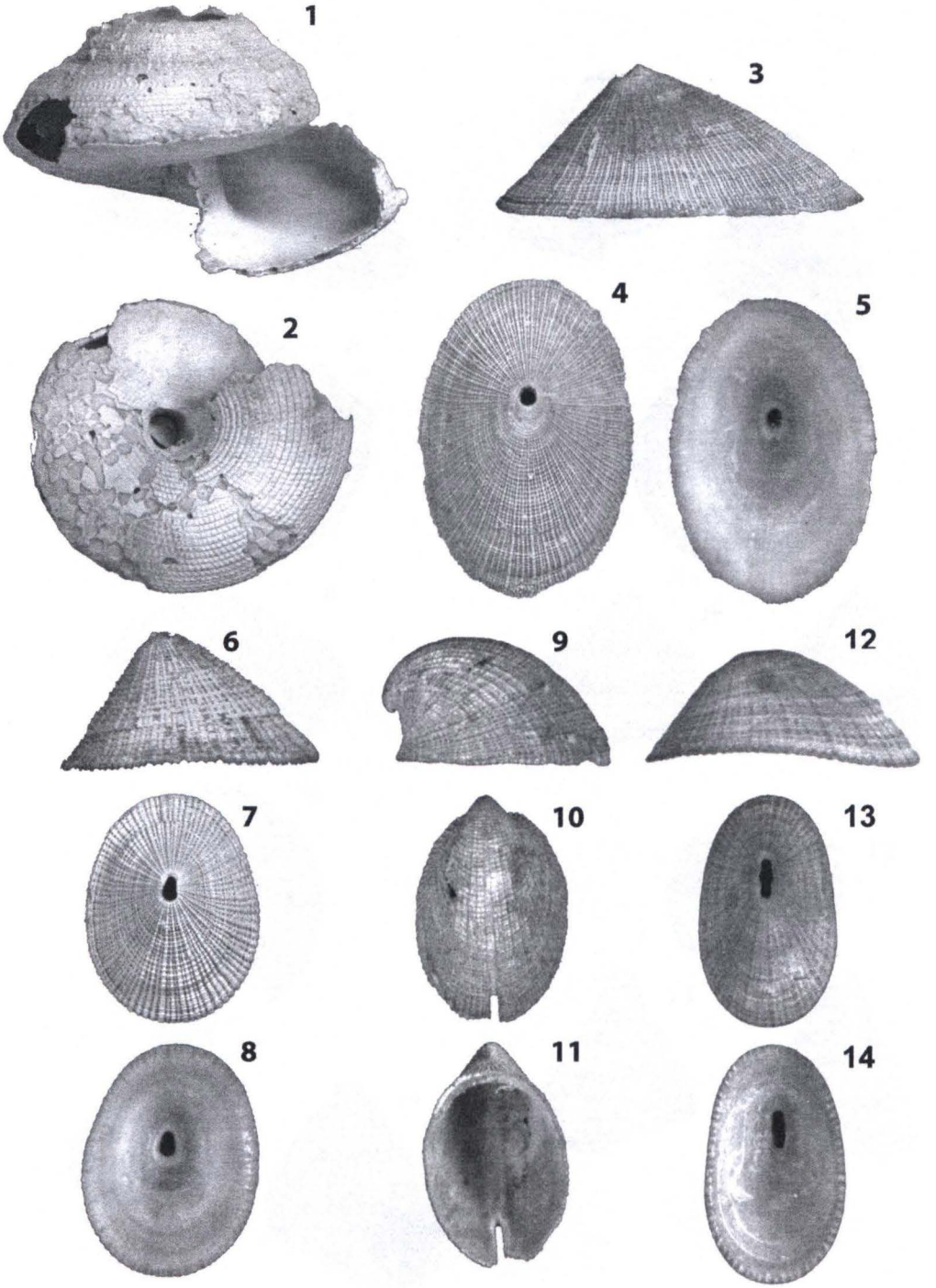

Plate 1 -- 1,2 *Perotrochus adansonianus* (Crosse and Fischer, 1861), BCFAU0001, length 38 mm. **3-5** *Diodora tanneri* (Verrill, 1883), BCFAU0002, length 23 mm. **6-8** *Diodora fluviana*, (Dall, 1889), BCFAU0003, length 19 mm. **9-11** *Emarginula tuberculosa* Libassi, 1859, BCFAU0004, length 19 mm.**12-14** *Diodora sayi* (Dall, 1889), BCFAU00099, length 18.8 mm.

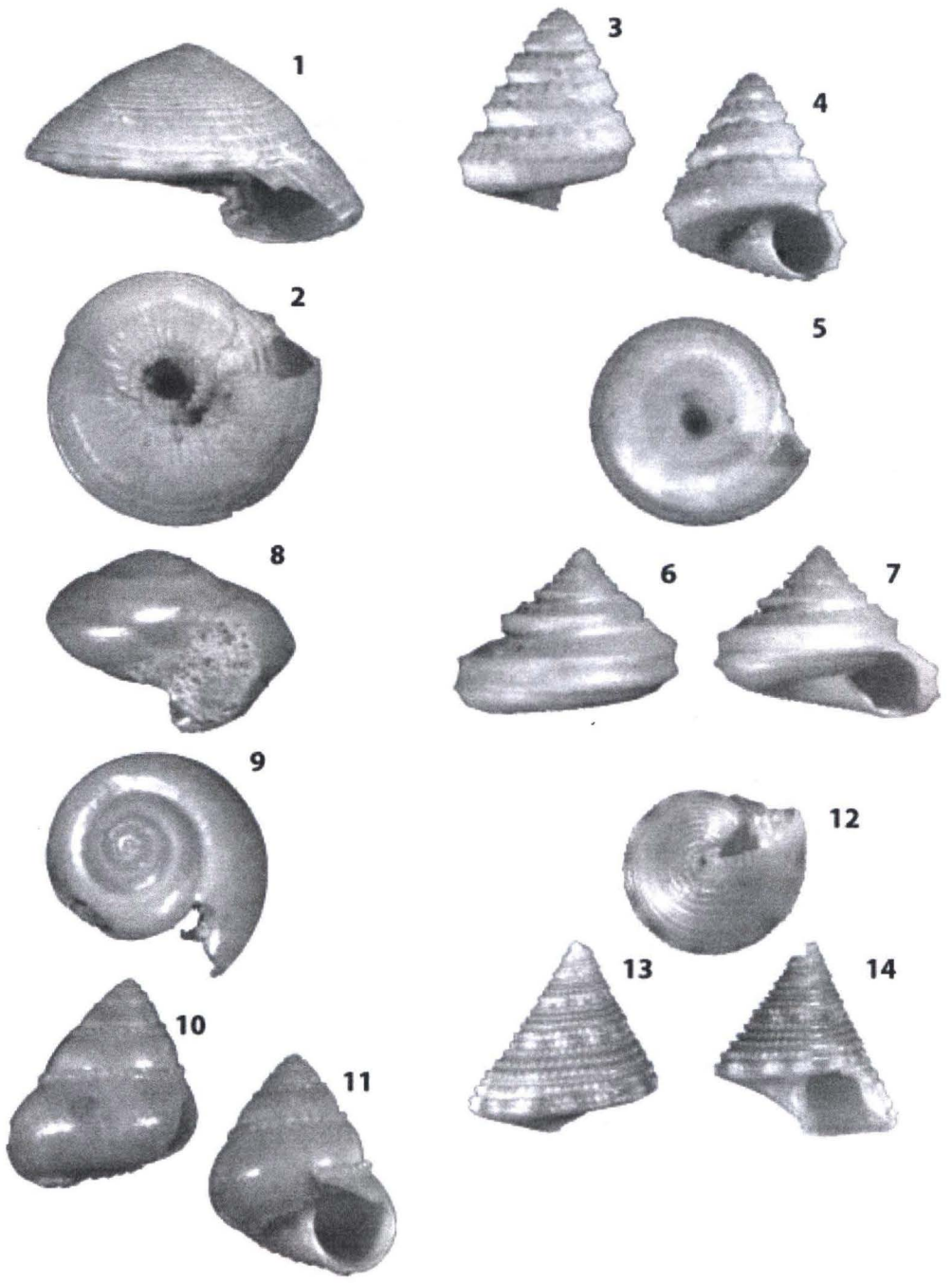

Plate 2 -- 1, 2 *Architectonica sunderlandi* Petuch, 1987, BCFAU0005, 18 mm length. **3,4** *Solariella (Solariella) lamellosa* Verrill and Smith, 1880, BCFAU0006, 6 mm length. **5-7** *Calliotropis (Solarcida) calatha* (Dall, 1927), BCFAU0007, 7.1 mm width. **8, 9** *Microgaza rotella inornata* Quinn, 1979, BCFAU0008, 7.5 mm width. **10, 11** *Solariella (Sauvotrochus) lubrica* Dall, 1881, BCFAU0009, 5 mm length. **12-14** *Calliostoma c.f. apicinum* Dall, 1881, BCFAU0010, 7.5 mm length.

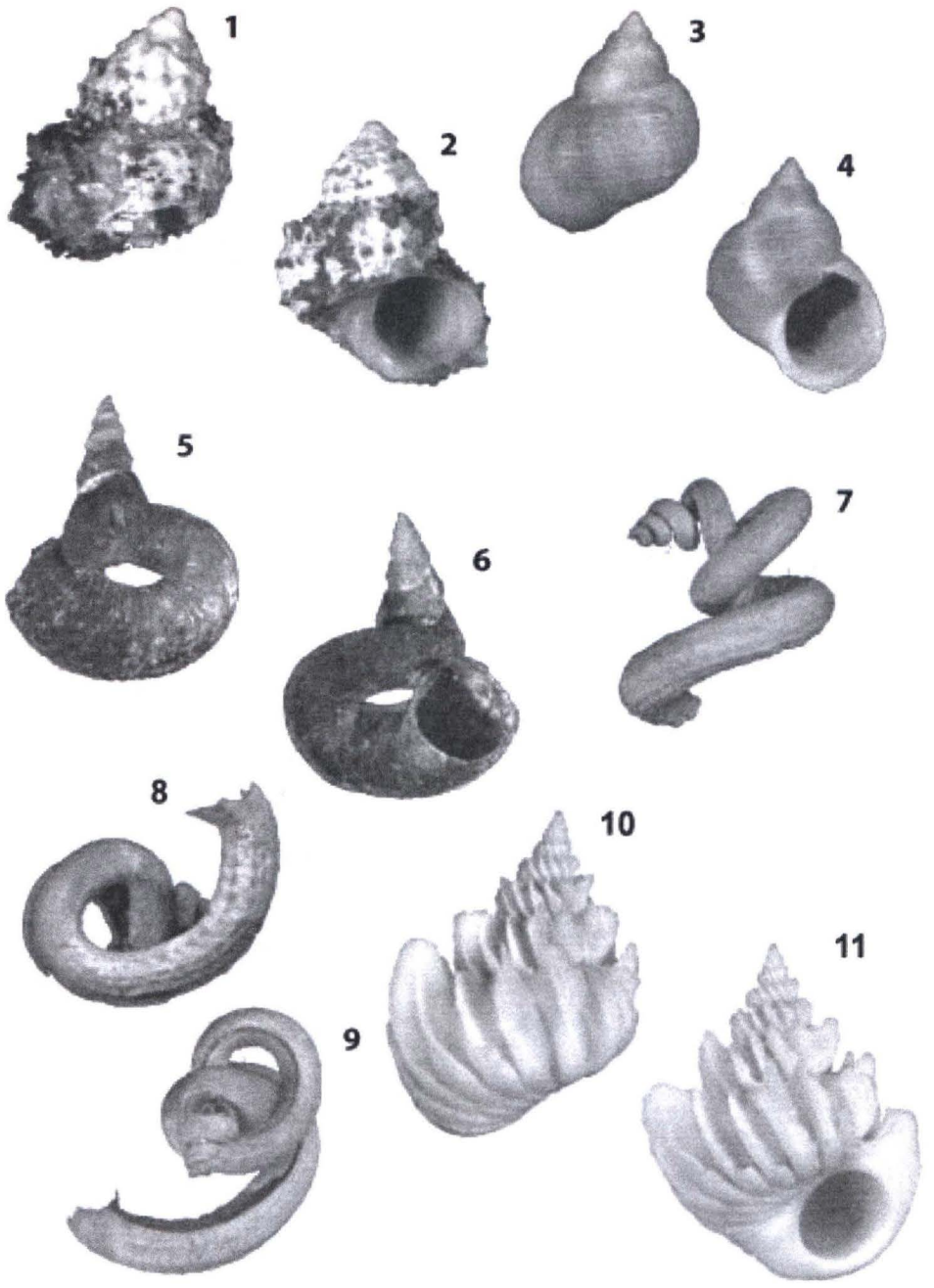

Plate 3 -- 1,2 *Turbo castanea* Gmelin, 1791, BCFAU0011, length 22.5 mm.**3,4** *Ganesa sp.*, BCFAU0012, length 7.5 mm. **5,6** *Vermicularia bathyalis* Petuch, 2002, BCFAU0013, length 7.5 mm, juvenile specimen. **7-9** *Siliquaria modesta* Dall, 1881, BCFAU0014, length 20.5 mm. **10, 11** *Sthenorytis pernobilis* (Fischer and Bernardi, 1856), BCFAU0095, height 35.8 mm.

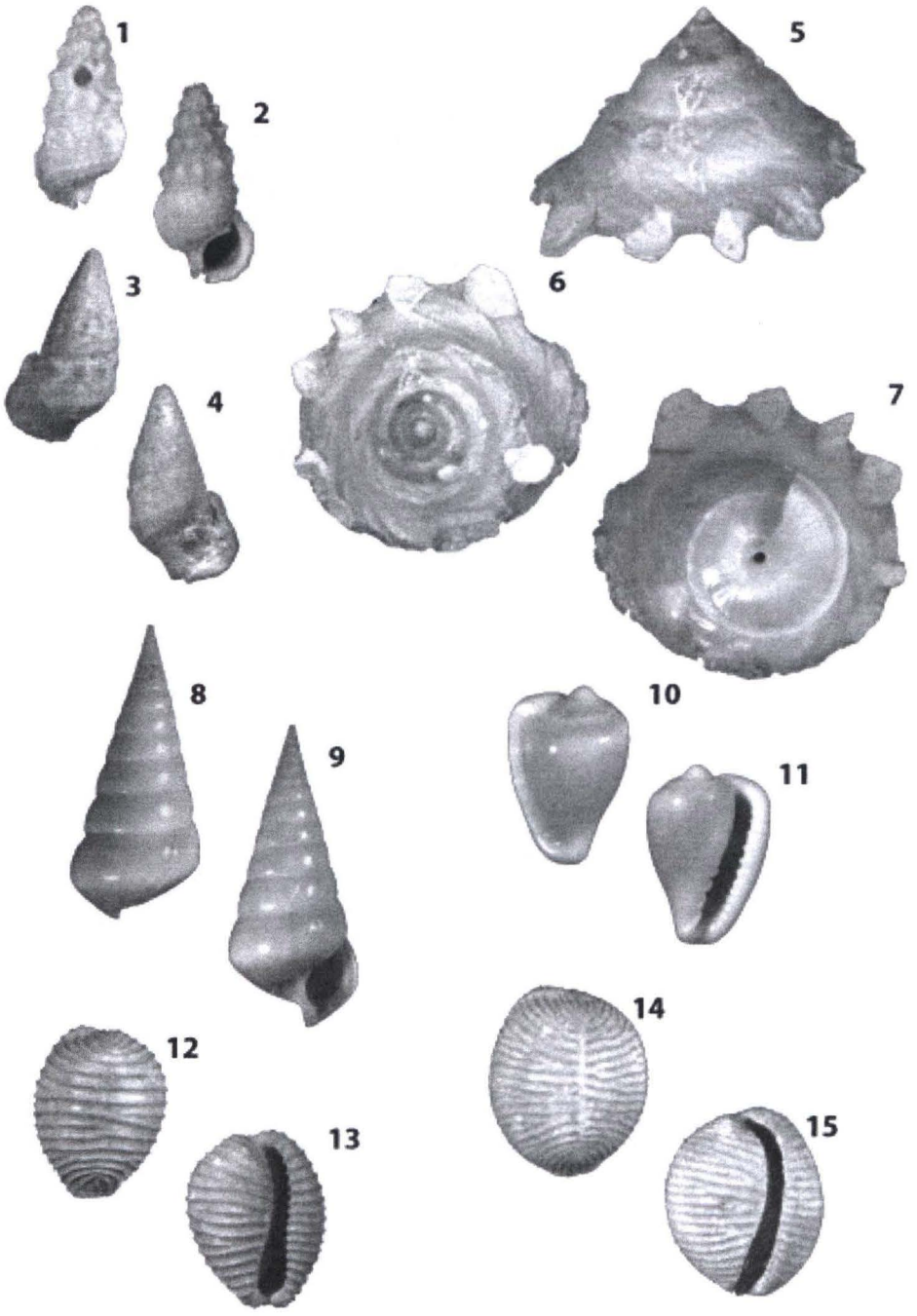

Plate 4 -- 1,2 *Cerithium (Thericium) eburneum* Bruguière, 1792, BCFAU 0013, length 16 mm. **3,4** *Cerithium (Thericium) litteratum* (Born, 1778), BCFAU0016, length 13.5 mm. **5-7** *Xenophora (Tugurium) caribaeum* (Petit, 1856), BCFAU0017, width 61 mm. **8,9** *Niso interupta var. albida* (Dall, 1889), BCFAU0018, length 22.5 mm. **10,11** *Hesperato sp.*, BCFAU0019, height 9.6 mm. **12,13** *Niveria (Cleotrivia) candidula* (Gaskoin, 1836) , BCFAU0020, length 11 mm. **14,15** *Niveria (Niveria) nix* (Schilder, 1922), BCFAU0021, length 10.9 mm.

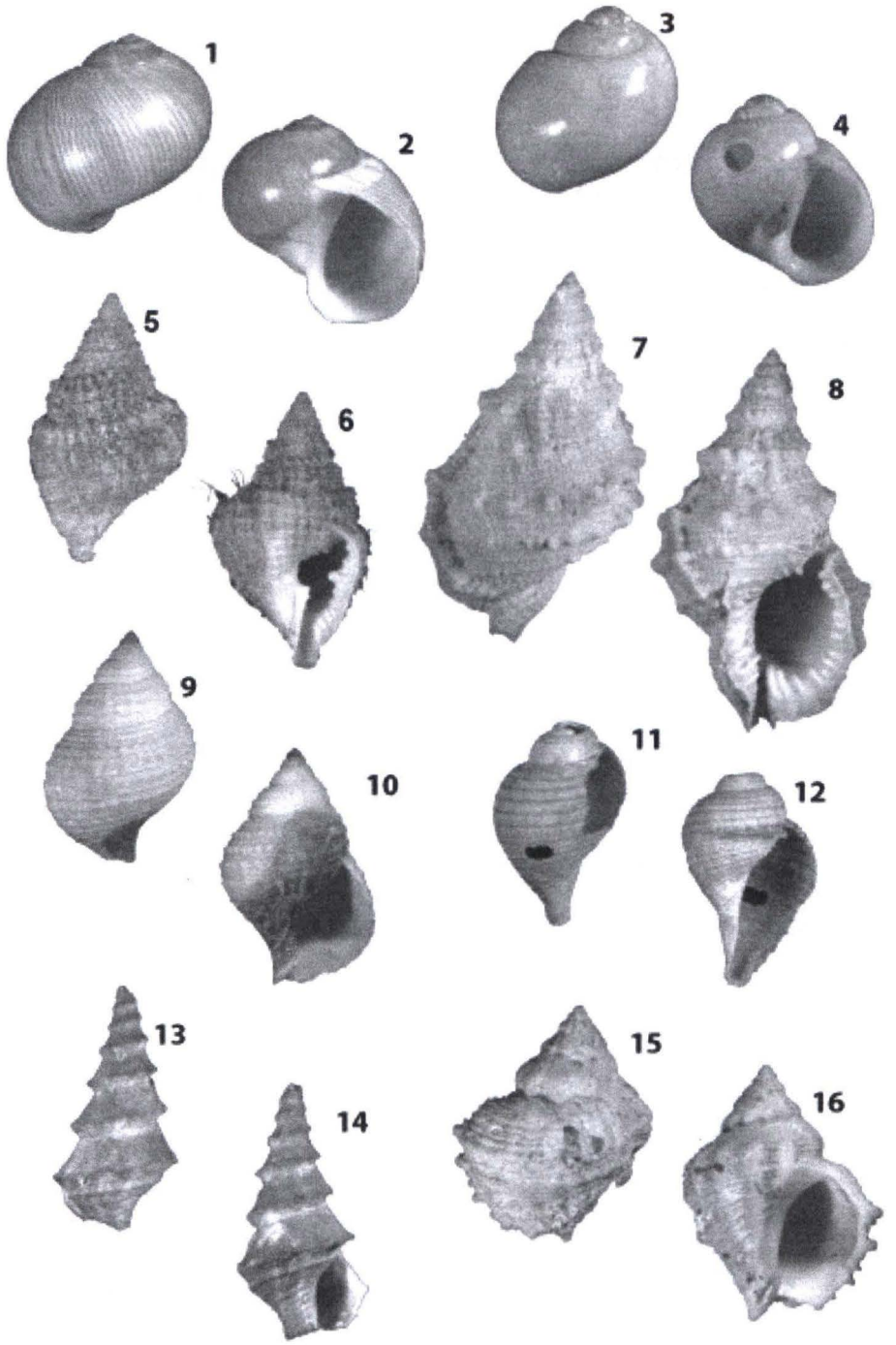

Plate 5 -- 1,2 *Natica perlineata* Dall, 1889, BCFAU0022, height 23 mm. **3,4** *Polinices bahamiensis* (Dall, 1925), BCFAU0023, length 6.5 mm. **5,6** *Distorsio perdistorta* Fulton, 1938, BCFAU0024, height 20.9 mm. **7,8** *Bursa finlayi* McGinty, 1962, BCFAU0025, length 50 mm. **9,10** *Pisanianura grimaldii* (Dautzenberg 1889), BCFAU0026, length 21.2 mm. **11,12** *Eudolium crosseanum* Monterosato, 1869, BCFAU0027, length 29 mm. **13,14** *Columbarium (Peristarium) electra* Bayer, 1971, BCFAU0028, length 16 mm. **15,16** *Coralliophilia caribaea* Abbott,1958, BCFAU0029, length 19 mm.

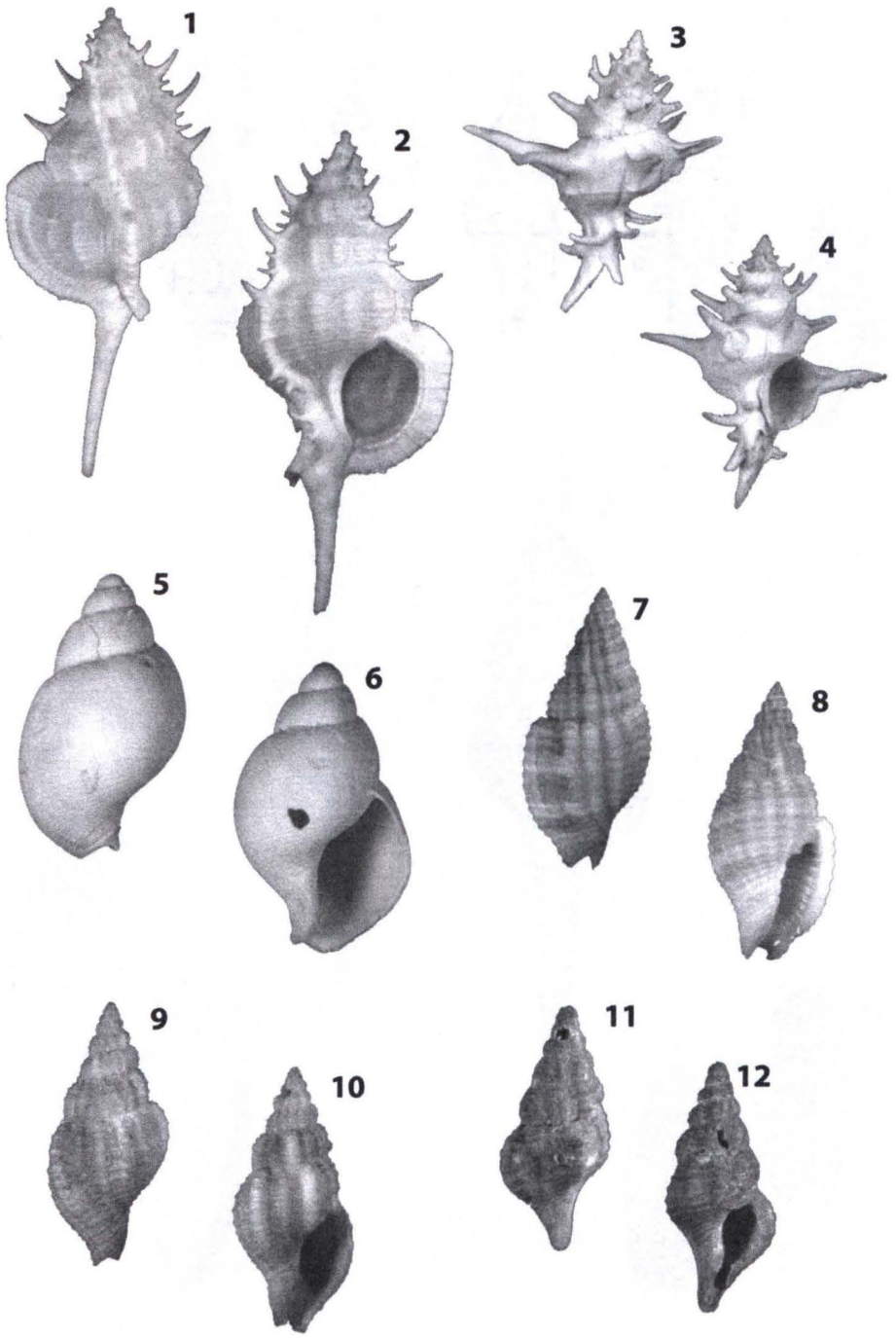

Plate 6 -- 1,2 *Siratus yumurinus* (Sarasua and Espinosa, 1978), BCFAU0030, length 66.5 mm. **3,4** *Poirieria (Paziella) pazi* (Crosse, 1869), BCFAU0031, length 42 mm. **5,6** *Chickcharnea fragilis* Petuch, 2002, BCFAU0033, length 35.5 mm. **7,8** *Antillophos bahamasensis* Petuch, 2002, BCFAU0034, length 21 mm. **9,10** *Antillophos freemani* Petuch, 2002, BCFAU0035, length 19.5 mm. **11,12** *Harasewychia amphiurgus* (Dall, 1889), BCFAU0036, length 11 mm.

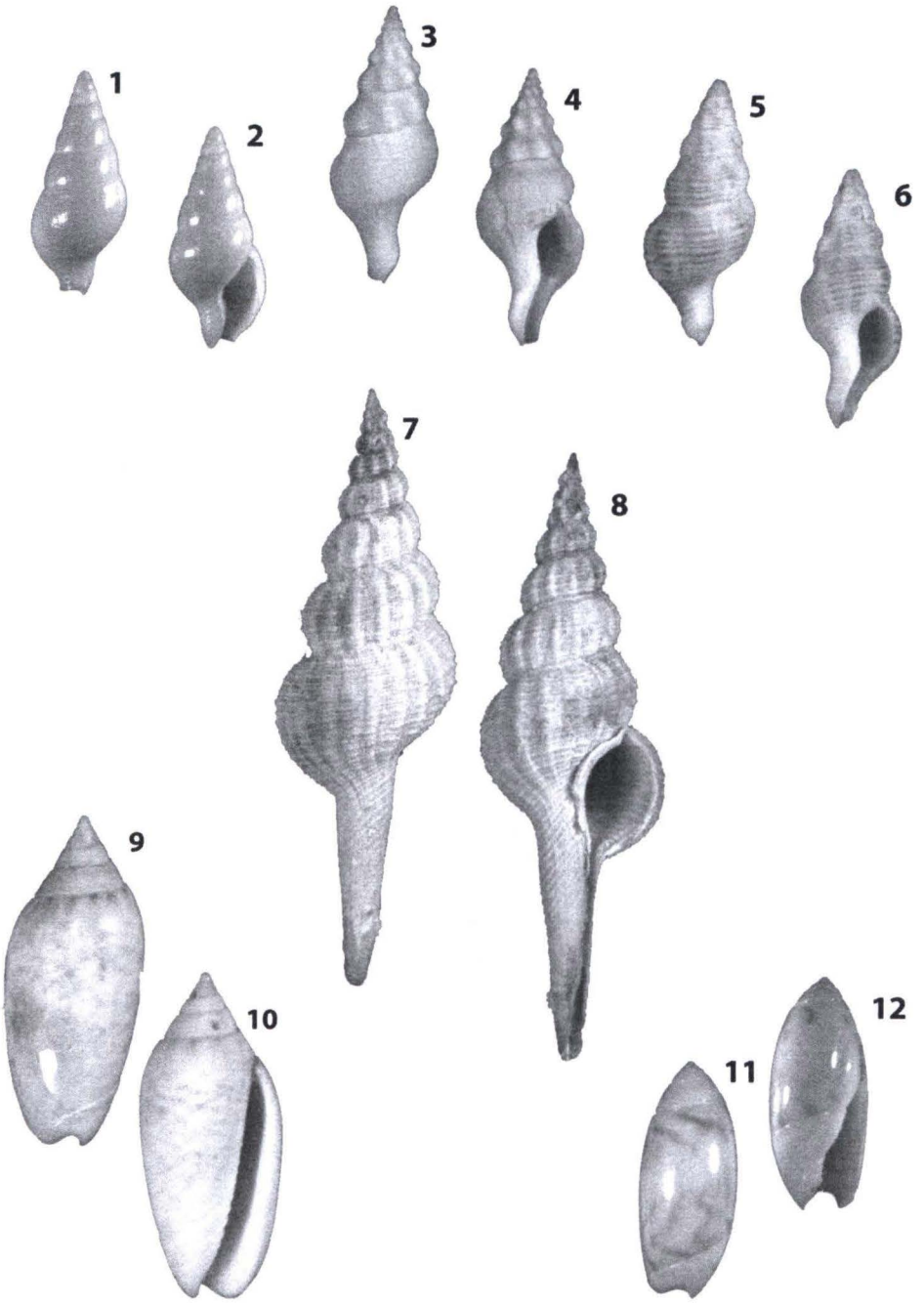

Plate 7 - 1,2 *Mitrella (Astyris) diaphana* (Verrill, 1882), BCFAU0032, length 13mm. **3,4** *Latirus (Hemipolygona) macmurrayi* (Clench and Aguayo, 1941), BCFAU0038, length 28.5 mm, pinkish-white variety with narrow pseudoumbilicus. **5,6** *Latirus (Hemipolygona) macmurrayi* (Clench and Aguayo, 1941), BCFAU0039, length 25 mm, BCFAU0040, striped variety with narrow pseudoumbilicus. **7,8** *Fusinus (Heilprinia) halistreptus* (Dall, 1889), BCFAU0037, length 77 mm. **9,10** *Oliva (Strephona) bahamasensis* Petuch and Sargent, 1986, BCFAU0044, length 43 mm. **11,12** *Olivella (Macgintiella) watermani* McGinty, 1940, BCFAU0045, length 13 mm.

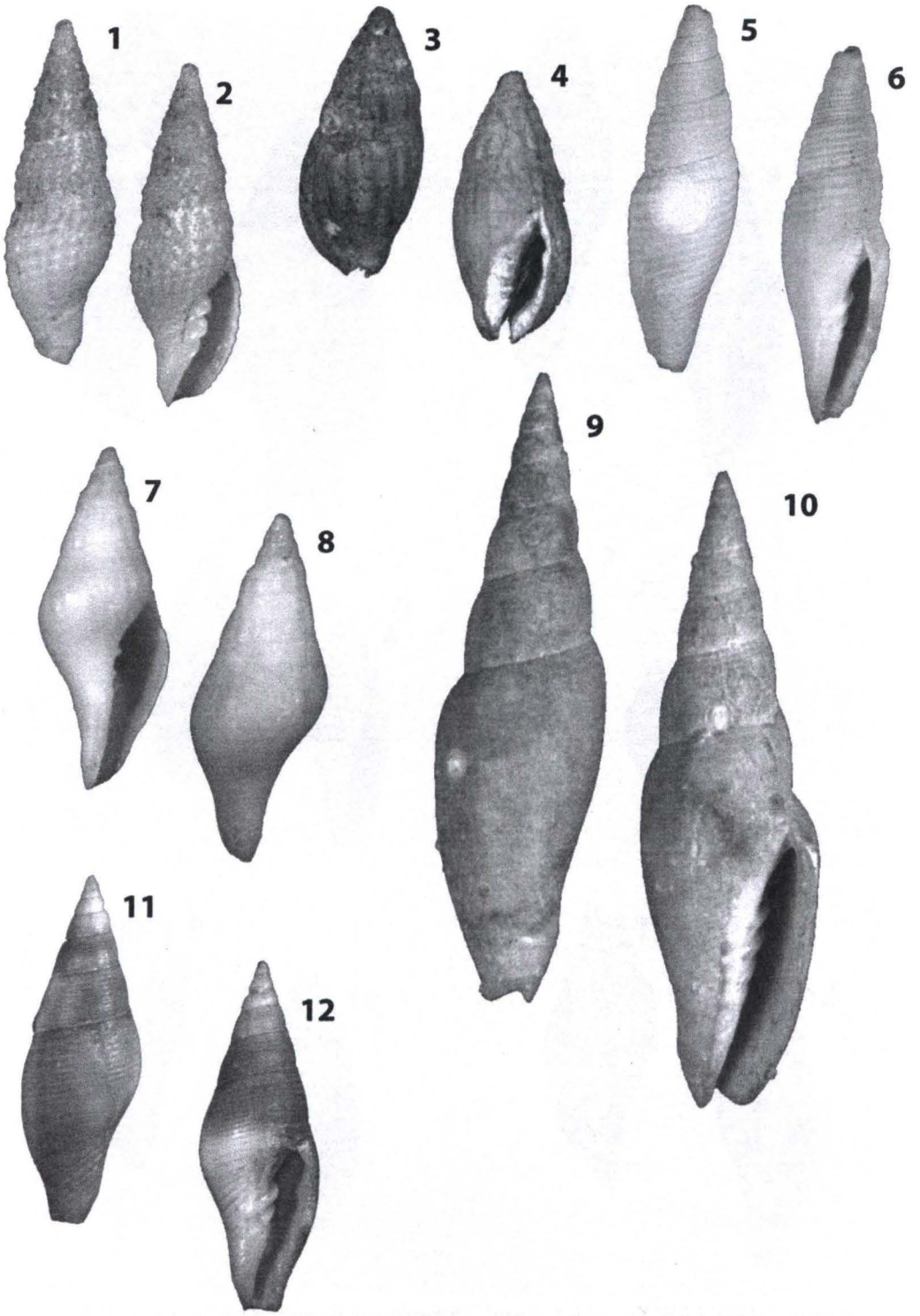

Plate 8 - 1,2 *Nodicostellaria styria* (Dall, 1889), BCFAU0051, length 11.4 mm. **3,4** *Enaeta reevei* Dall, 1907, BCFAU0052, length 12.7 mm. **5,6** *Mitra (Nebularia) straminea* A. Adams, 1853, BCFAU0053, length 40.5 mm. **7,8** *Exilia meekiana* (Dall, 1889), BCFAU0054, length 13 mm. **9,10** *Mitra (Mitra) swainsonii antillensis* Dall, 1889, BCFAU0055, length 89.5 mm. **11,12** *Mitra (Mitra) barbadensis* (Gmelin, 1791), BCFAU0057, length 20 mm.

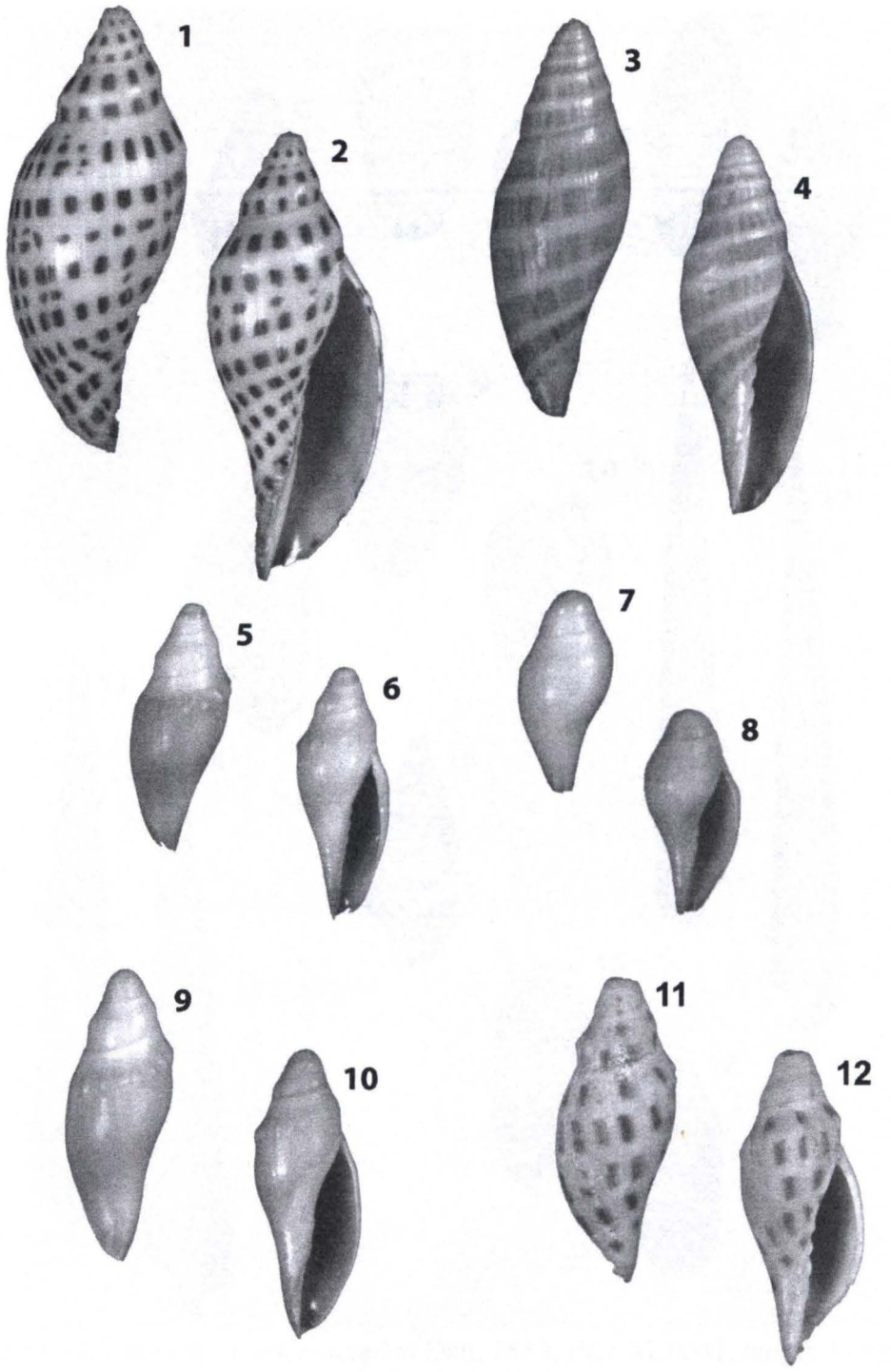

Plate 9 - 1,2 *Scaphella (Scaphella) atlantis* Clench 1946, BCFAU0040, length 66.5 mm. **3,4** *Scaphella (Scaphella) sp.*, BCFAU0000, length 48 mm. **5,6** *Scaphella (Scaphella) sp. nov.*, BCFAU0041, length 37.5 mm; orange color form. **7,8** *Scaphella (Scaphella) sp. nov.*, BCFAU0043, length 18 mm; white color form, juvenille **9,10** *Scaphella (Scaphella) sp. nov.*, BCFAU0042, length 35 mm; white color form **11,12** *Scaphella (Scaphella) bermudezi* (Clench and Aguayo, 1940), BCFAU0075, length 38.3 mm.

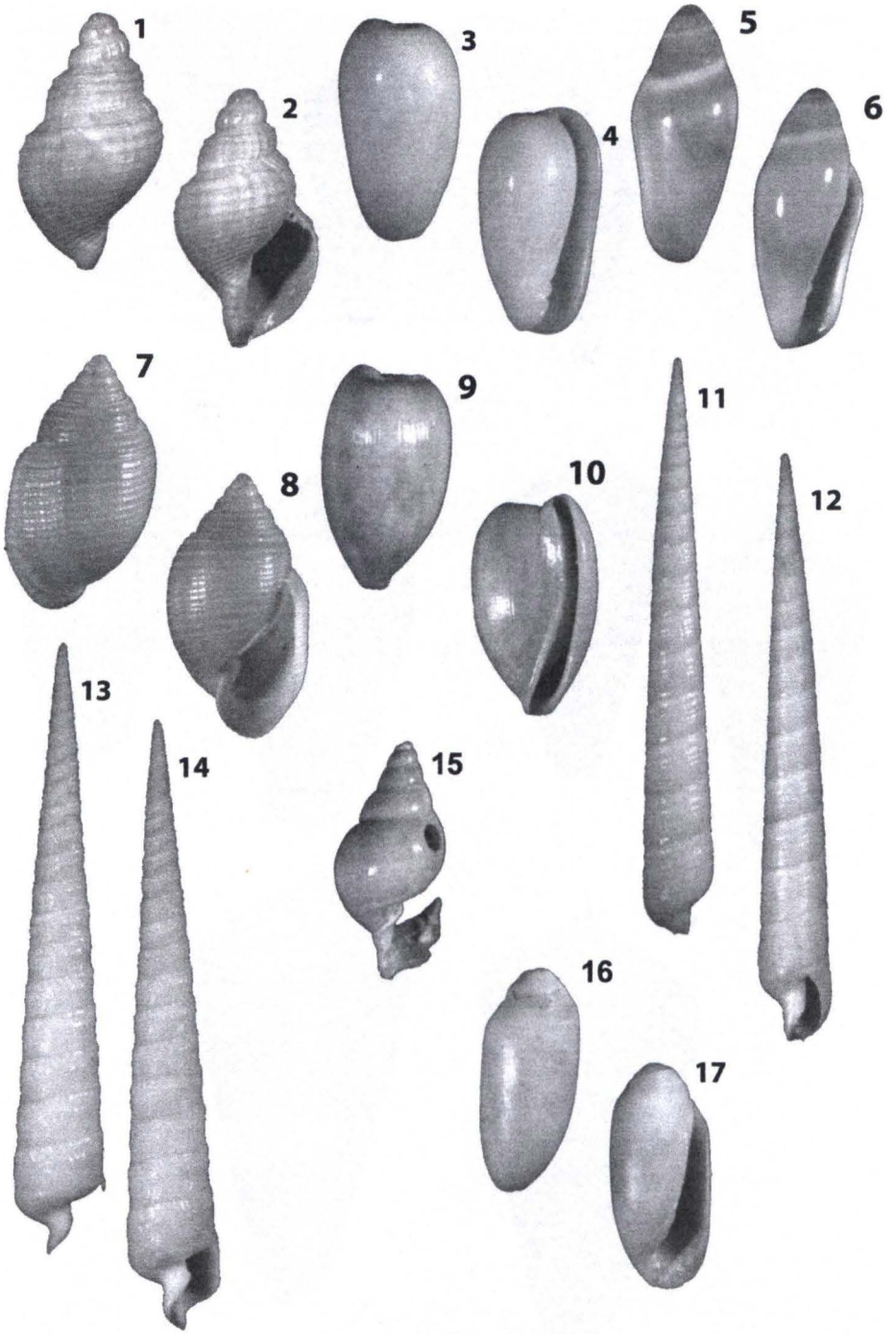

Plate 10 - 1,2 *Admete cf. microscopica* Dall, 1889, BCFAU0041, length 11 mm. **3,4** *Persicula bahamasensis* Petuch, 2002, BCFAU0042, length 8.8 mm. **5,6** *Hyalina avenacea* (Deshayes, 1844), BCFAU0043, length 15.4 mm. **7,8** *Actaeon danaida* Dall, 1881, BCFAU0044, length 7 mm. **9,10** *Ovulacteon meekii* Dall, 1889, BCFAU0046, length 5.3 mm. **11,12** *Terebra evelynae* Clench and Aguayo, 1939, BCFAU0047, length 49 mm. **13,14** *Terebra (Myurella) floridana* Dall, 1889, BCFAU0048, length 62.9 mm. **15** *Ringicula nitida* Verrill, 1873, BCFAU0049, length 4.5 mm. **16, 17** *Acteocina (Coleophysis) perplicatus* Dall, 1889, BCFAU0050, length 8 mm.

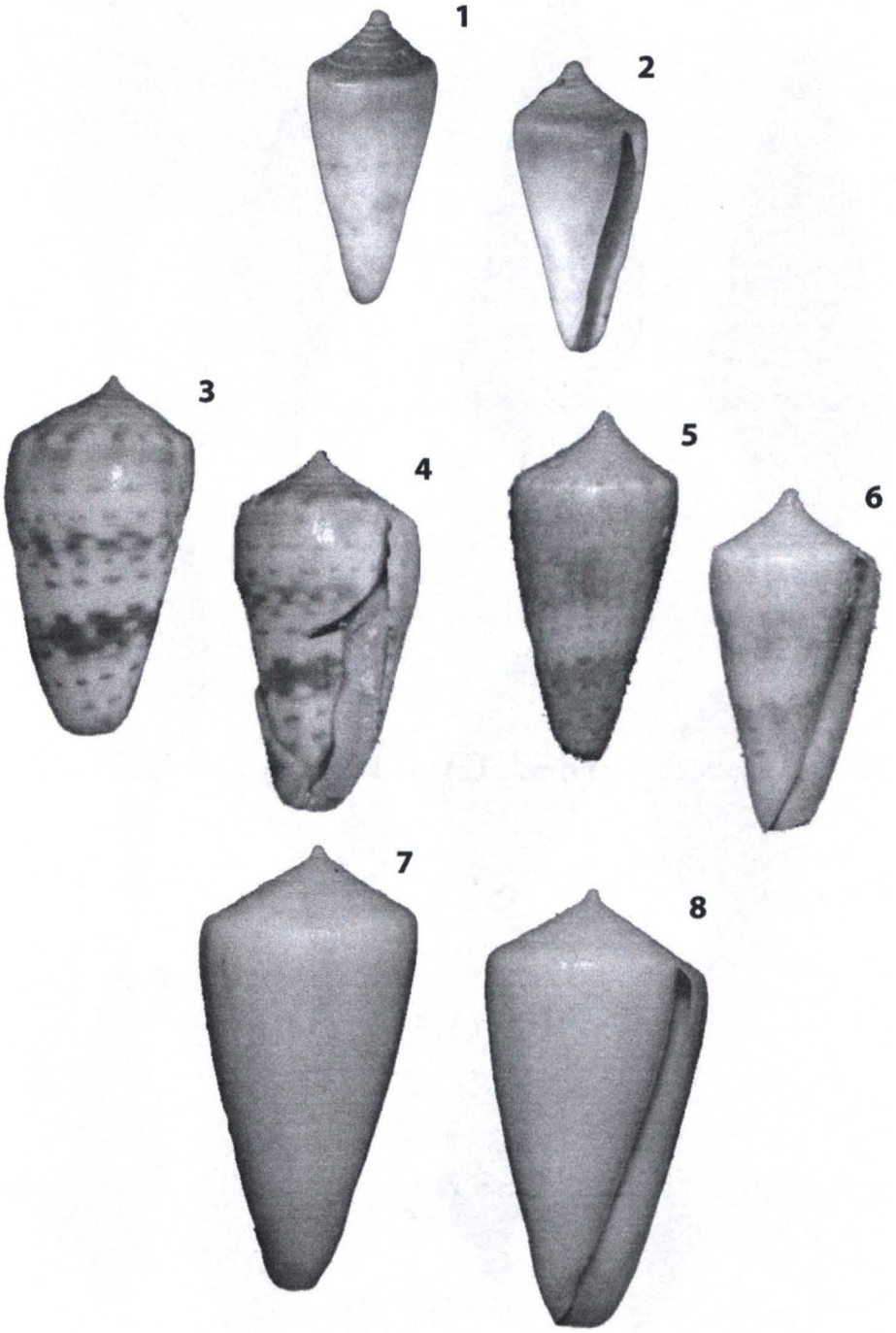

Plate 11 - 1,2 *Conus (Lindaconus) lindae* (Petuch, 1987), BCFAU0065, length 27 mm. **3, 4** *Conus (Lindaconus) lindae* (Petuch, 1987), banded color form, live with animal in shell, length approximately 35 mm. **5, 6** *Conus (Lindaconus) lindae* (Petuch, 1987), another banded color form, length approximately 25 mm. **7, 8** *Conus (Lindaconus) lindae* (Petuch, 1987), large pale colored specimen, length approximately 44 mm, (Images 3-8 taken aboard R/V Bellows in 2001, specimens reside in a private collection).

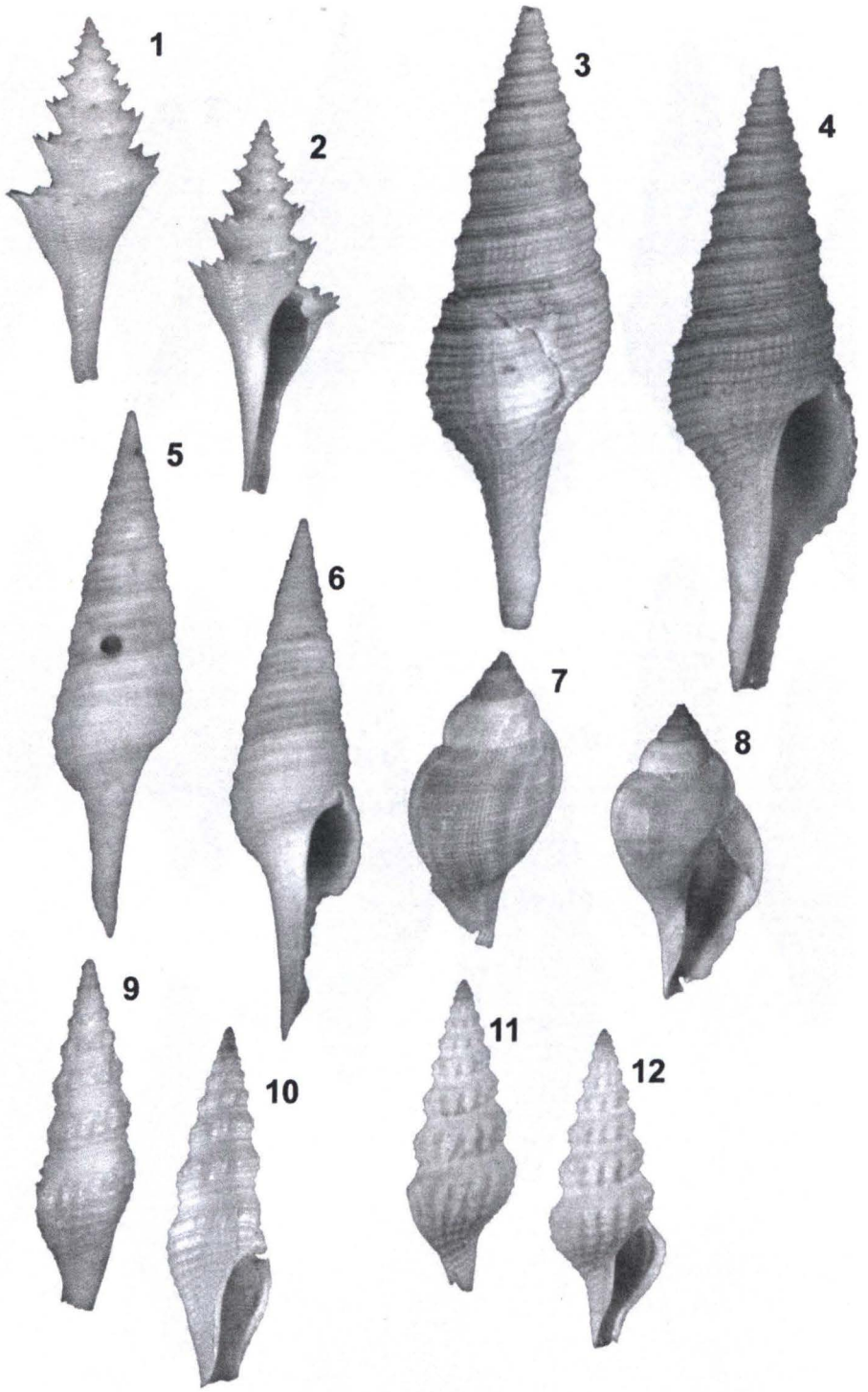

Plate 12 - 1,2 *Cochlespira radiata* (Dall, 1889), BCFAU0058, length 20.7 mm. **3,4** *Polystrira tellea* (Dall, 1889), BCFAU0059, length 60 mm. **5,6** *Polystira staretti* Petuch, 2002, BCFAU0090, length 28.9 mm. **7,8** *Dephnella pompholyx* Dall, 1889, BCFAU0064, length 6.5 mm. **9,10** *Compsodrillia acsestra* (Dall, 1889), BCFAU0062, length 24.6 mm. **11,12** *Compsodrillia tristicha* (Dall, 1889), BCFAU0084, length 12.8 mm.

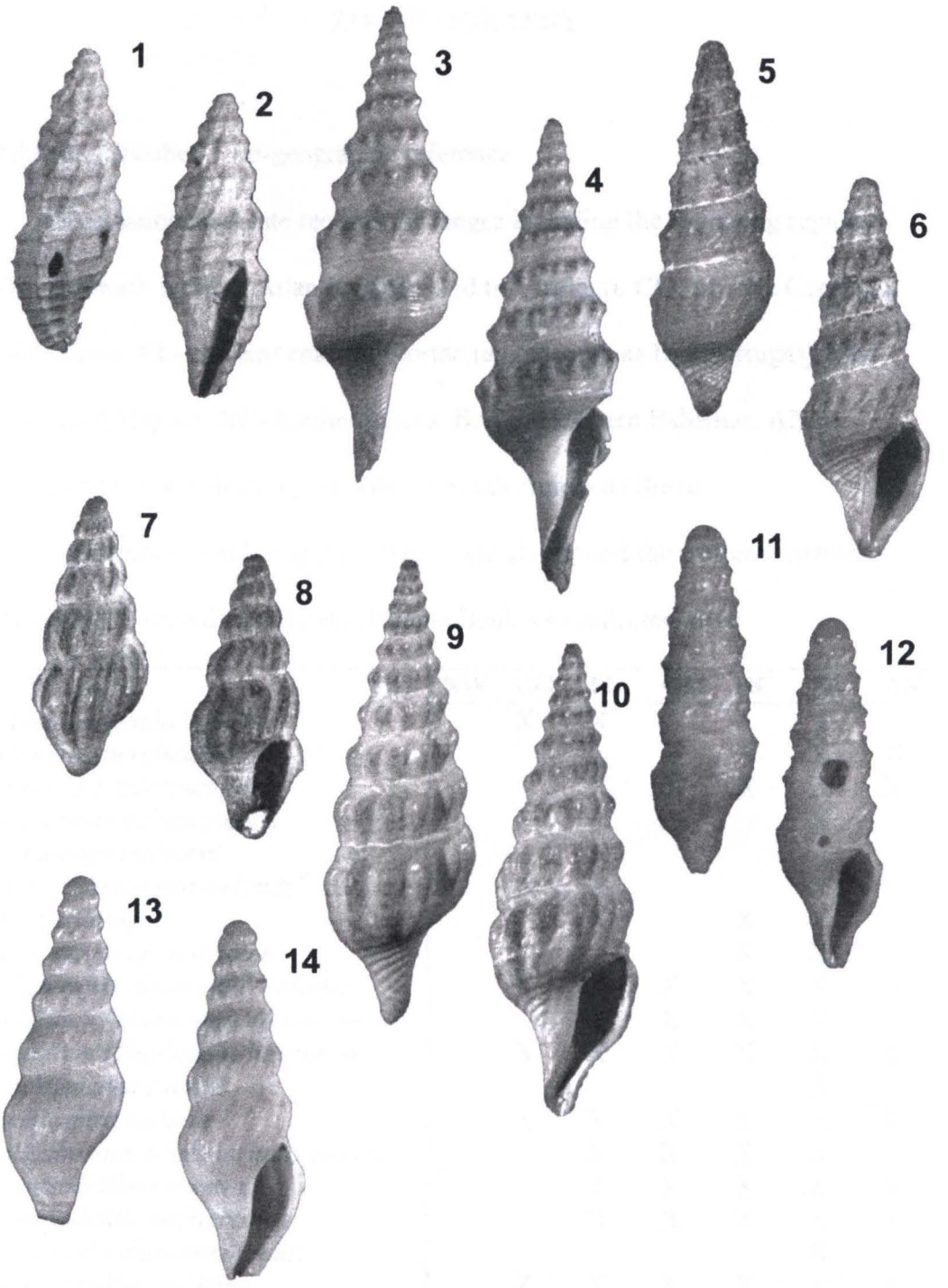

Plate 13 - 1,2 *Kurtziella serga* (Dall, 1881), BCFAU0063, length 9.7 mm. **3,4** *Leucosyrinx verillii*, (Dall, 1881), BCFAU80, length 16.7 mm. **5,6** *Drillia havanensis* Dall, 1881, BCFAU0081, length 11.4 mm. **7,8** *Splendrillia lissotropis* (Dall, 1881), BCFAU0083, length 8.1 mm. **9,10** *Inodrillia accova* Bartsch, 1943, BCFAU0082, length 16.3 mm. **11,12** *Drillia havanensis* Dall, 1881, juvenille, length 6.4 mm. **13,14** *Cymatosyrinx pagodula* (Dall, 1889), BCFAU0084, length 9.4 mm.

ZOOGEOGRAPHY

Table 1- Alphabetic bio-geographic reference.

Abbreviations indicate records for ranges including the following regions: **NW**- the north western Atlantic (Cape Cod to Virginia), **CG**- off The Carolinas and Georgia, **FL- t**he east coast of Florida (as far south as Dry Tortugas), **GM**- the Gulf of Mexico, **NC**- northern Cuba, **BA**- the western Bahamas, **AN**- throughout the Antillean region, **BR**- to South America (Brazil).

Additional symbology; (*) range extends beyond the western Atlantic Ocean, (#) 1st record from Great Bahama Bank, (♦) collected alive.

	NW	CG	FL	GM	NC	BA	AN	BR
Actaeon danaida #		X	X			X		X
Acteocina perplicatus					X	X	X	
Admete c.f. microscopica			X	X	X	X	X	
Antillophos bahamasensis						X		
Antillophos freemani						X		
Architectonica sunderlandi #			X			X		
♦*Bursa finlayi* #			X		X	X		
Calliostoma cf. apicinum					X	X		
Calliotropis (Solarcida) calatha		X	X	X	X	X	X	
Cerithium (Thericium) eburneum			X	X	X	X	X	X
Cerithium (Thericium) litteratum		X	X	X	X	X	X	X
Chickcharnea fragilis						X		
Cochlespira radiata		X	X	X	X	X	X	
Columbarium (Peristarium) electra			X	X	X	X		
Compsodrillia acsestra			X	X	X	X	X	X
Compsodrillia tristicha			X	X	X	X	X	X
♦*Conus (Lindaconus) lindae*						X		
Coralliophilia caribaea		X	X	X	X	X	X	X
Cymatosyrinx pagodula				X	X	X	X	X
Dephnella pompholyx						X	X	
Diodora fluviana			X	X	X	X	X	
Diodora sayi			X	X	X	X	X	X
Diodora tanneri	X	X	X	X	X	X	X	
♦*Distorsio perdistorta* *			X	X	X	X	X	X
Drillia havanensis				X	X	X		

	NW	CG	FL	GM	NC	BA	AN	BR
*Emarginula tuberculosa**		X	X	X	X	X	X	X
Enaeta reevei					X	X	X	
Eudolium crosseanum *	X	X	X	X	X	X	X	X
Exilia meekiana			X	X	X	X	X	
Harasewychia amphiurgus			X	X		X		
♦*Fusinus (Heilprinia) halistreptus*			X	X	X	X	X	
Ganesa sp.						X		
Hesperato sp.						X		
Hyalina avenacea		X	X	X	X	X	X	X
Inodrillia acova			X			X		
Kurtziella serga			X	X	X	X	X	
Latirus (Hemipolygona) macmurrayi					X	X		
Leucosyrinx verrillii		X	X	X	X	X	X	X
Microgaza rotella inornata		X	X			X		
Mitra (Mitra) barbadensis			X			X	X	X
Mitra (Mitra) swainsonii antillensis		X	X			X	X	
Mitra (Nebularia) straminea			X		X	X	X	
Mitrella (Astyris) diaphana	X	X	X	X		X		
♦*Siratus yumurinus*				X	X	X		
Natica perlineata			X		X	X	X	
Niso interupta var. albida		X	X	X	X	X	X	X
Niveria (Cleotrivia) candidula		X	X	X	X	X	X	X
Niveria (Niveria) nix			X	X	X	X	X	X
Oliva (Strephona)bahamasensis						X		
Olivella (Macgintiella) watermani			X	X		X	X	X
Ovulacteon meekii		X	X		X	X		X
Perotrochus(Entemnotrochus)adansonianus						X	X	X
Persicula bahamasensis						X		
Pisanianura grimaldii #*						X		
♦*Poirieria (Paziella) pazi*			X	X	X	X		
Polinices bahamiensis						X		
Polystira staretti						X		
Polystira tellea			X	X	X	X		
Ringicula natida	X	X	X	X	X	X	X	X
Scaphella (Scaphella) atlantis					X	X		
Scaphella (Scaphella) bermudezi					X	X		
Scaphella (Scaphella) sp.						X		
♦*Scaphella (Scaphella) sp. nov.*						X		
Siliquaria modesta			X	X	X	X	X	
Solariella (Sauvotrochus) lubrica			X	X	X	X	X	
Solariella (Solariella) lamellosa	X	X	X			X	X	
Splendrillia lissotropis			X	X	X	X	X	X
♦*Sthenorytis pernobilis*		X	X		X	X	X	
Terebra (Myurella) floridana		X	X	X	X	X	X	X
Terebra evelynae				X	X	X		

	NW	CG	FL	GM	NC	BA	AN	BR
Turbo castanea		X	X	X	X	X	X	X
Vermicularia bathyalis						X		
Nodicostellaria styria			X	X	X	X	X	
♦*Xenophora(Tugurium)caribaeum*		X	X	X	X	X	X	X

Faunal Affinities- From the analysis of what is still a limited collection from the deep waters of the western margin of the Great Bahama Bank it may be premature to make broad comparisons with the worldwide deep water molluscan fauna. Regardless, the following results are mainly suggestive indications gathered from the data at hand realizing that it is important to discuss the apparent relationships of the Straits of Florida deep water molluscan fauna and the western Atlantic and worldwide faunas in general.

The Straits of Florida region is within the tropical domain of the Western Atlantic Ocean, although at the northern edge so it is not surprising that at the specific level, the Straits of Florida fauna sampled in the Vicinity of Victory Cay shows a strong tropical affinity with a moderately strong influence from the temperate waters to the north; 54% (40) of the species recognized occur only in tropical West Atlantic waters (from Florida to northern Brazil); 30% (22) species occur in the temperate Northwest Atlantic (north of Georgia to Cape Cod); and 16% (12) species are restricted to the Great Bahama Bank or have only been collected from this study locality.

Four of the species collected (*Distorsio perdistorta, Emarginula tuberculosa, Eudolium crosseanum, Pisanianura grimaldii*) have extensive ranges extending beyond the Western Atlantic Ocean with *D. perdistorta* occuring

worldwide. Of the tropical species, 48% (24) have expansive ranges extending south to Brazil, 34% (17) of the tropical West Atlantic species occur throughout the Antillean region, and 18% (9) species occur only in the Straits of Florida.

Table 2- List of Temperate Northwest Atlantic Taxa.

Actaeon danaida	*Mitra (Mitra) swainsonii antillensis*
Calliotropis (Solarcida) calatha	*Mitrella (Astyris) diaphana*
Cerithium (Thericium) litteratum	*Niso interupta var. albida*
Cochlespira radiata	*Niveria (Cleotrivia) candidula*
Coralliophilia caribaea	*Ovulacteon meekii*
Diodora tanneri	*Ringicula natida*
Emarginula tuberculosa	*Solariella (Solariella) lamellosa*
Eudolium crosseanum	*Sthenorytis pernobilis*
Hyalina avenacea	*Terebra (Myurella) floridana*
Leucosyrinx verrillii	*Turbo castanea*
Microgaza rotella inornata	*Xenophora (Tugurium) caribaeum*

Table 3- List of Tropical West Atlantic Taxa.

Acteocina perplicatus	*Inodrillia acova*
Admete c.f. microscopica	*Kurtziella serga*
Architectonica sunderlandi	*Latirus (Hemipolygona) macmurrayi*
Bursa finlayi	*Mitra (Mitra) barbadensis*
Calliostoma cf. apicinum	*Mitra (Nebularia) straminea*
Cerithium (Thericium) eburneum	*Siratus yumurinus*
Columbarium (Peristarium) electra	*Natica perlineata*
Compsodrillia acsestra	*Niveria (Niveria) nix*
Compsodrillia tristicha	*Olivella (Macgintiella) watermani*
Cymatosyrinx pagodula	*Perotrochus(Entemnotrochus)adansonianus*
Dephnella pompholyx	*Pisanianura grimaldii*
Diodora fluviana	*Poirieria (Paziella) pazi*
Diodora sayi	*Polystira tellea*
Distorsio perdistorta	*Scaphella (Scaphella) atlantis*
Drillia havanensis	*Scaphella (Scaphella) bermudezi*
Enaeta reevei	*Siliquaria modesta*
Exilia meekiana	*Solariella (Sauvotrochus) lubrica*
Harasewychia amphiurgus	*Splendrillia lissotropis*
Fusinus (Heilprinia) halistreptus	*Terebra evelynae*
Ganesa sp.	*Nodicostellaria styria*

Table 4- List of Species Restricted To The Great Bahama Bank.

Antillophos bahamasensis	*Persicula bahamasensis*
Antillophos freemani	*Polinices bahamiensis*
Chickcharnea fragilis	*Polystira staretti*
Conus (Lindaconus) lindae	*Scaphella (Scaphella) sp.*
Hesperato sp.	*Scaphella (Scaphella) sp. nov.*
Oliva (Strephona) bahamasensis	*Vermicularia bathyalis*

Bathymetric Analysis- In defining bathymetric zones for the Straits of Florida, Quinn (1979) proposed a modified version of the bathymetric zones defined by Ekman (1953). In the bathymetric zones recognized for the Straits of Florida by Quinn, the littoral, or shelf, fauna extends from the tidal area down to about 150-180 meters which is somewhat shallower than the boundary used by Ekman (1953), Bruun (1957), and Voss (1967), but in the trochid fauna studied by Quinn (1979) and in the general molluscan fauna herein studied, a distinct break in species composition is recognized which occurs at the 150-180 m depths. The littoral fauna observed off Victory Cay is composed of 18 species and is dominated in composition by the families Trochidae, Triviidae, and Mitridae. Of the 18 littoral species, 8 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. Identifying the fact that only the south western 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, to the west, never reaches much more than about 900 meters depth before arriving at the western slope, the rest of the molluscs collected in this study will fall into 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). The shell that was most commonly collected alive was the carrier shell *Tugurium caribaeum*, with over 30 individuals collected (about half alive).The most abundant mollusk, overall, in the dredge hauls was *Conus lindae*, with over 50 individuals being collected from 2002-2005. A total of 5 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 cones which make up the *Conus* pavement are usually partially buried in fine carbonate mud and serve as a subsrate for the attachment of a number of cnidarians and poriferans, principally the hydrocoral *Stylaster laevigata*.

Table 5- List of Littoral Mollusca.

Cerithium (Thericium) eburneum	*Mitra (Nebularia) straminea*
Cerithium (Thericium) litteratum	*Mitrella (Astyris) diaphana*
Coralliophilia caribaea	*Niso interupta var. albida*
Diodora sayi	*Niveria (Niveria) nix*
Emarginula tuberculosa	*Olivella (Macgintiella) watermani*
Enaeta reevei	*Perotrochus(Entemnotrochus)adansonianus*
Microgaza rotella inornata	*Solariella (Solariella) lamellosa*
Mitra (Mitra) barbadensis	*Terebra (Myurella) floridana*
Mitra (Mitra) swainsonii antillensis	*Turbo castanea*

Table 6- List of Upper Bathyal Mollusca.

Actaeon danaida	*Inodrillia acova*
Acteocina perplicatus	*Kurtziella serga*
Admete c.f. microscopica	*Latirus (Hemipolygona) macmurrayi*
Antillophos bahamasensis	*Leucosyrinx verrillii*
Antillophos freemani	*Siratus yumurinus*
Architectonica sunderlandi	*Natica perlineata*
Bursa finlayi	*Niveria (Cleotrivia) candidula*
Calliostoma cf. apicinum	*Oliva (Strephona) bahamasensis*
Calliotropis (Solarcida) calatha	*Ovulacteon meekii*
Chickcharnea fragilis	*Persicula bahamasensis*
Cochlespira radiata	*Pisanianura grimaldii*
Columbarium (Peristarium) electra	*Poirieria (Paziella) pazi*
Compsodrillia acsestra	*Polinices bahamiensis*
Compsodrillia tristicha	*Polystira staretti*
Conus (Lindaconus) lindae	*Polystira tellea*
Cymatosyrinx pagodula	*Ringicula natida*
Dephnella pompholyx	*Scaphella (Scaphella) atlantis*
Diodora fluviana	*Scaphella (Scaphella) bermudezi*
Diodora tanneri	*Scaphella (Scaphella) sp.*
Distorsio perdistorta	*Scaphella (Scaphella) sp. nov.*
Drillia havanensis	*Siliquaria modesta*
Eudolium crosseanum	*Solariella (Sauvotrochus) lubrica*
Exilia meekiana	*Splendrillia lissotropis*
Harasewychia amphiurgus	*Sthenorytis pernobilis*
Fusinus (Heilprinia) halistreptus	*Terebra evelynae*
Ganesa sp.	*Vermicularia bathyalis*
Hesperato sp.	*Nodicostellaria styria*
Hyalina avenacea	*Xenophora (Tugurium) caribaeum*

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APPENDIX 1

SYSTEMATIC INDEX

Phylum **MOLLUSCA**

Class **GASTROPODA** Cuvier, 1797

Subclass *Prosobranchia* Milne-Edwards, 1848

PLEUROTOMARIIDAE Swainson, 1840

Perotrochus (Entemnotrochus) adansonianus (Crosse and Fischer, 1861)

FISSURELLIDAE Flemming, 1822

Emarginula tuberculosa Libassi, 1859

Diodora tanneri (Verrill, 1883)

Diodora fluviana (Dall, 1889)

Diodora sayi (Dall, 1889)

ARCHITECTONICIDAE

Architectonica sunderlandi Petuch, 1987

TROCHIDAE Rafinesque, 1815

Calliostoma cf. apicinum Dall, 1881

Solariella (Solariella) lamellosa Verrill and Smith, 1880

Solariella (Sauvotrochus) lubrica Dall, 1881

Microgaza rotella inornata Quinn, 1979

Calliotropis (Solarcida) calatha (Dall, 1927)

TURBINIDAE Rafinesque, 1815

Turbo castanea Gmelin, 1791

CYCLOSTREMATIDAE

Ganesa sp.

TURRITELLIDAE Clarke, 1851

Vermicularia bathyalis Petuch, 2002

SILIQUARIIDAE Anton, 1839

Siliquaria modesta Dall, 1881

CERITHIIDAE Fleming, 1822

Cerithium (Thericium) eburneum Bruguière, 1792

Cerithium (Thericium) litteratum (Born, 1778)

EPITONIIDAE

Sthenorytis pernobilis (Fischer and Bernardi, 1856)

MELANELLIDAE

Niso interupta var. albida (Dall, 1889)

XENOPHORIDAE (Troschel, 1852)

Xenophora (Tugurium) caribaeum (Petit, 1856)

ERATOIDAE Gill, 1871

Hesperato sp.

TRIVIIDAE Troschel, 1863

Niveria (Cleotrivia) candidula (Gaskoin, 1836)

Niveria (Niveria) nix (Schilder, 1922)

NATICIDAE Gray, 1840

Natica perlineata Dall, 1889

Polinices bahamiensis (Dall, 1925)

CYMATIDAE Iredale, 1913

Distorsio perdistorta Fulton, 1938

BURSIDAE Thiele, 1925

Bursa finlayi McGinty, 1962

RANELLIDAE

Pisanianura grimaldii (Dautzenberg, 1889)

TONNIDAE Peile, 1926

Eudolium crosseanum Monterosato, 1869

COLUMBARIIDAE Tomlin, 1928

Columbarium (Peristarium) electra Bayer, 1971

MURICIDAE da Costa, 1776

Siratus yumurinus (Sarasua and Espinosa, 1978)

Poirieria (Paziella) pazi (Crosse, 1869)

CORALLIOPHILIDAE Chenu, 1859

Coralliophilia caribaea Abbott, 1958

COLUMBELLIDAE Swainson, 1840

Mitrella (Astyris) diaphana (Verrill, 1882)

BUCCINIDAE Rafinesque, 1815

Chickcharnea fragilis Petuch, 2002

Antillophos bahamasensis Petuch, 2002

Antillophos freemani Petuch, 2002

FASCIOLARIIDAE Gray, 1853

Latirus (Hemipolygona) macmurrayi (Clench and Aguayo, 1941)

Fusinus (Heilprinia) halistreptus (Dall, 1889)

Harasewychia amphiurgus (Dall, 1889)

OLIVIDAE Latreille, 1825

Oliva (Strephona) bahamasensis Petuch and Sargent, 1986

Olivella (Macgintiella) watermani McGinty, 1940

MITRIDAE Swainson, 1831

Mitra (Mitra) swainsonii antillensis Dall, 1889

Mitra (Mitra) barbadensis (Gmelin, 1791)

Mitra (Nebularia) straminea A. Adams, 1853

COSTELLARIIDAE

Nodicostellaria styria (Dall, 1889)

TURBINELLIDAE

Exilia meekiana (Dall, 1889)

VOLUTIDAE Rafinesque, 1815

Enaeta reevei Dall, 1907

Scaphella (Scaphella) atlantis Clench, 1946

Scaphella (Scaphella) bermudezi (Clench and Aguayo, 1940)

Scaphella (Scaphella) sp. nov.

Scaphella (Scaphella) sp.

CANCELLARIIDAE Forbes and Hanley, 1853

Admete c.f. microscopica Dall, 1889

MARGINELLIDAE Fleming, 1828

Persicula bahamasensis Petuch, 2002

Hyalina avenacea (Deshayes, 1844)

CONIDAE Rafinesque, 1815

Conus (Lindaconus) lindae Petuch, 1987

TERIBRIDAE H. and A. Adams, 1854

Terebra (Myurella) floridana Dall, 1889

Terebra evelynae Clench and Aguayo, 1939

TURRIDAE Swainson, 1840

Cochlespira radiata (Dall, 1889)

Leucosyrinx verrillii (Dall, 1881)

Polystira staretti Petuch, 2002

Polystira tellea (Dall, 1889)

Drillia havanensis Dall, 1881

Inodrillia acova Bartsch, 1943

Splendrillia lissotropis (Dall, 1881)

Cymatosyrinx pagodula (Dall, 1889)

Compsodrillia acsestra (Dall, 1889)

Compsodrillia tristicha Dall, 1889

Kurtziella serga (Dall, 1881)

Dephnella pompholyx Dall, 1889

ACTEONIDAE Orbigny, 1842

Actaeon danaida Dall, 1881

Ovulacteon meekii Dall, 1889

RINGICULIDAE Philippi, 1853

Ringicula natida Verrill, 1873

ACTEOCINIDAE Pilsbry, 1921

Acteocina perplicatus Dall, 1889

Subclass *Prosobranchia* Milne-Edwards, 1848

Class Bivalvia Linné, 1758

VERTICORDIIDAE Stoliczka, 1871

Verticordia acousticostata Philippi, 1884

LUCINIDAE Fleming, 1828

Lucinoma filosa (Stimpson, 1851)

Pseudomiltha floridana (Conrad, 1833)

MYTILIDAE Rafinesque, 1815

Lithiphaga nigra (Orbingy, 1842)

PECTINIDAE Rafinesque, 1815

Caribochlamys imbricata (Gmelin, 1791)

Caribochlamys multisquamata (Dunker, 1864)

SPONDYLIDAE Gray, 1826

Spondylus ictericus Reeve, 1856

CHAMIDAE Lamarck, 1809

Chama lactuca Dall, 1886

LIMIDAE Rafinesque, 1815

Lima pellucida C.B. Adams, 1846

GLOSSIDAE Gray, 1847

Meiocardia agassizii Dall, 1889

CUSPIDARIIDAE Dall, 1886

Cuspidaria microrhina Dall, 1886

VENERIDAE Rafinesque, 1815

Transennella conradina (Dall, 1883)

POROMYIDAE Dall, 1886

Poromya (Cetomya) elongata Dall, 1889

CARDIIDAE Oken, 1818

Nemocardium permabile (Dall, 1881)

APPENDIX 2

DREDGE LOGS

DREDGE LOGS FROM THE VICTORY CAY AND BIMINI VICINITY

The following is a "cleaned up" version of the dredge logs from the Bahamas research cruises aboard the *R/V BELLOWS* and aboard the *R/V* SUNCOASTER. Here the dredges are numbered 1 through 26 for reference, these dredge numbers do not match the dredge numbers from the raw data collected aboard the ships while at sea during the summers of 2002 and 2003 because many other dredges were logged at other localities during the trips that do not pertain to this report. The start and end coordinate indicate where the dredge frame was dropped into and pulled out the water (not where it hit bottom). The dredges were logged by one of the collectors (not necessarily me) immediately after they were brought aboard and sorted so comments are not conclusive. All molluscs and some other invertebrates were immediately preserved in denatured ethanol alcohol to be further examined later in the laboratory. The species listed in the comments and contents are not conclusive, many more organisms were found later when samples were sorted and examined more intensively. All gastropods collected were identified and photographed, see the systematic index and photographic plates for a comprehensive list of all molluscs collected.

Dredges aboard *R/V BELLOWS*, 2002

May 23

Dredge # 1

Time Deployed: 10:15 AM

Time Retrieved: 11:45 AM

Bottom Time: 30 Min

Start Coordinates: 25°26.008'N

79°18.617'W

End Coordinates: N/A

Maximum Depth: 600 m

Contents: Stemmed crinoids, siliceous sponges, abundant Pteropods

Small trochidae (*Margarites*?), Marginellidae, Naticidae, one *Puncturella*

Few brachipods, Rock fragments – limestone and oolitic limestone + mud clumps

Dredge # 2

Time Deployed: 12:23 PM

Time Retrieved: 2:25 PM

Bottom Time- 30 Min

Start Coordinates: 25°27.332'N

79°19.223W

End Coordinates: 25°26.008'N

79°18.617W

Maximum Depth- 500m

Contents: Muddy ooze (foraminiferal – pteropod). Abundant pteropods, few brachiopods, small stemless crinoids, broken hydroids and solitary corals, shallow water bivalves (*Dosinia* etc.), small echinoderms, deep- water Trochidae (Margaritidae?) or Sequenziidae, *Columbarium*, *Crassispira*, Rissoidae, Pyramidellidae, small rock fragments- limestone.

Dredge # 3

Time Deployed: 2:30 pm

Time Retrieved: 4:07 pm

Bottom time: 28 min

Start Coordinates: 25°28.477'N

79°17.632'W

End Coordinates: N/A

Maximum Depth- 400 m

Contents: Rubble, a lot of limestone rock fragments, 3 *Conus lindae* strongly corroded, few stemmed crinoids, sea feathers, various echinoderms, Ophiuroids, brachiopods, few pteropods, Turridae, few *Xenophora*, common bivalves (mostly *Dosinia* etc) washed from the shallow water, few brachiopods.

Date: May 23 – May 24

Dredge # 4

Time Deployed: 11:30 PM

Time Retrieved: 1:00 AM

Bottom Time: 37 min

Start Coordinates: 25°28.082'N

79°18.393'W

End Coordinates: 25°28.603'N

79°17.275'W

Maximum Depth: 400 m

Contents: Rubble (limestone chunks), sea feathers, few soft echinoids, *Xenophora*, few Murricidae, decapods, Few brachiopods, minor pteropods, *Gorgonocephalus* ophiuroids.

Dredge # 5

Time Deployed: 1:25 AM

Time Retrieved: 3:02 AM

Bottom Time: 23 min

Start Coordinates: 25°28.735'N

79°19.084'W

End Coordinates: 25°29.280'N

79°17.759'W

Maximum Depth: 450 m

Contents: Limestone rubble, few stemmed crinoids, one stem-less crinoid, regular echinoderms, abundant Terebratulidae, few gooseneck barnacles, *Murex bahamasensis* (?) alive and 1 dead, 2 – 3 Xenophora sp., 5 – 6 *Conus lindae*, one fairly fresh; abundant ophiuroids, few *Gorgonacephalus* on sea-feathers.

Dredge # 6

Time Deployed: 3:19AM

Time Retrieved: 4:44AM

Bottom Time: 22 minutes

Start Coordinates: 25°29.617'N

79°18.041'W

End Coordinates: 25°30.109'N

79°17.873'W

Maximum Depth: 380 m.

Contents: Limestone rubble with abundant *Conus lindae* (eroded, one moderately fresh), *Pterotrochus quoyanus*, *Xenophora*, one *Scaphella gaudiati* with hermit crab, hydroids, rare sea lilies, 2-3 pteropods, no brachiopods.

Fresh large red *Spondylus*, Moderately fresh Pectinidae. *Cyprea spadicea*, eroded.Contamination from shallow water. Few large yellowish sea urchins.

Dredge # 7

Time Deployed: 5:05 AM

Time Retrieved: 5:49 AM

Bottom Time: 14 minutes

Start Coordinates: 25°30.620'N

79°17.961'W

End Coordinates: 25°30.825'N

79°18.205'W

Maximum Depth: 380 m (less?)

Comments: Dredge hit something on the way and was pulled out early. Dredge came with moderately large broken pieces of hydrocoral. Apparently it hit a deep-water bioherm or deep reef.

Contents: Mollusks: *Antillophos bahamasensis*, *Scaphella gaudiati* (both with hermit crabs) and Trochidae alive (1 specimen each). *Antillophos*, although has a large hole on the side, looked very fresh with color preserved.

Dredge # 8

Time Deployed: 6:20 AM

Time Retrieved: 7:45AM

Bottom Time: 21 minutes

Start Coordinates: 25°29.758'N

79°18.462'W

End Coordinates: 25°30.292'N

79°17.476'W

Maximum Depth: 410 m

Comments: Dredge began at 280 m, dredge got tangled in the sediment (stuck) at ~ 280 m (268 m)

Contents: Fine gravel, mostly of carbonate hard parts (sample taken) with seldom seen hydrocorals. Dominant gastropod, *Conus lindae* (1 specimen ALIVE!), one albino, one very fresh, small, with color and hermit crab inside. Also *Fissurella*, live *Bursa*, shallow water contaminants minor. Gravel is glued together by whitish mud (ooze?).

Dredge # 9

Time Deployed: 8:20 AM

Time Retrieved: 9:50 PM

Bottom Time: 38 minutes

Start Coordinates: 25°29.748'N

79°18.123'W

End Coordinates: 25°29.855'N

79°17.394'W

Maximum Depth: 476 m

Contents: Gravel with some irregular and soft echinoids, minor ophiuroids, few dead *Conus lindae*, one very fresh and large *Scaphella gaudiati* with the hermit crab in it, *Xenophora*, shallow water contamination (*Turbinella*, *Strombus*, *Cyprea*)

Dredge # 10

Time Deployed: 8:39PM

Time Retrieved: 10:05PM

Bottom Time: 38 minutes

Start Coordinates: 25°28.355'N

79°18.944'W

End Coordinates: 25°28.650'N

79°18.165'W

Maximum Depth: 559 m

Comments: Coarse gravel with limestone chunks up to 20cm diameter. Hard bottom.regular echinoids, 2 species of Crinoids, 2 Species of ophiuroids, *Xenophora,* fan sponges, broken hydrocorals, broken solitary corals.

Dredge # 11 (cable length 800m on this one)

Time Deployed: 10:25PM

Time Retrieved: 11:45PM

Bottom Time: 30min

Start Coordinates: 25°29.791'N

79°18.478'W

End Coordinates: 25°28.650'N

79°18.165'W

Maximum Depth: 481

Comments: Dredge stuck at 335 – 336 m

Contents: Medium to moderately coarse gravel, limestone chunks 5 – 10 cm in diameter, *Xenophora*, live *Conus Lindae, Scaphella gaudiati*, *Chickcharnea* , soft shell echinoids, Yellow echinoids, feather sponges.

05-27-2002 Western Slope of Victory Cay/South Cat Cay

Dredge # 13

Deployed 12:55PM

Retrieved 2:30PM

Bottom Time: 45min

Start Coordinates: 25°.30.053'N

79°19.107'W

End Coordinates: 25°30.867'N

79°18.350'W

Maximum Depth: 564m

Contents: Fragments of limestone from 5 to ~ 15 cm in diameter, 1 live Fusinus, regular echinoid, large Gorgonocephalus, ophiuroids, brachiopods (mostly broken), siliceous sponges.

Dredge #14

Deployed: 2:35pm

Retrieved: 4:50pm

Bottom time: 37 min

Start Coordinates: 25°31.197'N

79°18.801'W

End Coordinates: 25°31.509'N

79°18.039'W'

Maximum Depth: 400m to 113 m (stuck at 386 m)

Comments: Dredge was stuck at 386 m

Contents: Gravel, two species of echinoids, two species ophiuroids, few dead *Conus lindae*, hydrozoans, odd sea cucumber, *Xenophora sp.*, *Antillophos bahamasensis*, Bursidae.

5-28-2002 off Wedge Rock, Victory Cay

Dredge # 15

Deployed: 3:53AM

Retrieved: 5:30 AM

Bottom Time: 35min

Start Coordinates: 25°30.449'N

79°18.214'W

End Coordinates: 25°30.481'N

79°18.184'W'

Maximum Depth: 440 m

Comments: from 4:20 – 4:55AM the dredge was stuck. Sediment sample taken.

Contents: Fine rubble (Coral, hydrocoral, and sponge fragments, with larger chunks of deep water coral, hydrocoral, minor ophiuroids, live *Murex*, live *Fissidentalium?*dead *Conus lindae*, 2 Pteropods, minor sea-urchins.

Dredge # 16

Deployed: 6:04 AM

Retrieved: 7:20 AM

Bottom time: 30 min

Start Coordinates: 25°30.470'N

79°18.380'W

End Coordinates: 25°30.080'N

79°17.382'W'

Maximum Depth: 440 m

Contents: Fine to medium sized rubble with larger limestone chunks. Molluscs: One live *Conus lindae*, 1 live *Fusinus*, dead *Mitra*, dead *Terebra*, small Marginellidae.

Dredges aboard *R/V Suncoaster*, 2003

May 9- off Victory Cay, Bimini Chain, Bahamas

Dredge # 16

Dredge #1 in Bimini area for 2003

Deployed: 3:34 AM

Retrieved: 4:02 AM

Bottom Time: 28 min.

Start Coordinates: 25°29.370"N

79°18.243"W

End Coordinates: 25°29.065N

79°18.056'W

Maximum Depth: 511 m

Max Cable Length: 800m

Contents: Rocky substrate, yellow Echinoids, Crinoids, Brachiopods, dead *Xenophora carribaea?* Disarticulated bivalves, ophiuroids, dead hydrocorals.

Dredge # 17

Dredge #2 in Bimini area for 2003

Deployed: 4:50AM

Retrieved: 5:20 AM

Bottom Time: 30 min.

Start Coordinates: 25 °28.460'N

79 °17.354'W

End Coordinates: 25 °28.355"N

79 °16.532"W

Maximum Depth: 500 m

Comments: Dredge came empty (except for 2 brachiopods)

Dredge # 18

Dredge #3 in Bimini area for 2003

Deployed: 6:15 AM

Retrieved: 6:45 AM

Bottom Time: 30 min.

Start Coordinates: 25°29.286"N

79°16.835"W

End Coordinates: 25°29.095'N

79 °16.826'W

Maximum Depth: 291 m

Comments: Dredge stuck at 206m, 200 m, and 154 m. There seem to be a number of rocky cliffs on the bottom

Contents: Sediment consists of molluscan-coral rubble, 2 echinoids.

May 9- Southern Bimini

Dredge #19

Dredge #4 in Bimini area for 2003

Deployed: 11:30 AM

Retrieved: 12:00 PM

Bottom Time: 30 min.

Start Coordinates: 25°42.085"N

79o22.186"W

End Coordinates: 25°42.085"W

79°21.792

Maximum Depth: N/A

Comments: Depth sounder malfunctioned at 570m, dredge pulled back early

Max Cable Length: 1200m

Contents: Gravel bottom with some large fragments (5cm), gorgonians, soft echinoids, ophiuroids, regular sea stars, crinoids and bottom fish.

Dredge # 20

Dredge #5 in Bimini area for 2003

Deployed: 1:13 PM

Retrieved: 1:43 PM

Bottom Time: 30 min.

Start Coordinates: 25°42.189"N

79°20.496"W

End Coordinates: 25°42.940"N

79°19.900"W

Maximum Depth: 432 m

Comments: Gravel bottom with large chunks (10cm), Talus. Dead *Scaphella gaudiati*, 2 live *Fusinus* new sp(?), 1 *Murex* new sp(?), 2 dead *Terebra*, dead *Genota*, 2 fresh dead *Conus lindae* numerous pteropods, some ophiuroids, tube worms, shrimp.

May 10- off Victory Cays and Wedge Rocks

Dredge # 21

Dredge #6 in Bimini area for 2003

Deployed: 6:04 PM

Retrieved: 6:40 PM

Bottom Time: 36 min.

Start Coordinates: 25°30.165'N

79°18.169'W

End Coordinates: 25°31.247'N

79°18.224'W

Maximum Depth: 472 m

Comments: Dredge got stuck, weak link broke.

Contents: shell-coral rubble with large (30 cm) blocks of coral. Hydrocorals, few live echinoids, live *Scaphella gaudiati*, fresh dead *Conus Lindae*, *Terebra*, egg capsules on the rock (preserved with the rest of the material from the station inalcohol).

Dredge # 22

Dredge #7 in Bimini area for 2003

Deployed: 8:24 AM

Retrieved: 8:55 AM

Bottom Time: 31 min.

Start Coordinates: 25°29" 898'N

79°19" 840'W

End Coordinates: 25°30.233'N

79°19.262'W

Maximum Depth: 670(?) m

Contents: rocky rubble, limestone chunks and coral, numerous crinoids, some ophiuroids, common glass sponges, hydrocorals, soft corals, 1 dead *Xenophora carribaea*, 1 brachiopod, 1 live *Marginella*.

Dredge # 23

Dredge #8 in Bimini area for 2003

Deployed: 11:05 AM

Retrieved: 11:35 AM

Bottom Time: 30 min.

Start Coordinates: 25°29.137"N

79°18.944"W

End Coordinates: 25°29.475"N

79°18.329"W

Maximum Depth: 580 m

Contents: Gravel bottom with plentiful large chunks of rubble. Plentiful crinoids, small soft echinoids, brachiopods, dead *Scaphella gaudiati* w/ hermit crab, hydrocorals, gorgonians, pteropods, unknown gastropod w/ soft barnacle growing on it, shrimp.

Dredge # 24

Dredge #9 in Bimini area for 2003

Deployed: 1:30

Retrieved: N/R

Bottom Time:

Start Coordinates: 25°28.500"N

79°18.766"W

End Coordinates: 25°28.580"N

79°19.204"W

Maximum Depth: ~ 500 m

Comments– depth sounder malfunctioning

Contents: gravel bottom with large black chunks, solitary corals, crinoids, mermaids purse, near empty dredge.

May 11- off Victory Cay

Dredge # 25

Dredge #10 in Bimini area for 2003

Deployed: 4:00 PM

Retrieved: N/R

Bottom Time: N/R

Start Coordinates: 25°29.136"N

79o19.278"W

End Coordinates: N/R

Maximum Depth: roughly 500-600m

Comments: Depth sounder not functioning, max cable length:1200 m

Contents: Dredge was completely empty, never touched the bottom.

Dredge # 26

Dredge #11 in Bimini area for 2003

Deployed: 4:30 PM

Retrieved: Never Retrieved

Bottom Time: 1 hr. 10 min. (stuck on bottom)

Start Coordinates: 25°30.814"N

79o18.216"W

End Coordinates: NONE

Depth: N/R

Comments: Max Cable Length: 800 m. Capetown dredge frame lost at 6:40 PM.

End of Dredging for 2003

Dredges aboard *R/V Bellows*, 2005

June 12th

Dredge # 1

General Vicinity: Victory Cay

Time Deployed: 14:48

Time Retrieved: 15:50

Bottom Time: 24 minutes

Start Coordinates: 25° 30.362 N

79° 18.086 W

End Coordinates: 25° 29.637 N

79° 17.571 W

Depth range: 390-380 meters

Comments: First dredge of the trip. 1050 meters of cable. The dredge actually hit bottom at 25° 29.847 N, 79° 17.594 W at about 15:24. We are dredging in a North- South direction, almost parallel with the slope. The bottom started at 390 m, sloped up and then back down to 380 meters.

Contents: Excellent catch! Rock/rubble, abundant sponges, *Lophelia* and *Stylaster* corals, 5 fresh dead *C. lindae*, echinoderms, starfish, *Stenorytis pernobilis*, *Xenophora*, broken *Perotrochus* and some bivalves.

June 13th

Dredge # 2

General Vicinity: North and West of Ocean Cay, Bahamas.

Time Deployed: 14:24

Hit Bottom at: 15:01

Time Retrieved: 15:42

Bottom Time: 40 mins.

Start Coordinates: 25° 28.494 N

79° 16.904W

End Coordinates: 25° 26.560 N

79° 15.820W

Depth range: 410-390 m

Comments: Heading 163°, Dredge dropped in 410 meters of water. Hit bottom at 25° 27.610N, 79° 16.447 W. 1200 meters of cable released. As a result of the malfunctioning winch, it took nearly two hours to get the dredge to the surface.

Contents: Two dead *C. lindae*, a Coke can (really!), one small *Z. carribaea*, a couple eroded bivalves, a chunk of worm rock and some limestone rubble.

June 14th

Dredge # 3

General Vicinity: South and West of Anguilla Cays, Cay Sal Bank.

Time Deployed: 12:33

Time Retrieved: 1:00

Bottom Time: 5 minutes?

Start Coordinates: 23° 25.103 N

79° 35.557 W

End Coordinates: 23° 23.751 N

79° 41.849 W

Depth range: 200 meters

Comments: We are attempting to dredge along the wall of this steep escarpment at 200 meters depth, heading 284° at 2.3 knts. About 600 meters of cable deployed. Dredge was stuck so we retrieved it prematurely. After scouting a couple of areas, we have decided not to attempt anymore dredges because of the complicated bathymetry and our crippled winch.

Contents: rubble, limestone/shell fragments. High percentage of shallow water material: bivalves, 4 or 5 species of dead murex, many crab parts, one dead cone, *jaspideus?* (shallow water), a few *Spondylus sp.*, a dead juvenile *Cassis flammea*. Rubble and shell material sampled.

June 17th

Dredge # 4

General Vicinity: Victory Cay

Time Deployed: 14:05

Time Retrieved: 14:48

Bottom Time: 8 mins?

Start Coordinates: 25° 30.818 N

79° 18.230 W

End Coordinates: 25° 30.492 N

79° 17.608 W

Depth range: 400- 200 meters

Comments: This is basically the same site as dredge #1. Dredge hit bottom around 14: 40 with 1145 meters of cable out. We retrieved it after only about 8 mins of

dragging because the bottom sloped up and the dredge was pulling back, we were not making way. The dredge was stuck on a rocky ledge.

Contents: Returned with only some limestone fragments, a few disarticulated oyster valves a dead *C. lindae* shell and some dead *Stylaster* and *Lophelia* fragments.

June 17th

Dredge # 5

General Vicinity: Victory Cay

Time Deployed: 16:25

Time Retrieved: 17: 20

Bottom Time: 30 mins

Start Coordinates: 25° 30.069 N

79° 18.316 W

End Coordinates: 25° 29.149 N

79° 16.999 W

Depth range: 400- 360 ft.

Comments: 1125 meters of cable were deployed, the drag started at 16:50, heading 121°.

Contents: We hit the spot! Limestone rubble, full dredge. No live *lindae* but we got 6 fresh ones (white and colored forms) some so fresh they still have periostracum. We also got 15-20 or more "bones", this looks like the spot, we just didn't luck out with a live one. Also *Z. caribaeum, Scaphella atlantis, Persicula,*

Antillophos, Polystira, Emarginula, Trivia, live *Distorsio, Vermicularia*, oysters, scallops, bivalves……..