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THE MARINE MOLLUSKS OF GRAND CAYMAN ISLAND, BRITISH WEST INDIES

By
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INTRODUCTION

This is a taxonomic and ecological study of the shallow-water marine mollusks of Grand Cayman Island, British West Indies. The report is based upon the extensive collections made at 160 localities (see map 2) around Grand Cayman by Alfred J. and Ruth Ostheimer, 3rd, of Whitford, Pennsylvania, and members of the Academy of Natural Sciences of Philadelphia. Three visits, each of approximately one month's duration, were made in October and November from 1952 to 1954. On the second expedition, the Ostheimers were assisted by Mr. John D. Parker, formerly with the Department of Mollusks at the Academy. The main set of specimens are deposited in the Academy, and duplicates placed in the U. S. National Museum, the Museum of Comparative Zoölogy at Harvard College, and the Institute of Jamaica in Kingston, Jamaica.

The collectors wish to express their thanks to many residents of Grand Cayman for their many kindnesses and cooperation. Especial appreciation is due the former Commissioner, Mr. Andrew M. Gerrard (now transferred to Nigeria). The field work and research were made possible by a series of grants from the Natural Science Foundation (of Philadelphia), an organization established for the purpose of encouraging the increase and diffusion of knowledge of mollusks.

The only other general report on the marine mollusks of this island was published in 1953 by A. E. Salisbury who listed 62 species collected by the Oxford University Expedition to the Cayman Islands in 1938.

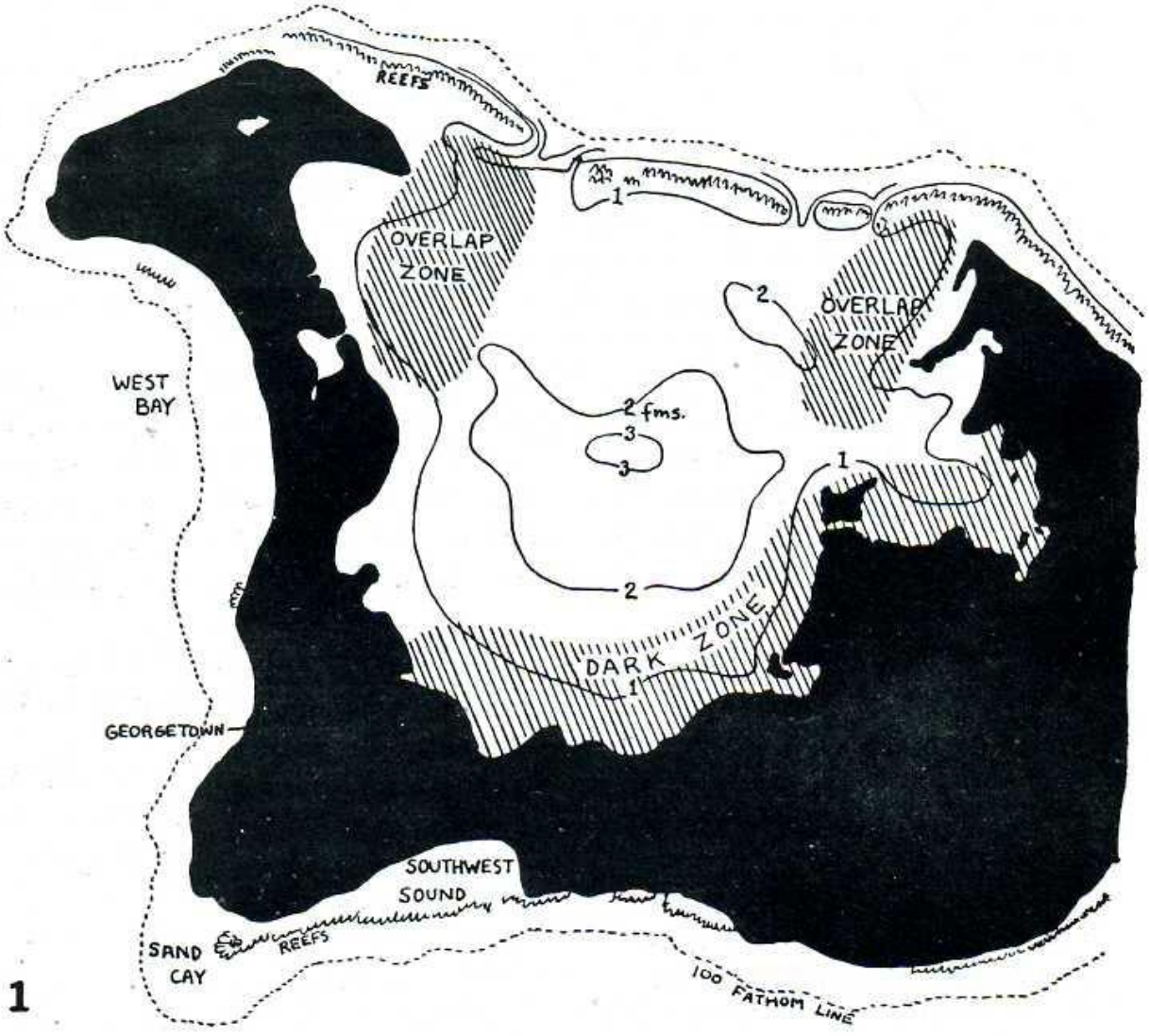
The synonymy, description, habitat, and geographical range of the 293 species of mollusks found at Grand Cayman Island are presented in the taxonomic section of this report. The following new species and new names are introduced:

Emarginula ostheimerae new species
Coralliophila caribaea new species
Murex (*Phyllonotus*) *margaritensis* new name
Latirus (*Polygona*) *virginensis* new species
Ithycythara parkeri new species
Turbonilla (*Pyrgiscus*) *alfredi* new species
Strombiformis auricincta new species
Cosa caribaea new species
Transennella gerrardi new species

GEOGRAPHY OF GRAND CAYMAN ISLAND

The three small Cayman Islands, which are a dependency of Jamaica, lie a little closer to Cuba than to Jamaica. They are projecting peaks of the Cayman Ridge, a range of submarine mountains continuous with the Sierra Maestra Range of Cuba and running west to the Misteriosa Bank in the direction of British Honduras. A few miles south of this ridge runs the Bartlett Deep which, about 40 miles south of Grand Cayman, is about 3,400 fathoms in depth. The smaller two islands, Cayman Brac and Little Cayman, are about 70 miles northeast of Grand Cayman.

Grand Cayman is a low, flat-topped island capped entirely with limestone rock and sparse, semi-xerophytic vegetation. It is 22 miles long from east to west with a maximum width of about 8 miles. It has an area of about 76 square miles, and the low ridges on its surface vary from 10 to 40



Map. 1. Bathymetric chart of North Sound at the western end of Grand Cayman Island showing the ecological "overlap" and "dark" zones.

feet in elevation. The rainfall varies between 67 and 77 inches per year. The western third of the island is taken up by the large, mangrove-bordered, shallow North Sound, 7.5 by 6 miles in extent, and less than 20 feet in depth (Map 1). The island is cliffed with karstic shoreline except for a three-mile, sandy beach at the west end. It is almost entirely ringed by poorly developed coral reefs which cut across bights, forming sounds or lagoons of sizable dimensions. A detailed and illustrated description of the topography of the island is given by Doran (1954).

The temperature of the ocean waters offshore, from the surface down to 50 meters, is about 26° C (about 78° F) and the salinity 36.00 parts per thousand. The general horizontal circulation of the upper layers of the ocean are from the vicinity of the Isle of Pines, southeasterly across the Cayman Ridge and on to the north coast of Jamaica (Parr, Bull. Bingham Ocean. Coll., vol. 5, art. 5, 1937). We have no inshore temperature records. The spring tide range is 1.1 feet; the mean range 0.9 feet. An informative general account of the island may be found in the biennial Colonial Reports, " Cayman Islands ", sold for two shillings at Her Majesty's Stationery Office, P. O. Box 569, London, S.E.1, England.

COMPOSITION OF THE GRAND CAYMAN FAUNA

A total of 293 species and subspecies of mollusks were obtained from 57 intertidal stations and 103 shallow-water (6 to 60 feet in depth) dredging stations.

Gastropoda	202
Amphineura	11
Scaphopoda	3
Pelecypoda	73
Cephalopoda	4
Total collected	293

RELATIVE ABUNDANCE OF SPECIMENS

No quantitative records were made during the collecting of specimens at Grand Cayman Island, and our remarks concerning the relative abundance of certain species are inferred from the collections as they were received at the Academy. The terms " abundant," " common," and " rare " are not very satisfactory, but we use them nevertheless to give some indication of the relative occurrence of individuals.

In ocean-facing lagoons.—It appears from an examination of the dredging samples from lagoons around the island that the following species are the thirteen which are found in greatest numbers:

Cerithium eburneum	*Bulla occidentalis*	*Tellina similis*
Nassarius albus	*Rissoina bryerea*	*Tellina candeana*
Columbella mercatoria	*Cerithium litteratum*	*Tellina listeri*
Olivella dealbata	*Conus jaspideus*	*Chione cancellata*
	Divaricella quadrisulcata	

In North Sound.—The following are the twelve most abundant species dredged throughout the entire extent of North Sound (depth: 1 to 18 feet):

Bulla occidentalis	*Nassarius albus*	*Lyropecten antillarum*
Astraea phoebia	*Columbella mercatoria*	*Codakia orbiculata*
Cerithium eburneum	*Rissoina bryerea*	*Codakia costata*
Modulus modulus	*Olivella dealbata*	*Pitar fulminata*

On reef flats.—This list of species may not be significant, since no special effort was made to find out which species were most abundant on the reef flats. According to the number of specimens in the collections, and on the basis of the memory of the collectors, the following may be considered to be the most abundant:

Drupa nodulosa	*Conus mus*	*Hipponix antiquatus*
Hemitoma octoradiata	*Astraea caelata*	*Barbatia cancellaria*
Acmaea jamaicensis	*Leucozonia nassa*	*Chlamys ornata*
Diodora listeri	*leucozonalis*	*Barbatia domingensis*

A two gallon dredging sample made in the lagoon at Bluff Bay in 6 feet of water where the bottom consisted of white sand and a small amount of brown algae included 64 species. The 12 species represented by the largest estimated total mass of shells were: *Divaricella quadrisulcata* (450 dead valves), *Tellina radiata* (55 dead valves), *Olivella dealbata* (680 dead), *Tellina similis* (210 dead valves), *Tellina cuneata* (115 dead valves), *Lucina pensylvanica* (13 dead valves), *Hipponix antiquatus* (52 dead), *Strigilla mirabilis* (54 dead valves), *Nassarius albus* (13), *Polinices lacteus* (17), *Bulla occidentalis* (9) and *Tellina listeri* (6 dead valves). The remaining species occurred in considerably less mass and fewer specimens, except for 32 small *Tricolia affinis* and 203 very young *Cerithium.* The others are listed in our census of circum-insular species. This type of assemblage is fairly typical of the narrow lagoons found between the fringing reefs and shoreline of the north coast of Grand Cayman Island. In all likelihood, the above 12 most common species would be represented in a fossil assemblage coming from a similar type of habitat.

Relative abundance in other areas.—There have been no extensive surveys published which would allow a fair comparison of the prevalent Grand Cayman Island species with those from other West Indian areas. Stephenson and Stephenson (1950) in their survey of the Lower Florida Keys observed a great deal of variation from key to key as to which are the commonest snails in the lower tidal zones. Likely, a similar variation occurs around Grand Cayman, for some ecological areas are more suitable than others. It is interesting to note that while some species have large populations at Grand Cayman Island, Florida, Bermuda (Peile, 1926), and Puerto Rico (Dall and Simpson 1901), they may be rare or absent or are replaced by other closely related species in other parts of the West Indies. The greatest similarity in abundance in all these areas is found in the species that live in the middle and lower Ironshore zones (such as *Nerita peloronta,*

Acanthopleura granulata, and *Fissurella barbadensis*). However, the upper Ironshore and reef-flat dominant species are somewhat dissimilar, as for example the absence or rarity in Bermuda and Florida of *Echininus nodulosus, Livona pica* and *Puperita pupa.* Below is a table which shows an example of the varying degree of occurrence of several species as indicated by size of populations.

	Grand Cayman	Bermuda	West Florida	Lower Florida Keys	Ba .as
Murex pomum	very rare	extinct	abundant	uncommon	common
Drupa nodulosa	abundant	rare	absent	abundant	common
Pecten ziczac	absent	common	uncommon	uncommon	rare
Livona pica	abundant	extinct	absent	extinct	abundant
Cancellaria reticulata	absent	extinct	abundant	uncommon	absent
Fasciolaria tulipa	rare	rare	common	common	uncommon (?)
Brachidontes exustus	rare	common	common	abundant	common (?)
Modiolus americanus	rare	abundant	abundant	uncommon	rare (?)

ECOLOGICAL DISTRIBUTION

The significance of the distribution of populations of common species within restricted depth-zones and other ecologic niches has been discussed by Stephenson and Stephenson (Jour. of Ecology, vol. 38, p. 398, 1950) in their study of intertidal Florida species. Knowledge of the influencing factors, usually temperature, substrate, and food, will give great insight into the reasons for these varying sizes of populations in the general tropical Western Atlantic province.

Habitudinal Distribution of Grand Cayman Species

	Chitons	Pelecypods	Gastropods	Scaphopods	Total
Sand Species (177)					
Found everywhere	0	12	15	0	27
Only in North Sound	0	7	6	0	13
North and Frank Sound	0	1	1	0	2
Only circum-insular	1	30	104	3	138
Reef Species (69)	1	13	53	0	69
Mangrove Species (6)	0	0	6	0	6
Ironshore (22)					
Upper	0	0	4	0	4
Middle	3	0	4	0	4
Lower	5	0	8	0	13
Pelagic (5)	0	0	5	0	5
Unspecified					12
				Grand Total	293

Ironshore Fauna (Upper Platform).—Much of the coastline of Grand Cayman Island consists of hard, jagged, dark-gray limestone rock which Doran (1954, p. 369) refers to as " ironshore ". Stephenson and Stephenson (1950) refer to it as the " Upper Platform ". This is a common West Indian type of shore platform which rings many islands, and appears to be the result of wave action upon the underlying marlformation. The Grand Cayman ironshore was searched thoroughly in a few places, but no detailed notes were made concerning the exact numbers and locations of the mollusks. We have attempted to divide the ironshore into three general zones on the basis of the mollusks living there, but these results should be considered incomplete. A detailed field study is much needed. Needlessly to say, there is an overlap in these zones, and some species found in the lower ironshore zone also occur on the dead reef flats where similar conditions exist.

Upper Ironshore.—High tide does not reach this area, but, during rough weather, ocean spray and sea water may wet this zone. In some areas, there exist small puddles of briny water which receive water from rain or splashings from waves. These are termed " splash pools ", and at Grand Cayman they are inhabited by numerous specimens of *Puperita pupa* and *Littorina mespillum.* The only other two snails in the upper ironshore are *Tectarius muricatus* and *Echininus nodulosus,* but neither lives in the splash pools. All species in this zone are common wherever they occur.

Middle Ironshore.—This zone might be considered an upper intertidal area. For a few hours each day at least, waves reach this part of the shore, but the zone is most of the time out of water. However, only during very calm, sunny weather do the rocks become dry, and then only for a relatively short time. All of the species in this zone are common or abundant wherever they occur. Some also occur in the lower ironshore zone. Stephenson and Stephenson (1950, p. 374) refer to this as the lower Yellow Zone.

Nerita peloronta
Nerita versicolor
Littorina ziczac
Nodilittorina tuberculata
Chiton tuberculatus
Chiton squamosus
Acanthopleura granulata

Lower Ironshore.—The substrate in this zone is generally flat or slightly sloping, usually covered with algae, and other marine growths, but in some areas may be worn smooth or cut in to fissures by sand or by waves. The zone is always wet, and is awash or slightly uncovered only at low tide. Conditions here are somewhat similar to those on the higher, offshore reefs, although there are no loose coral boulders for protection. Some of the species listed below are rarely found on the reefs. Most species occuring in this zone are common or abundant wherever they occur, although a few are uncommon or rare.

Fissurella barbadensis (common)
Fissurella angusta (common)
Nerita tessellata (moderately common)
Livona pica (abundant)
Planaxis lineatus (moderately common)
Purpura patula (common)
Thais rustica (moderately common)
Thais deltoidea (moderately common)
Ceratozona rugosa (common)
Acanthochitona spiculosa (rare)
Acanthochitona hemphilli (moderately common)
Callistochiton shuttleworthianus (rare)
Chiton viridis (common)
Octopus vulgaris (common ?)
Octopus hummelincki (common ?)

North Sound Fauna.—North Sound (Map 1, p. 2) is a considerable body of water, some five miles in diameter. Separated from the open sea on the north by reef and shoals, it has a shallow bowl shape with the deepest portion, about 20 feet, just south of the center. In many places the floor is formed by exposed limestone bedrock, while in others it is composed of a thin veneer of marly material or covered by a growth of turtle grass (*Thalassia*) or algae. The shoreline of the sound is determined around most of its periphery by mangroves growing in the shallows. This boundary is transitional because water extends back among the tangle of mangrove roots for considerable distances, as for instance at least three miles east of little Sound (Doran, 1954, p. 367).

The molluscan fauna of North Sound may be divided generally into three types: 1) the mangrove species; 2) exclusively North Sound species; and 3) a few widespread species. Some of these species are rather evenly distributed throughout the sound, while all of the mangroves species and a few others are concentrated around the periphery.

Three special areas should be noted. On map 1 there are two " overlap areas " which denote the regions where living specimens of sound and circum-insular (or coral-water) species are found together. This is evidently made possible by the alternate exchange of sound and ocean water currents during tidal changes. Along the southern and southeastern shores of the sound is a so-called " dark zone " which denotes the region where a number of widespread species exhibit dark pigmentation in their shells. This is undoubtedly correlated with the muddy nature of the bottom in this section of the sound. A third location of interest is Duck Pond, at the southeast corner of the sound. Although its present living fauna is typical of the " dark zone ", there were dredged there a number of dead shells of typical coral-water species. It is possible that these shells were deposited there by some recent hurricane, or that they are semifossils which have been " uprooted " in some manner from a lower level of the floor of the sound.

Exclusively North Sound Species.—The species listed below were found nowhere else, and evidently will not tolerate oceanic or coral-water conditions. These species are more commonly found associated with larger islands. Further ecological remarks are found in the systematic part of this paper.

Anadara notabilis. Rare at 4 stations.
Modiolus americanus. Rare at 2 stations.
Musculus lateralis. Rare at 3 stations.
Lyropecten antillarum. Moderately common at 16 stations.
Aequipecten gibbus nucleus. Rare at 4 stations.
Anodontia alba. Rare at 4 stations.
Pitar fulminata. Abundant at 22 stations.
Tellina guadeloupensis. Uncommon at 9 stations.
Bittium varium. One colony only.
Astraea phoebia. Common at 16 stations.
Prunum apicinum. Uncommon at 4 stations.
Pusia hanleyi. Moderately common at 5 stations.
Crassispira leucocyma. Uncommon at 2 stations.
Haminoea petiti. Abundant at 5 stations.

North Sound and Frank Sound Species.—

Crassinella guadeloupensis. Common at 9 North Sound stations; 5 specimens at one Frank Sound station.
Diodora dysoni. Uncommon at 4 North Sound and 3 Frank Sound stations.

North Sound and Circum-insular Species.—This list includes species which are found throughout many parts of North Sound, the coastal lagoons and off West Beach in depths ranging from 4 to 48 feet. These are essentially coral-water species which have a tolerance for North Sound conditions. They are the so-called " ubiquitous " species.

Glycymeris pectinata. Uncommon at 12 scattered North Sound stations, and only 8 coastal lagoon stations.
Arcopsis adamsi. Uncommon at 5 North Sound stations, but common in coral rubble at 9 coastal lagoon stations.
Pinctada radiata. Uncommon at 5 North Sound and 3 coastal lagoon stations.
Laevicardium laevigatum. Abundant (6 to 30 specimens) at 12 North Sound stations; common (2 to 12 specimens) at 7 stations off West Beach in 12 to 36 feet; and uncommon at 2 Frank Sound stations.
Codakia orbicularis. Common nearly everywhere in sand.
Codakia orbiculata. Common nearly everywhere in sand.
Codakia costata. Common nearly everywhere in sand.
Chione cancellata. Common nearly everywhere in sand.
Gouldia cerina. Uncommon at 3 North Sound and 4 coastal lagoon stations.
Diplodonta semiaspera. Uncommon at 2 North Sound stations, and at one coastal station at Bluff Bay.
Diplodonta punctata. 2 to 10 specimens alive at 4 North Sound stations; uncommon (2 to 3 specimens) at 3 Frank Sound stations; and rare and dead at one South West Sound station.
Cumingia coarctata. 1 to 5 specimens at 5 stations on the west side of North Sound; 1 to 2 specimens at 6 coastal lagoon stations, but not off the west end of the island.
Acmaea pustulata. The turtle grass form was taken in fairly large numbers at 6 North Sound stations and at 13 stations in the coastal sounds wherever turtle grass grows. The rock form was taken on the reefs and dead in sand near the reefs at 19 coastal stations. Both forms in dead condition were dredged at the same stations.
Tegula fasciata. 5 to 20 specimens at each of 16 stations throughout North Sound, and at nearly every station (30) in coastal lagoon areas in sandy areas at depths from 4 to 20 feet.
Tricolia thalassicola. A few specimens were found at 8 North Sound stations, but many were dredged dead and 3 to 15 live specimens at 24 coastal lagoon stations.

Modulus modulus. Very common in North Sound where 4 to 20 specimens were taken at each of 18 widely scattered stations, and moderately common in shallow water at 12 coastal lagoon areas in depths of 4 to 18 feet over sand or sand and turtle grass.

Zebina browniana. Numerous specimens were found at 5 stations in North Sound, and at 10 stations in the coastal lagoons in 5 to 18 feet of water. Its optimum habitat, however, appears to be in the coastal lagoons.

Rissoina bryerea. This is one of the most common of the small gastropods. From 3 to 50 specimens were dredged at 8 stations in North Sound (although not in the center, and 10 to 100 specimens at 18 stations in the coastal lagoons. *Rissoina decussata* was not found in North Sound.

Cerithium eburneum. This is probably the most widely distributed, abundant mollusk at Grand Cayman. It was taken in all sections of North Sound at 12 stations, and at 31 other stations in coastal lagoons and off the west end of the island. It lives in depths from a few inches to 30 feet of water on sand bottom with or without algae.

Cerithium litteratum. This species is as abundant as *C. eburneum*, but was taken at more coastal stations (42) and only in the outer half of North Sound at 7 stations. It was also obtained in sand pockets on reefs and shore benches. It appears to be more tolerant to wave action, but less tolerant to the warm shallow conditions in the inner half of North Sound.

Columella mercatoria. This is one of the very abundant and widely dispersed species at Grand Cayman. It was taken in nearly all sections of North Sound (10 stations), off the west end of the island (7 stations) and in the coastal lagoons (30 stations). Like *C. litteratum*, it may be found in small sand pockets on some reefs and coastal benches.

Anachis hotessieriana. 1 to 5 specimens in each dredging at 4 North Sound stations, those at Duck Pond being dead; and 2 to 8 specimens at 13 coastal sound stations, but not off the west end of the island.

Nassarius albus. Very widely distributed and abundant at Grand Cayman. Numerous at 21 North Sound stations (although not in the center), and numerous at 30 stations in coastal sounds and along the west end.

Olivella dealbata. The distribution of this species is almost identical with that of *Nassarius albus*, and is also absent in the center of North Sound where it was otherwise taken abundantly at 13 stations. Specimens from the inner most edges of the sound are darkly pigmented.

Prunum pruniosum. 3 to 12 specimens at each of 12 North Sound stations, and at 39 coastal and west end stations. It was obtained at one station at the center of North Sound.

Bulla occidentalis. 5 to 25 specimens at each of 10 North Sound stations were very dark in color, while 5 to 25 specimens from the entrance to North Sound, the coastal lagoons and West Bay (34 stations) were medium brown to almost cream in color.

Circum-insular Soft-bottom Fauna.—The following list consists of mollusks found exclusively in the sandy areas of coastal lagoons and small sounds or off the west end or in sandy areas near reefs where there may or may not be turtle grass and other algae. These are the true " coral-water " species. None of these species was found in North Sound proper, but do enter the " overlap " areas near the north entrances to the sound. To this list should be added 26 circum-insular species that are mentioned above as also occurring in North Sound.

Species	No. stations	Depth range (feet)	Specimens per station
Barbatia cancellaria	13	3–12	2–10
Glycymeris decussata	dead beach valves (rare)		1
Pinna carnea	2	4–5	1
Limea bronniana	2	7–?	1
Carditopsis smithi	4	7–12	6–20
Lucina pensylvanica	22	6–40	2–10
Divaricella quadrisulcata	45	5–30	3–25
Trachycardium magnum	dead beach valves (rare)		
Papyridea semisulcata	3	6–48	1
Americardia media	3	8–18	3–5
Americardia guppyi	19	6–48	5–30
Antigona listeri	1	4	1
Chione pygmaea	11	9–45	2–3
Transennella gerrardi	14	8–54	6–30
Tellina radiata	18	6–48	1–50
Tellina laevigata	dead beach valves (rare)		
Tellina listeri	30	6–48	3–20
Tellina similis	34	6–25	5–35
Tellina candeana	26	6–25	5–35
Tellina cuneata	25	6–25	3–10
Tellina sybaritica	4	6–8	2–3
Arcopagia fausta	7	4–6	1–3
Quadrans lintea	1	48	1
Strigilla mirabilis	21	6–48	4–20
Semele bellastriata	6	6–16	2–4
Asaphis deflorata	dead valves (uncommon ?)		
Ervilia concentrica	11	6–30	4–12
Varicorbula operculata	1	48	1
Basterotia quadrata	1	30	1
Basterotia newtoniana	1	6	3
Acmaea pustulata	15	5–15	4–20
Cyclostrema cancellatum	2	6–12	1 (dead)
Turbo castanea	18	5–25	3–20
Smaragdia viridis	26	2–15	10–50
Synaptocochlea picta	18	8–30	2–5
Phenacolepas hamellei	1	5	1 (dead)
Rissoina decussata	4	6–8	1–3
Rissoina cancellata	11	6–25	5–20
Cingulina babylonia	3	6–12	1–2
Alvania auberiana	2	6–8	1–5
Cochliolepis parasitica	3	6–12	3–6 (dead)
Heliacus cylindricus	4	9–30	1–4 (dead)
Alabina adamsi	6	8–25	5–25
Alaba incerta	11	5–16	5–100
Seila adamsi	14	6–25	3–20
Cerithiopsis abrupta	1	12	1
Mathilda barbadensis	1	6	1
Triphora turris-thomae	9	6–30	1–6
Triphora melanura	8	6–12	3–12
Triphora decorata	7	6–18	3–5
Triphora intermedia	2	6	1
Epitonium krebsi	2	6	1
Epitonium echinaticostum	1	8	1 (dead)
Epitonium lamellosum	2	beach, dead	
Epitonium candeanum	1	8	1
Epitonium novangliae	4	6–30	1–3
Opalia crenata	1	3	1 (dead)
Opalia morchiana	3	6–8	1 (dead)
Vanikoro oxychone	1	6	1 (dead)
Tugurium longleyi	1	60	1 (dead)
Strombus gigas	locally very common; 12 to 30 feet.		
Strombus costatus	locally rather common; 20 to 25 feet.		
Strombus raninus	4 dead specimens; rare ? living ?		
Fossarus orbignyi	2	8–12	2–4
Trivia quadripunctata	7	6–18	5–12
Trivia suffusa	2 dead specimens; rare ?		
Trivia pediculus	1	3 dead specimens; rare ?	

Species	No. stations	Depth range (feet)	Specimens per station
Polinices hepaticus	1	beach specimen; rare ?	
Natica canrena	4	beach specimens; uncommon ?	
Natica floridana	3	6–2	1
Natica livida	25	2–50	3–30
Sigatica semisulcata	2	10–60	1
Cassis tuberosa	1	12	2
Cassis flammea	2 dead specimens; rare ?		
Phalium cicatricosum	1	beach specimen; rare ?	
Cymatium femorale	1	beach specimen; rare ?	
Cymatium nicobaricum	7	4–8	1–2
Cymatium muricinum	1	4	1 (reef ?)
Cymatium labiosum	1	4	1 (reef ?)
Charonia variegata	1	8	1
Aspella paupercula	3	6–8	1
Murex pomum	2	2–6	1
Muricopsis oxytatus	1	beach specimen; rare ?	
Anachis catenata	1	5	4
Nitidella nitida	4	5–8	1
Mitrella idalina	1	4	1
Mitrella fenestrata	10	5–16	1–6
Psarostola monilifera	13	8–16	2–12
Bailya parva	4	5–6	1
Fasciolaria tulipa	1	4	4
Latirus trochlearis	2	6	1
Oliva reticularis	(from Grand Cayman ?)		
Olivella nivea	1	6	2
Pusia cubana	5	30–54	2–6
Pusia gemmata	2	5–12	5–6
Voluta musica	1	dredged in 3 feet, fide Salisbury (1953)	
Prunum guttatum	11	3–18	1–2
Hyalina albolineata	5	5–7	1–2
Hyalina avenacea	1	6	1
Hyalina tenuilabra	10	5–20	2–5
Bullata ovuliformis	2	6–8	2–6
Persicula lavalleeana	5	6–8	3–8
Conus jaspideus	47	6–60	3–20
Conus daucus	5	beach specimens	
Terebra hastata	13	5–25	3–15
Crassispira fuscescens	1	10	1
Crassispira nigrescens	4	5–20	1–2
Drillia cydia	2	5–60	1–2
Ithycythara parkeri	1	3	1 (dead)
Pyrgocythara coxi	2	7–8	1
Mangelia bartletti	13	16–40	2–20
Mangelia trilineata	1	6	1
Mangelia biconica	15	8–18	2–5
Mangelia quadrilineata	10	8–18	2–5
Daphnella lymneiformis	1	12	2
Atys riiseana	6	8–20	1–3
Atys caribaea	13	6–18	6–24
Haminoea antillarum	1	dead, beach shell.	
Haminoea elegans	2	6–18	1
Rhizorus acutus	1	dead shell	
Retusa canaliculata	10	8–18	5–25
Pyramidella dolabrata	15	6–24	3–10
Odostomia laevigata	8	6–20	3–12
Triptychus niveus	2	6–8	1
Turbonilla alfredi	2	8–9	1–2
Turbonilla unilirata	1	5	1
Turbonilla pupoides	2	12–16	2–4
Melanella jamaicensis	3	6–25	1–2
Strombiformis auricincta	4	6–8	1–3
Cadulus quadridentatus	4	6–48	2–3
Dentalium antillarum	30	6–48	3–10
Dentalium semistriolatum	8	20–48	1–3
Ischnochiton purpurascens	12	3–18	1–3

Offshore West End Fauna.—Except for the rocky headlands at the extreme north and south, and except for semi-reef conditions in a few inshore localities, the west end of Grand Cayman is a vast, relatively quiet, flat sandy area which slopes gently down to the 100 fathom line to a distance of one to two miles off shore. The sandy ocean bottom is a relatively desolate region, lacking turtle grass, algae or protective rubble and coral blocks, and is doubtlessly subject to at least gentle shifting of fine sand. The mollusks which were sampled here at depths from 16 to 48 feet are quite characteristic: few in species, and nearly all pure white in color. The proportion of bivalves and gastropods is about equal, and all of the latter are light-colored, carnivorous species. This particular type of habitat supports the following spècies:

PELECYPODS

Laevicardium laevigatum
Americardia guppyi
Divaricella quadrisulcata
Tellina radiata
Tellina listeri
Tellina cuneata
Strigilla mirabilis

SCAPHOPODS

Dentalium antillarum
Dentalium semistriolatum

GASTROPODS

Polinices lacteus
Natica livida
Sigatica semisulcata (rare)
Nassarius albus
Olivella dealbata
Prunum pruniosum
Pusia cubana (uncommon)
Conus jaspideus (smooth form)
Atys riiseana
Atys caribaea

Dredgings on this sandy slope at depths below 60 feet would probably reveal the increasing presence of deep-water species and the absence of typically shallower water forms such as *Laevicardium laevigatum, Tellina radiata,* and *Conus jaspideus.* A fragment of *Tugurium longleyi* was dredged in 60 feet off West Beach, and other normally deep-water species were dredged sparingly in this region(*Drillia cydia, Mangelia bartletti*).

All of the gastropods here are known to be carnivorous. The first four on the list belong to genera that are known to drill holes in bivalves and shells of other and their own species. I am unaware that the others drill through shells and they likely feed on marine worms or are scavengers. I doubt if *Olivella dealbata, Nassarius albus* or *Prunum pruniosum* (which occur also in North Sound) depend specifically upon the above pelecypods or *Dentalium* (which do not occur in North Sound) for food. A number of shells of *Conus jaspideus* had the egg cases of a *Prunum* (presumably *pruniosum*) attached to them, a phenomenon which speaks for the rarity of a hard substratum to which to anchor egg cases.

It is believed that the absence of color and the smoothness in sculpture of *Conus jaspideus,* and the absence of dark pigment in the shells of *Nassarius albus* and *Laevicardium laevigatum* is indicative of the relative sterility (lack of nitrogenous material and algae) and relative quiet waters

of such a habitat. It should be pointed out, however, that smoothness of shell and lack or presence of bright pigments in other species of *Conus* is not necessarily indicative of depths or degree of disturbance of water.

In all likelihood, similar conditions and the same dominant species of mollusks occur in waters around the other parts of Grand Cayman Island a half to one mile off the fringing reefs in depths of 16 to 48 feet. However, future investigation may reveal other predatory or scavenger species which live upon " escapes " from the reefs, which might not be able to survive in the relatively sterile sandy slopes off the west end of the island.

Reef Fauna.—So-called reef-flat conditions grade from zones which are permanently submerged to parts which emerge from the sea at the lowest tides. All sides of Grand Cayman Island, except the west, are flanked by broken stretches of reef-flats or benches which may come close to shore or be separated from land by shallow, sand-bottomed lagoons. The mollusks of the reef flats may be rock-dwellers, either under, on top, or boring within, or they may be sand- and fine rubble-dwellers when such a substrate occurs on the reef flats. No micro-ecological observations were made to determine the exact types of bottom that each species prefers. Many of the reef dwelling species are dislodged from their normal habitat and may be found alive or dead in the proximity of the reef, either to seaward or on the lagoon side. This accounts for some typical reef-dwellers being dredged in several feet of water over sandy bottom.

Species	No. of stations	Relative abundance
Barbatia cancellaria	25	very common (also dredged)
Barbatia candida	4	rare
Barbatia tenera	1	rare
Barbatia domingensis	18	common
Botula fusca	1	rare ?
Lithophaga nigra	1	probably common
Lithophaga bisulcata	1	" "
Chlamys imbricata	2	rare
Chlamys ornata	23	moderately common
Spondylus americanus	3	probably common
Lima lima	17	common
Chama congregata	4	probably common
Chama sarda	1	" "
Lima scabra	3	uncommon
Lima pellucida	2	uncommon
Emarginula ostheimeri	2	rare, dead
Emarginula pumila	4	rare, dead
Hemitoma octoradiata	13	very common
Diodora listeri	20	abundant
Diodora jaumei	2	rare
Diodora minuta	12	uncommon
Lucapina suffusa	14	moderately common
Fissurella nodosa	2	uncommon (?)
Fissurella fascicularis	2	dead, rare ?
Acmaea pustulata	many	" rock form " only
Acmaea jamaicensis	21	common
Acmaea leucopleura	dead shells, probably common	
Tegula lividomaculata	12	common
Arene cruentata	6	uncommon
Turbo filosa	1	dead, rare
Astraea tecta cubana	20	moderately common
Astraea caelata	20	common

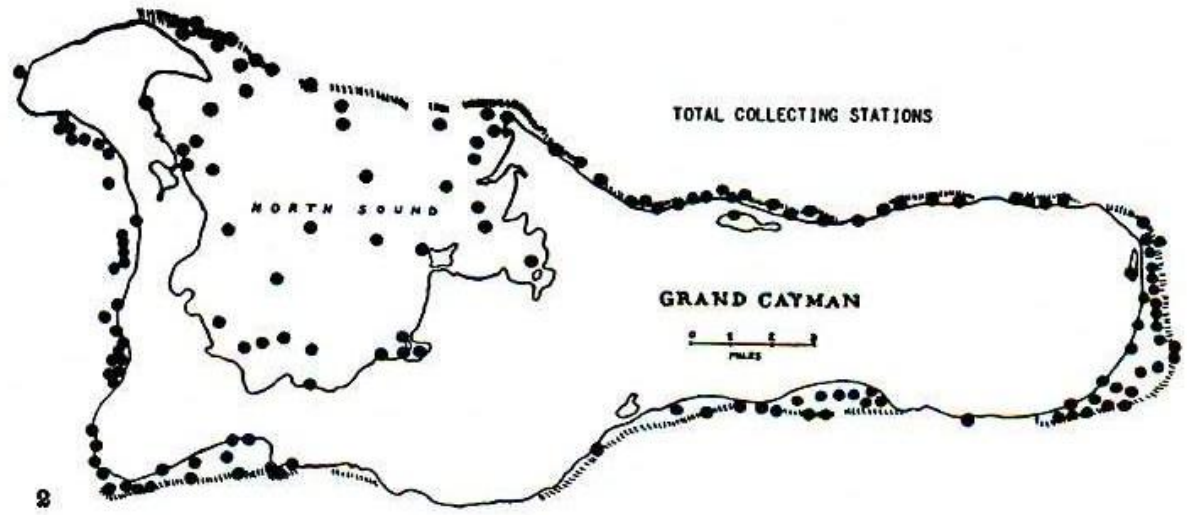
Species	No. of stations	Relative abundance
Vermetus sp.		dead shells, probably uncommon
Cheila equestris	4	uncommon
Hipponix antiquatus	23	common; also dredged dead
Xenophora conchyliophora	2	dead, uncommon
Cyphoma gibbosum	17	moderately common
Cypraea cinerea	17	common
Cypraea spurca	4	uncommon
Cypraecassis testiculus	6	moderately common
Morum oniscus	7	moderately common
Tonna maculosa	6	uncommon
Cymatium martinianum	2	uncommon
Cymatium vespaceum	1	rare
Bursa thomae	1	rare
Bursa cubaniana	12	moderately common
Bursa corrugata	1	rare
Drupa nodulosa	27	abundant
Coralliphila abbreviata	13	common
Coralliphila caribaea	3	uncommon
Coralliophila aberrans	1	rare
Pyrene ovulata	5	uncommon
Engina turbinella	11	moderately common
Colubraria obscura	1	rare
Pisania pusio	13	moderately common
Cantharus auritulus	11	common
Fusilatirus cayohuesonicus	1	rare
Leucozonia leucozonalis	22	abundant
Mitra nodulosa	15	common
Mitra barbadensis	11	moderately common
Pusia puella	1	beach specimen
Prunum guttatum	11	uncommon, in pairs
Hyalina avena	14	uncommon
Conus regius	17	moderately common
Conus mus	21	common
Conus ranunculus	1	rare
Cryptoconchus floridanus	1	rare
Octopus vulgaris (common ?)		
Octopus hummerlincki (common ?)		

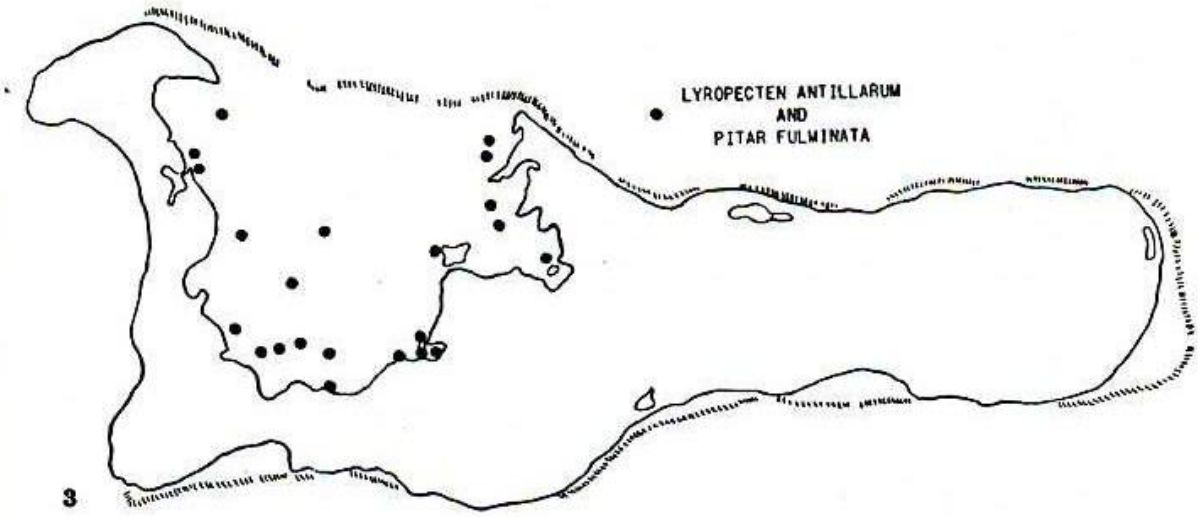
Mangrove Fauna.—No extensive collecting was done in the mangrove areas of Grand Cayman, and our list of 6 species may not be complete. The species below are widely distributed throughout the Caribbean area. It is interesting to note the absence of several common West Indian mangrove species. This leads us to suspect that even the mangrove species may be divided into those that live on small islands and those that are limited to large islands and continental shores.

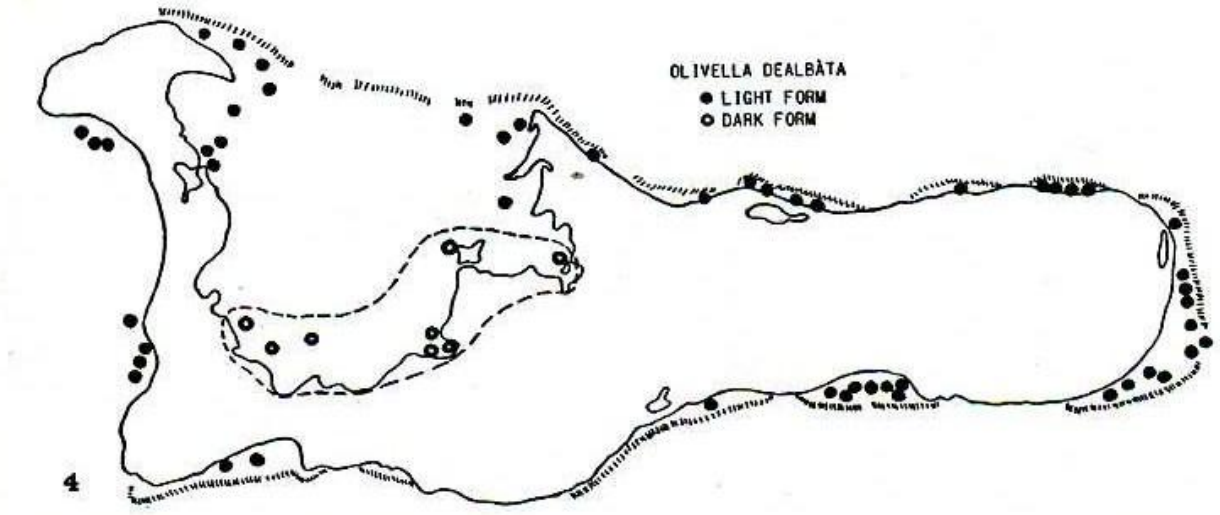
Isognomon alatus
Neritina virginea
Littorina angulifera
Cerithidea costata
Batillaria minima
Cerithium variabile

Pelagic Fauna.—No survey was made of the holopelagic mollusks of Grand Cayman, and those listed below were fortuitously collected in dead condition on the beach or found dead in dredging samples. There are probably about 25 holopelagic species in the area.

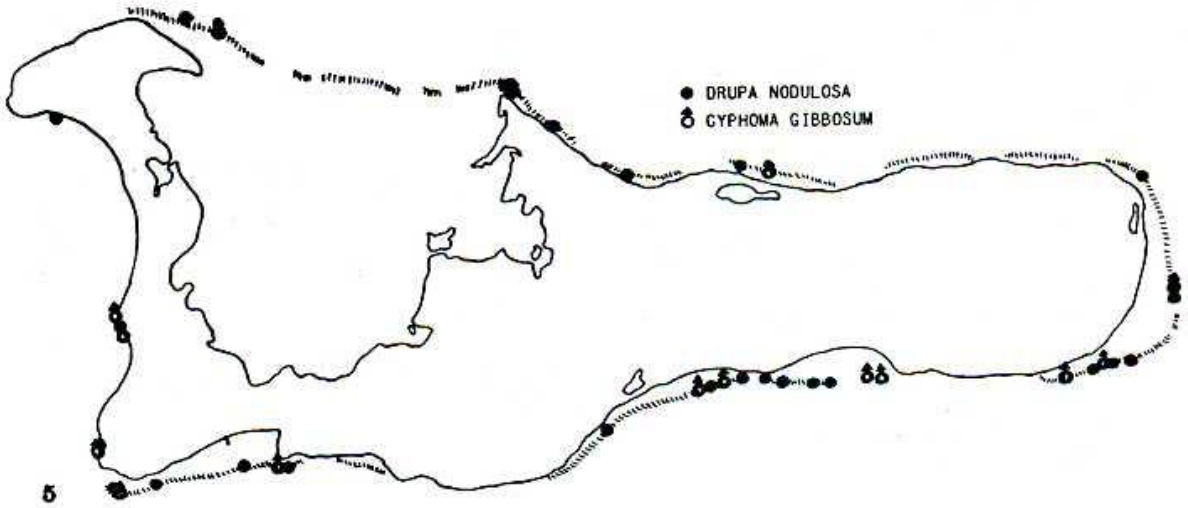
Litiopa melanostoma
Janthina janthina
Janthina exigua
Styliola subulata
Spirula spirula

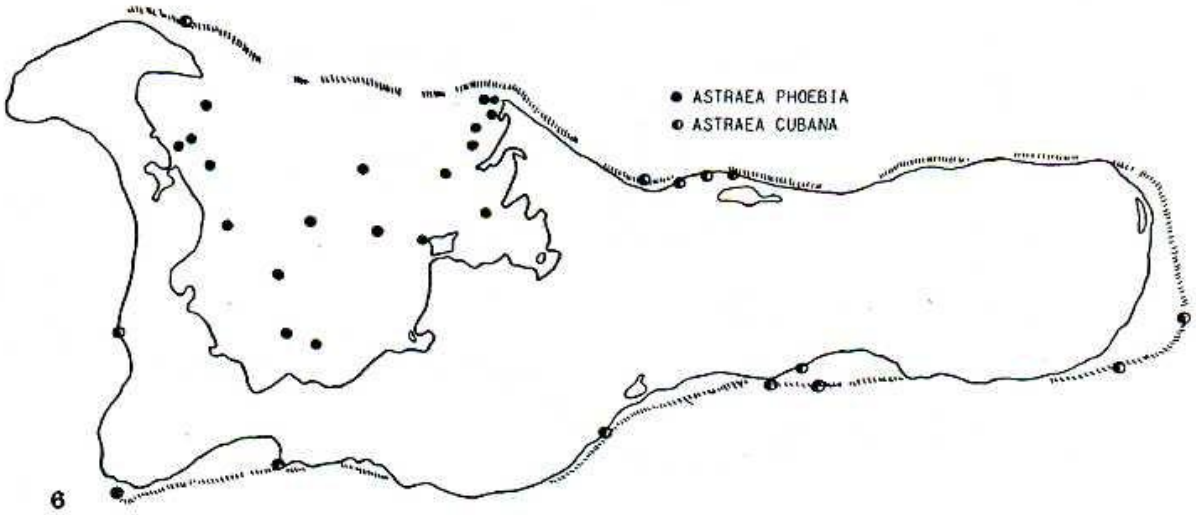


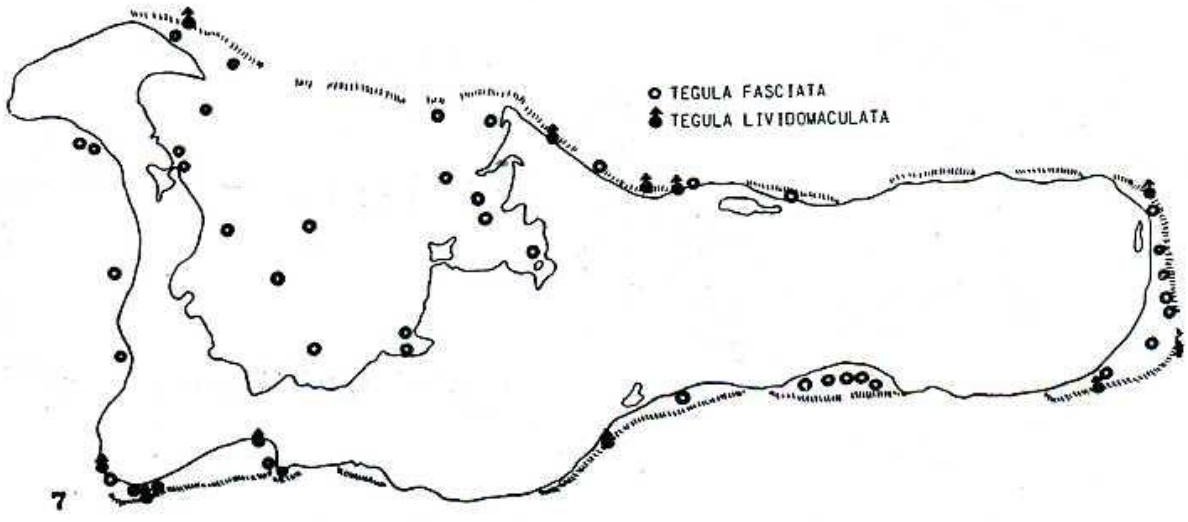




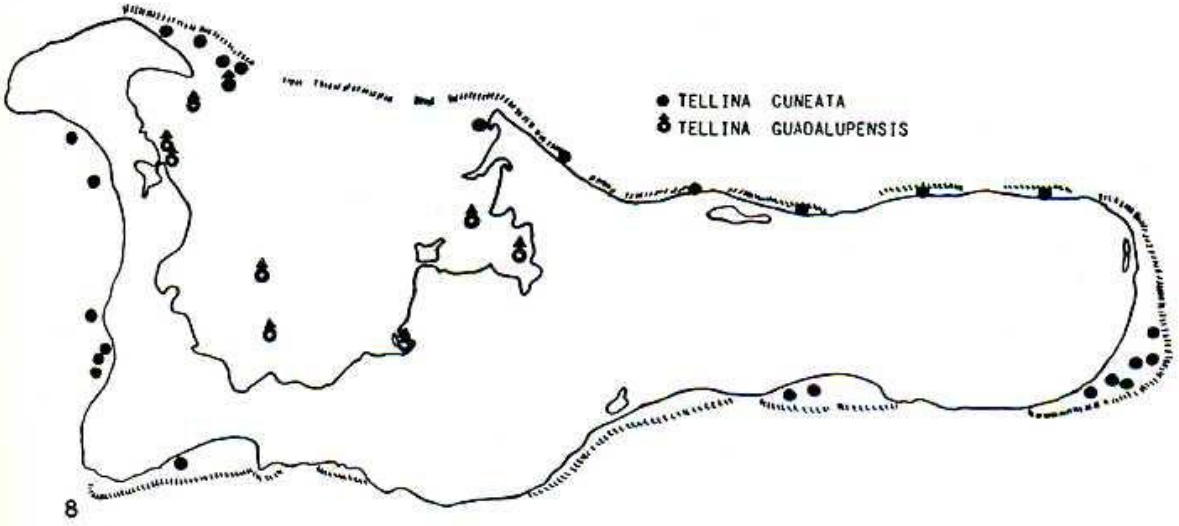
Maps 2-4. Localities sampled for mollusks at Grand Cayman Island. Maps 3 and 4. Locality records for mollusk species.

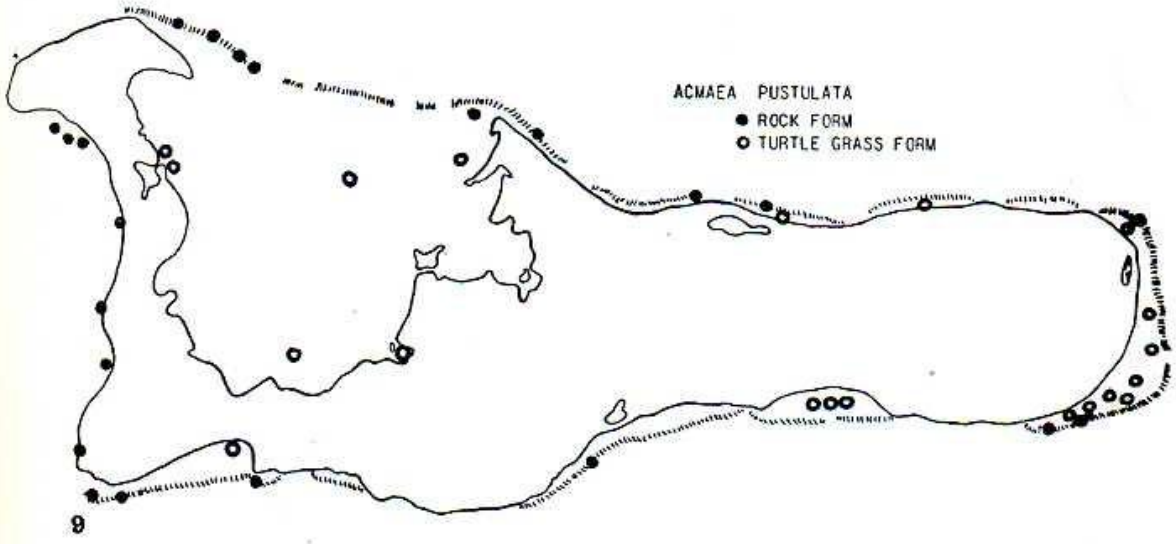


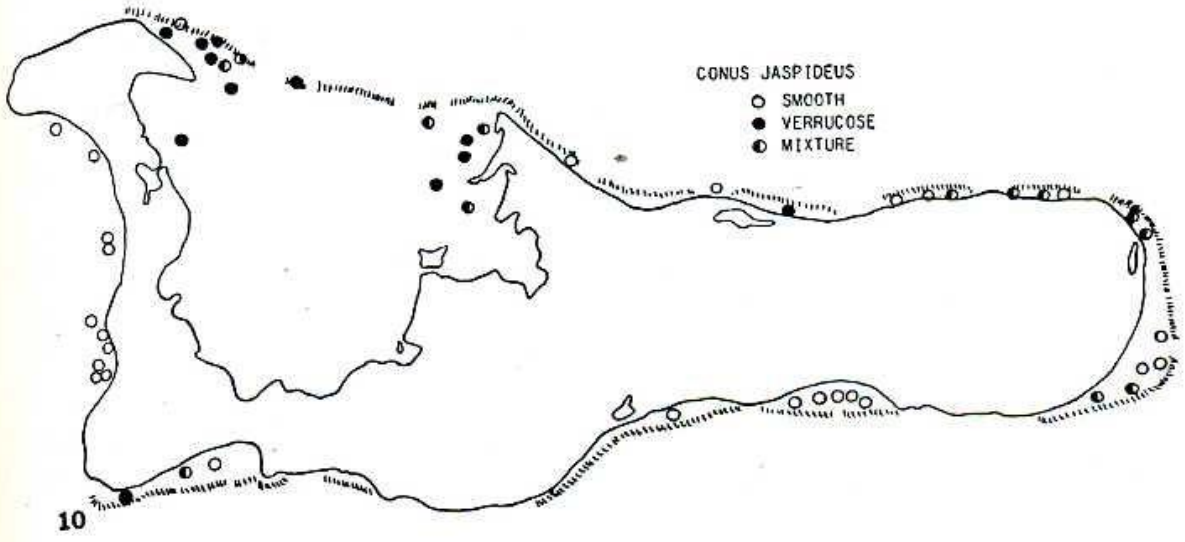




Maps 5–7. Locality records for six gastropod species at Grand Cayman Island.







Maps 8–10. Locality records for four mollusk species at Grand Cayman Island.

SYSTEMATIC TREATMENT

Phylum Mollusca

Class GASTROPODA — Subclass PROSOBRANCHIA

Order ARCHAEOGASTROPODA — Superfamily *PLEUROTOMARIACEA*

Family **FISSURELLIDAE**

Subfamily **EMARGINULINAE**

Genus EMARGINULA Lamarck 1801

Emarginula ostheimerae new species — Plate 1c.

Description.—Shell 10 to 22 mm. in length, solid, rather heavy and coarsely sculptured, quadrate in outline and low. Color opaque ashen-white; interior glossy white. Base oblong, slightly wider behind. Apical whorl one, white, smoothish and very small, and located at about the center of the shell. Sides of shell nearly flat or slightly convex near the margins. Anal fasciole narrow, indistinct, and formed by thicked "inverted-U-shaped", slightly raised lamellae. Fissure very short, about one eighth the length of the anterior slope. Sculpture consists of eight large primary ribs which are made up of 4 to 5 heavily knotted, rounded, distinct radial cords. The bases of these ribs extend well beyond the margin in younger shells. Secondary ribs much smaller, of single cords, and 3 to 5 in number between the primary ribs. Concentric cords stronger than the secondary radial cords, and their intersection forms large rounded nodules. On the interior, the ribs are indicated by weak, broad grooves, but the anal fasciole is not so shown.

Measurements

length	width	height	
22.5 mm.	15.0 mm.	8.0 mm.	Paratype, ANSP no. 195982
13.5	10.0	4.2	Holotype, ANSP no. 195983
9.5	7.0	2.5	Paratype, Ostheimer collection

Types.—Holotype (ANSP no. 195983) and one paratype (Ostheimer collection) were found on the beach west of Old Man Bay, north side of Grand Cayman Island by Mrs. Ruth M. Ostheimer on Nov. 21, 1953. Another large paratype (ANSP no. 195982) was dredged dead in 8 fathoms, ⅓ mile off the Stack, Georgetown Harbour, Grand Cayman, Oct. 28, 1954.

Remarks.—Our three specimens from Grand Cayman are so different from *E. pumila* from Cayman and elsewhere in the West Indies, that we do not hesitate to consider it specifically distinct from the very variable *pumila*. *E. ostheimerae* differs in being much heavier, in having only 8 very large primary ribs which gives the squarish base a stellate appearance. Our specimen of *pumila* from North Sound is equally as depressed as *ostheimerae*, but it is a more delicate shell and with a strongly concave anterior slope.

Emarginula pumila A. Adams 1851 Plate 1d.

Remarks.—This wide-ranging, although not common, species (southeast Florida to Brasil) is characterized by its ovalish outline, 11 to 16 unequal primary ribs, concave anterior slope, and slight groove on the inside of the shell underneath the anal fasciole.

Records.—GRAND CAYMAN: one dead, but fresh specimen was dredged in 10 feet just northwest of Water Point, North Sound; also 9 fathoms, Georgetown Harbour; off Palmetto Point in 5 feet over sand; 6 feet, South West Sound; and intertidal, on rock at Breakers Point.

Genus HEMITOMA Swainson 1840

Subgenus HEMITOMA Swainson 1840

Hemitoma octoradiata Gmelin 1791 Plate 1a and b.

1791 *Patella octoradiata* Gmelin, Systema Nat., 13th ed., p. 3699, no. 36 (insulas Americae mediae; refers to Lister Conch., pl. 532, fig. 11 the type fig. fide A. Adams 1851, p. 90; Martini, Conchyl.—Cab., vol. 1, figs. 82, 83.

1890 *Subemarginula octoradiata* Gmelin, Pilsbry, Manuel of Conchology, vol. 12, p. 273, pl. 29, figs. 17, 18, 37.

1950 *Hemitoma rubida* A. H. Verrill, Nautilus, vol. 63, no. 4, p. 126, pl. 9 (Canefield Point, Dominica).

Description.—15 to 25 mm. in maximum diameter, conic, apex subcentral, inclined backward and to the right; front slope convex, back slope straight. Characterized by 8 strong, radiating ribs between which are one or two secondary, smaller ribs, and by the grayish green or dark slate-gray interior which is whitish at the apex. The anterior, internal groove is narrow and well-marked, but the front margin is not notched.

Remarks.—This common limpet was abundant at 13 stations around Grand Cayman wherever there were exposed and wave-swept rocks. It ranges from southeast Florida through the Caribbean.

Subfamily **DIODORINAE**

Genus DIODORA Gray 1821

Subgenus DIODORA Gray 1821

Diodora listeri Orbigny 1853

Remarks.—A common littoral species at Grand Cayman where it was found on coral rocks on the reefs at low tide. It is considerably more common than *dysoni* Reeve.

Range.—Southeast Florida, Bermuda and the Caribbean.

Records.—GRAND CAYMAN: abundant at 20 littoral stations around the island wherever hard, intertidal substrate is found. Young dead shells were dredged in one fathom at 6 stations a few yards from the reefs.

Diodora dysoni Reeve 1850

Remarks.—This is a moderately common Florida, Bahama and West Indies species. It was taken dead in North Sound in 4 areas and at 3 stations in Frank Sound, Grand Cayman, in 3 to 8 feet of water. It probably lives under rocks on reefs.

Diodora jaumei Aguayo and Rehder 1936

Remarks.—This uncommon, beautiful species ranges from off Lake Worth, Florida, to Trinidad. The Ostheimers obtained only two specimens at Grand Cayman: 9 feet of water off Little Bluff, north shore; 15 feet, coral and sand, West Bay.

Diodora minuta Lamarck 1822

Remarks.—Found common at 12 stations at Grand Cayman in intertidal rocky areas with *D. listeri.*

Range.—Southeast Florida to the Lesser Antilles.

Records.—GRAND CAYMAN: alive, uncommon, on rocks on reef at low tide at Prospect, Breakers Point, Rum Point, and dredged dead 5 to 15 feet on sand in outer part of North Sound and Frank Sound.

Genus LUCAPINA Sowerby 1835

Lucapina suffusa Reeve 1850

Remarks.—This is a fairly common reef species on Grand Cayman found with *Diodora listeri. L. sowerbii* Sowerby was not found at Grand Cayman.

Range.—Southeast Florida and the Caribbean.

Records.—GRAND CAYMAN: all sides of the island where rocky reefs occur. (Prospect; Pease Bay; outer reaches of North Sound; Brinkleys; Colliers Cay).

Subfamily **FISSURELLINAE**

Genus FISSURELLA Bruguière 1789

Subgenus CREMIDES H. and A. Adams 1854

Fissurella nodosa Born 1778

1778 *Patella nodosa* Born, Index Mus. Caes. Vind., p. 448 (Barbados); 1780, Born, Testacea Mus. Caesarei Vind., p. 429 (Barbados; refers to Lister, pl. 528, fig. 6, and others).

1797 *Patella rudis* Röding, Museum Boltenianum, p. 2, no. 13 (refers to Lister, pl. 528, fig. 6).

1943 *Fissurella (Cremides) nodosa* Born, Farfante, Johnsonia, vol. 1, no. 10, p. 3, pl. 1, figs. 3 and 4; 1954, Abbott, American Seashells, N. Y., p. 100, pl. 17d.

Remarks.—Only one specimen was obtained at Jackson Point, Grand Cayman, on the rocky, wave-dashed shoreline. Salisbury (1953, p. 43) re-

ported six (dead) specimens from off Water Cay. As is the case in Florida and the Bahamas, this species is rare at Grand Cayman, although abundant in Cuba and Navassa Island. It evidently lives further to seaward than *F. barbadensis*.

Fissurella barbadensis Gmelin 1791

Remarks.—This widely dispersed keyhole limpet (southeast Florida, Bermuda and the Caribbean) is abundant along the rocky shores of many West Indian islands, Bermuda and in rock areas of Grand Cayman.

Fissurella angusta Gmelin 1791

Remarks.—Although not as common nor as widely distributed as *barbadensis*, this species was taken at 14 stations and is perhaps more common on Grand Cayman than the former. It was taken alive on rocks with *F. barbadensis*.

Subgenus CLYPIDELLA Swainson 1840

Fissurella fascicularis Lamarck 1822

Remarks.—This is a moderately common species (southeast Florida, Bahamas and south through the Lesser Antilles). Dead specimens were found on the beach at Chisholm House, and Old Man Bay, north shore, Grand Cayman.

Superfamily *PATELLACEA*

Family **ACMAEIDAE**

Genus ACMAEA Eschscholtz 1830

Subgenus COLLISELLA Dall 1871

Acmaea pustulata Helbling 1779 Map 9.

1779 *Patella pustulata* Helbling, Abhandl. Privatgesell. Bohmen . . . , vol. 6, p. 110, pl. 1, fig. 12.

1791 *Patella punctulata* Gmelin, Systema Naturae, 13th ed., p. 3705, no. 68 and p. 3717, no. 132 (refers to Bonanni, pl. 1, fig. 7 and Martini, Conchyl.-Cab., vol. 1, pl. 7, fig. 55).

1819 *Patella puncturata* Lamarck, Anim. sans Vert., vol. 6, p. 333 (Barbados; refers to Lister, pl. 537, fig. 18).

1845 *Patella cubaniana* Orbigny [in Sagra], Historia La Isla de Cuba, vol. 5, p. 272, pl. 25, figs. 4 to 6 (Cuba and Florida).

1891 *Acmaea punctulata* var. *pulcherrima* "Guilding of authors" Pilsbry, Manual of Conchology, vol. 13, p. 38 (Key West type, ANSP 40976). Non *pulcherrima* "Guilding" Petit 1856 = *antillarum* Sowerby.

1927 *Acmaea pulcherrima* "Guilding" Dall, Proc. U. S. Nat. Mus., vol. 70, no. 2668, p. 3 (St. Thomas, West Indies). Non Petit 1856.

Description.—**Rock form** (*pustulata*), 10 to 25 mm. in maximum diameter, wide-oval, moderately to quite solid, usually depressed or rarely coni-

cal, apex acute and nearly central. Surfaces roughly but somewhat weakly sculptured with numerous, low, separate radial riblets of which the third or fourth is usually the larger. Concentric, raised, numerous lamellae much finer than the radial ribs, and sometimes (in unworn specimens) form pustules at their intersection. Color of exterior ashen-white to cream, with or without brown, carmine or reddish specklings or rarely radial bars. Interior usually glossy whitish or yellowish, rarely orange-tinted, and with or without small purplish or brownish flecks or embedded, chalk-white maculations. Margin rarely with about 5 to 10 small light-brown spots.

Turtlegrass form (*pulcherrima* of authors), 10 to 15 mm. in length, moderately to well-depressed, thin and fairly fragile, usually translucent, and oblong in outline. Sculpture weak, but when fully developed consists of fimbriations, concentric lamellae and weak radial, unequal ribs. Color in general pinkish or light yellowish brown, with fine pinkish, brownish and chalk-white maculations or rarely radial bars. Inner margin sometimes pinkish or purplish. The side edges of larger specimens usually show a pinching in or constriction probably due to the limiting width of the leaves of the *Thalassia* turtlegrass. Intergrades in sculpturing and similarity in color patterns exist between the rock and turtlegrass form.

Remarks.—This widely dispersed and variable West Indian species exhibits morphological variations in the shell which appear to be correlated with the substrate and other ecological conditions. The thin, oblong, tan to pinkish form which we term the "turtlegrass form" was dredged in the quiet waters of North Sound, (5 stations, 5 to 12 feet, grass and muddy sand), South West Sound (one station inshore), Frank Sound (3 stations, 5 to 8 feet, on grass, sand bottom) and East Sound (6 stations, 5 to 15 feet, feet, grass beds and sand). Most of these stations were not very far from mangroves. The rock form was collected in clear, more exposed, coral bottom areas from 5 to 18 feet off North Sound, and the fringing reefs off the west end, Frank Sound and South West Point.

The name *pulcherrima* Guilding was first validated by Petit (1856, Jour. de Conchyl., vol. 5, p. 155) when it was put into the synonymy of "*Patella candeana* Orbigny". The latter is a synonym of *antillarum* Sowerby 1831, a common West Indian species which, oddly enough, is absent or extremely rare on Grand Cayman Island.

Range.—Lower Florida Keys, Bermuda and the West Indies to the Lesser Antilles.

Records.—GRAND CAYMAN; around most of the island at 26 stations, including the rock and turtlegrass forms (see under remarks).

Acmaea jamaicensis Gmelin 1791

1791 *Patella jamaicensis* Gmelin, Systema Naturae, 13th ed., p. 3715, no. 124 (Jamaica; refers to Martini, Conchyl.-Cab., vol. 1, fig. 37). Not Gmelin, ibid., p. 3730, no. 200.

1798 *Patella fungoides* Röding, Museum Boltenianum, p. 8, no. 78, (refers to Lister, fig. 539, fig. 23; no locality).

1845 *Patella albicosta* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 8 (Jamaica); fig. of holotype in Clench and Turner, 1950, Occ. Papers Mollusks, vol. 1, no. 15, pl. 36, figs. 1 and 2.

1954 *Acmaea jamaicensis* Gmelin, Abbott, American Seashells, N. Y., p. 106, pl. 17c.

Description.—10 to 25 mm. in maximum diameter, moderately high, ovalish in outline, usually with rounded sides, thick, with about 15 to 20 rather large, rounded, white radial ribs on a black-brown background, rarely all white. Interior white, rarely with a black-spotted margin and with a thickened, light-brown to black callus.

Remarks.—Martini's figure is not particularly good, but seems to fit the only large, ribbed Acmaea from Jamaica. If Gmelin's name is abandoned, Röding's *fungoides* would apply, since it is based upon a diagnostic figure in Lister based upon a Barbados specimen.

The shells at Grand Cayman and elsewhere in the West Indies are quite variable, especially in height and in the strength of the radial ribs. The margin of the shell may be grossly crenulate due to the strong ribbing or may be finely crenulate or even worn-smooth.

Range.—Southeast Florida and the West Indies.

Records.—GRAND CAYMAN; on rocks at low tide on reefs at 21 stations. It is moderately common where found, and associated with the rock form of *A. pustulata.*

Acmaea leucopleura Gmelin 1791

1791 *Patella leucopleura* Gmelin, Systema Naturae, 13th ed., p. 3699, no. 34 (refers to Lister, pl. 539, fig. 22; Martini Conchyl.-Cab., vol. 1, figs. 56, 57).

1798 *Patella digitale* Röding, Museum Boltenianum, p. 7 (refers to Martini, vol. 1, fig. 57).

1798 *Patella papillaris* Röding, loc. cit., p. 7 (refers to Lister, pl. 539, fig. 22).

1954 *Acmaea leucopleura* Gmelin, Abbott, American Seashells, N. Y., p. 106, pl. 17, fig. 17b.

Remarks.—This high-conic, smoothish, 1/3 inch-long *Acmaea* is common from Florida to the Lesser Antilles. It has numerous alternating black and white radial lines. One dead specimen was collected on the beach near Little Bluff on the north shore of Grand Cayman, but it is probably not uncommon. It has been found in Cuba clinging to the underside of *Livona pica* Linné. *A. cubensis* Reeve 1855 and *cubensis simplex* Pilsbry 1891 are synonyms.

Superfamily *TROCHACEA*

Family **TROCHIDAE**

Subfamily **GIBBULINAE**

Genus SYNAPTOCOCHLEA Pilsbry 1890

Synaptocochlea picta picta Orbigny 1842

1842 *Stomatia picta* Orbigny [in Sagra], L'Isle Cuba, Mollusques, pl. 24, figs. 19-20; 1853, vol. 2, p. 184 (Cuba).

1890 *Synaptocochlea picta* Orbigny, Pilsbry, Manual of Conchology, series 1, vol. 12, p. 29, pl. 54, figs. 19, 20; pl. 21, figs. 22-25; 1900, Verrill and Bush, Trans. Conn. Acad. Arts and Sciences, vol. 10, p. 525, fig. 1 (radula).

Description: Shell minute, 2 to 4 mm. in length, auriculiform, last whorl proportionately very large, white with mauve maculations which grade to deep reddish purple sometimes black; darker colors run along the raised cords. Live shells oily glistening in appearance and semi-translucent in structure. Whorls three; nucleus translucent-white, flattened. Second whorl usually white and with red flammules. Spire short, obtuse. Body whorl ovate. Post-nuclear whorls with 15 to 18 unequal spiral cords which are crossed by numerous, weakly-incised, axial striae, giving a slightly beaded appearance to the shell. White areas may obscure the presence of the cords. Suture smooth, slightly indented; columella white; umbilicus shallow but broad; aperture obliquely ovate, elongate, interior shining and semi-translucent with the outer coloration showing through but not nacreous.

Remarks.—This species is moderately common at Grand Cayman. Dead shells were dredged in sand in water 6 to 14 feet in depth in the vicinity of reefs at 10 stations. Mr. Parker believes that it lives among coral and coralline algae on the reefs. The Cayman Island specimens are characterized by having rather strongly developed spiral ribs. In other parts of the West Indian region, specimens may have finer and more numerous ribs. This form has been found in the Lower Florida Keys, is dominant in Bermuda and rare in the Virgin Islands. This is the form or subspecies *nigrita* Rehder 1939 (Nautilus, vol. 53, p. 20, pl. 6, fig. 1 from Dry Tortugas, Florida). It has as wide a color range as *picta,* although pure white or black specimens appear to be more common.

I can see little difference between the Atlantic *picta,* especially the form or subspecies *nigrita* Rehder, and the Indo-Pacific *concinna* Gould 1845, except perhaps that the latter usually has weaker spiral ribs in most specimens. At best, it should be considered a subspecies of *picta. Stomatella concinna inconcinna* Pilsbry 1921 (Proc. A.N.S.P., vol. 72, p. 380 from Honolulu, Hawaii) is probably only an albino form. A cotype of *Stomatella caliginosa* H. and A. Adams 1863 (Proc. Zool. Soc. London for 1863, p. 434, no locality) in ANSP no. 40739 strongly suggests that this species is a synonym of *picta concinna* Gould. *S. asperulata* A. Adams 1850 from St. Helena Island appears to be a good subspecies of *picta* which has a finely beaded surface.

Genus LIVONA Gray 1842

Livona pica Linné 1758

Remarks.—The large, common West Indian Top-Shell is common along the rocky intertidal and sublittoral areas on Grand Cayman. The natives eat the flesh in the form of a chowder.

Range.—Bahamas, and the Caribbean as far south as Trinidad.

Subfamily **MONODONTINAE**

Genus TEGULA Lesson 1832

Subgenus AGATHISTOMA Olsson and Harbison 1953

Tegula fasciata Born 1778 Map 7.

1778 *Trochus fasciatus* Born, Index Rerum Natur. Mus. Caesarei Vind., p. 336 (no locality); 1780, Testacea Mus. Caesarei Vind., p. 331, pl. 2, figs. 3 and 4 (no locality).

1791 *Turbo dentatus* Gmelin, Systema Naturae, 13th ed., p. 3601 (no locality; refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1767, 1768).

1822 *Trochus carneolus* Lamarck, Anim. san Vert., vol. 7, p. 29 (no locality).

1842 *Trochus hotessierianus* Orbigny, [in sagra] Hist. L'Ile de Cuba, Mollusques, vol. 2, p. 59, pl. 18, figs. 15-17 (Cuba, Antilles, Florides, Sainte-Lucie, etc.).

1845 *Trochus occultus* Philippi, Abbild. und Beschr. Conchyl., vol. 2, p. 29, pl. 5, fig. 8 (no locality).

1845 (Jan.) *Monodonta maculo-striata* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 6 (Jamaica); lectotype on pl. 39, fig. 13 in Clench and Turner, 1950, Occ. Papers Moll., Cambridge, Mass., vol. 1, no. 15.

1877 *Adeorbis picta* Tenison-Woods, Proc. Roy. Soc. Tasmania for 1876, p. 146 (see Hedley 1902, Nautilus, vol. p. 49).

1889 *Chlorostoma substriatum* Pilsbry, Manual of Conch., vol. 11, p. 187, pl. 29, fig. 78 (type locality here designated: Bahamas). Holotype ANSP no. 40831.

1954 *Tegula fasciata* Born, Abbott, American Seashells, N. Y., p. 118, pl. 17p.

Description.—Adult 10 to 18 mm. in length, turbinate, depressed, thick and solid, umbilicate, and smooth to weakly lirate or with a microscopic, spiral " silky " texture. Color very variable, usually with a whitish or buff ground color which is heavily overlaid with maculations of either brown, reddish, orange, purple or blackish, and usually bearing over this numerous fine spiral rows of white and brown or reddish dots. Obliquely slanting axial flames sometimes present. Umbilicus colored or whitish, rarely all black. Whorls 6 to 8, the apex obtuse, upper whorls slightly rounded and bearing fine spiral threads which may or may not persist in the later whorls. Last whorl well-rounded, but flattened beneath the suture, and sometimes descending. Umbilicus round, narrow, deep, either smooth or (especially in young) bordered by 1 to 3 spiral cords. Base usually smooth. Outer lip usually thickened within by an axial shelf and with a dozen or so fine spiral teeth. Interior of aperture whitish pearl. Parietal callus white, shelf-like; columella short, sharp, and strongly curved, and with one large and one or two small tubercles at the base. Operculum horny, thin, round, multispiral with about a dozen visible whorls, light tan in color.

Remarks.—After examining a large series of lots from many parts of the West Indies, we have concluded that *hotessieriana* and *maculostriata* are merely threaded forms. All specimens of *fasciata* are spirally threaded in the early whorls, but, as growth continues, these threads are usually lost. The spiral cords in the umbilicus are also variable in strength, and more evident in smaller, more strongly threaded forms. The latter form occurs in all colors, but the bright rose shells were named *substriata* Pilsbry 1889. This species is replaced from Panama to Trinidad and south to Brasil by a

closely-related rugose, beaded species, *Tegula viridula* Gmelin 1791. The genus name, *Tegula,* is feminine, and not neuter as some authors indicate.

This species (with its several color and sculptural forms) is very common on Grand Cayman Island where it was obtained at 56 stations. It is one of the most widespread shallow water species on the island, being found in 5 to 15 feet of water in clear white sand, sandy mud or mangrove mud not only around most of the open coast but also in nearly every place within the quiet, warm North Sound. We could not note any correlation between shape, color and sculpturing and its wide choice of environments.

Range.—Southeast Florida, Yucatan and Bahamas to the Lesser Antilles.

Records.—GRAND CAYMAN: common at 58 stations along the entire coast and within North Sound.

Tegula lividomaculata C. B. Adams 1845 Map 7; Plate 2s and t.

1842 *Trochus canaliculatus* Orbigny, [in Sagra] Hist. L'Ile de Cuba, Mollusques, vol. 2, p. 60, pl. 18, figs. 18, 19 (Cuba). Non Brocchi 1814, Borson 1825, Cristofori and Jan 1832, Quoy and Gaimard 1834, Philippi 1836.

1844 *Trochus scalaris* "Anton" Philippi, Abbild. und Beschr. Conchyl., vol. 1, p. 140, pl. 4, fig. 11 (Laguayra). Non Roemer 1836.

1845 *Monodonta livido-maculata* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 7 (Jamaica); lectotype on pl. 39, fig. 11 in Clench and Turner 1950, Occ. Papers Moll., Cambridge, Mass., vol. 1, no. 15.

1848 *Trochus gundlachi* Philippi, Zeitschr. für Malak., 1848, p. 108 (Cuba); Conchyl-Cab., p. 226, pl. 34, fig. 13.

1877 *Astele turbinata* Tenison-Woods, Proc. Roy. Soc. Tasmania for 1876, p. 145 (see Hedley 1902, Nautilus, vol. 16, p. 49).

1889 *Chlorostoma scalare* Anton, Pilsbry, Manual of Conchology, vol. 11, p. 185, pl. 29, figs. 70-73.

Description.—Adult shell 11 to 14 mm. in length, slightly broader, turbinate, depressed, broadly and deeply umbilicate; with about a dozen, fine, beaded, spiral threads on the whorls. Color cream with large maculations and axial flames of purplish to reddish brown, sometimes with spiral rows of tiny white dots. Between the spiral threads are numerous, crowded, microscopic, axial fimbriations. Umbilicus deep, cream, with two spiral ribs within, one terminating in the broad callus of the columella at its junction with the body whorl, the other ending in the largest of the two basal teeth on the nacreous columella. Interior of aperture whitish and nacreous. Operculum horny, round, multispiral and light-brown.

Remarks.—We agree with Pilsbry (1889, p. 186) that the "*Globulus indusii* Chemnitz" is based upon too poor an illustration for satisfactory determination (Conchyl.-Cab., vol. 5, fig. 1682). Therefore, we consider the following names as dubious: *Omphalius indusii* "Chemitz" Mörch 1852, *Trochus carneus* Gmelin 1791, p. 3574, and *Turbo crenulatus* Röding 1798, p. 89.

This species is moderately common and was found at 12 stations in shallow, intertidal waters on rocky, fringing reefs facing the open ocean. It was usually found in company with *Tegula fasciata,* except in the quieter, warmer waters of North Sound.

Range.—Lower Florida Keys, Bahamas, and the Greater and Lesser Antilles.

Records.—GRAND CAYMAN: moderately common at 12 stations on intertidal, rocky fringe reefs on all sides of the island, except the central west end.

Family **TURBINIDAE**

Subfamily **LIOTIINAE**

Genus ARENE H. and A. Adams 1854

Arene cruentata Mühlfeld 1829

1829 *Turbo cruentatus* Megerle von Mühlfeld, Ges. Nat. Fr. Berlin Verh., vol. 1, pt. 4, p. 211, pl. 7, figs. 8a, b. (English Islands of the West Indies).

1839 *Delphinula radiata* Kiener, Coquilles Vivantes, vol. 10, *Delphinula,* p. 7, no. 4, pl. 4, fig. 9 (les mers de L'Inde).

1939 *Arene vanhyningi* Rehder, Proc. U. S. Nat. Mus., vol. 93, p. 192, pl. 19, figs. 15, 16 (Sand Key, 8 mi. south of Key West, Florida).

Description.—Shell 7 to 9 mm. in length and 9 to 12 mm. in diameter, turbinate, deeply umbilicate, whitish with 7 to 12 large, squarish to oblong bright rose splotches on the upper part of the whorl. 4 to 6 whorls angular with the periphery bearing a series of about a dozen, strong, triangular spines which are hollow on their anterior edges; below is a smaller spiral row of minor spines. Suture channeled. Axial sculpture of microscopic, crowded, sharp threads, although sometimes weak or absent (form *vanhyningi*). Aperture circular, pearly within. Umbilicus round, very deep, and bordered by 3 spiral, beaded cords. Operculum circular, multispiral, with rows of tiny calcareous, rounded beads on top of the horny base.

Range.—Lower Florida Keys and the West Indies.

Records.—GRAND CAYMAN: Uncommon on reefs at night at low tide at Brinkleys and 1 mile east of Brinkleys, north shore; Boat channel, off Palmetto Point; south side of East Channel, Gun Bay; and the reef off Collier's Point at the east end of the island.

Genus CYCLOSTREMA Marrayat 1818

Cyclostrema cancellatum Marryat 1818

Remarks.—A dead but fine specimen was dredged in 6 feet of water in the channel leading into Bluff Bay, Grand Cayman. It is a widespread West Indian species.

Subfamily **TURBININAE**

Genus TURBO Linné 1758

Subgenus MARMOROSTOMA Swainson 1829

Turbo castanea Gmelin 1791

1791 *Turbo castanea* Gmelin, Systema Naturae, 13th ed., p. 3595, no. 28 (in Mari Americam australem; refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1807, 1808, and others).

1954 *Turbo castaneus* Gmelin, Abbott, American Seashells, p. 123, pl. 3g (in color).

Remarks.—This well-known and common West Indian species (North Carolina to Florida, Texas, and the West Indies) is moderately common at Grand Cayman. It lives in moderately deep water from 5 to 25 feet where the bottom is clear sand and grassy. It occurs with *Strombus gigas* and apparently requires cool, pure, ocean water, although colonies of *castanea* have invaded the northeast corner of North Sound where, however, there is little influence from the brackish warm waters. The Cayman specimens are usually 20 mm., rarely 25 mm., in length, usually beaded, rarely fimbriated, and colored a dark greenish purple or dark olivaceous with white specklings. The operculum is round, swollen, calcareous, glossy, and white with a purplish rose flush. *T. crenulatus* Gmelin 1791 is a synonym. Gmelin originally used the trivial name *castanea* as a substantive noun, and not as an adjective.

Turbo filosus Wood 1828 Plate 2o.

1828 *Trochus filosus* Wood, Suppl. Index Testac., p. 17, pl. 5, Trochus, fig. 23 (no locality).

1873 *Turbo filosus* Kiener, Fischer, Icon. Coquilles Vivantes, vol. 10, Turbo, p. 40, pl. 13, fig. 2.

1856 *Turbo cailletii* Fischer and Bernardi, Jour. de Conchyl., vol. 5, p. 294, pl. 10, figs. 10, 11 (Guadeloupe).

Remarks.—This rare species which resembles *castanea* is characterized by about a dozen smooth spiral cords on the body whorl, broadness of the lower half of the columella, slight umbilication, and absence of beads. One dead specimen, 28 mm. in length, was found on Grand Cayman. It has also been found at Dry Tortugas and Guadeloupe.

Genus ASTRAEA Röding 1798

Subgenus CALCAR Montfort 1810

Astraea tecta americana Gmelin 1791

1791 *Trochus americanus* Gmelin, Systema Naturae, 13th ed., p. 3581, no. 94 (Americam australem; refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1534, 1535).

1798 *Trochus anilis* Röding, Museum Boltenianum, p. 82, no. 1068 (refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1534, 1535).

1954 *Astraea americana* Gmelin, Abbott, American Seashells, p. 124, pl. 3i (in color).

Description.—Shell 20 to 40 mm. in length, trochiform, elevated, imperforate, solid, whitish to yellowish brown in color; whorls 7, flattened or slightly concave on their upper surfaces, axially obliquely plicate, the folds numbering from 21 to 38 (usually 27 to 32) on the last whorl, terminating on the periphery in rounded nodules (or spines in very young); periphery angled, usually somewhat swollen; base nearly flat, more or less sharply radiately striate, and with 5 to 6 spiral lirae; columella short, heavy, with two small tubercles at the base, and bounded by a radially plicate cord.

Range.—Limited to the Lower Florida Keys.

Remarks.—This is the United States subspecies of a widely dispersed West Indian species which shows a gradual transition between four subspecies. The subspecies *americana,* found rarely at Grand Cayman, is characterized by the numerous axial folds (21 to 38 but usually 27 to 32). In the Bahamas, Greater Antilles and the Cayman Islands, the subspecies *cubana* Philippi is characterized by 9 to 26 axial folds (usually 13 to 16 in the Bahamas, and 19 to 23 at Grand Cayman). In the Yucatan, Mexico region, the subspecies *papillata* Potiez and Michand is characterized by darker colored shells with 11 to 16 folds. Except for color, many of these specimens closely resemble the Bahaman *cubana,* while a few approximate the subspecies *tecta* Solander found to the south in Panama and the Lesser Antilles. The latter subspecies bears 18 to 21 strong folds which are fluted at their ends. We have not seen specimens from Brasil.

Astraea tecta cubana Philippi 1849 Map 6.

1849 *Trochus* (*Calcar*) *cubanus* Philippi, Zeitsch. für Malac., 1848, p. 104 (Cuba); 1850, Philippi, Conchyl. Cab., ed. 2, vol. 2, pt. 3, p. 274, pl. 40, fig. 5.

1865 *Astralium guadeloupense* Crosse, Jour. de Conchyl., vol. 13, p. 36, pl. 1, figs. 10, 11 (Guadeloupe).

Diagnosis.—Similar to *americana,* but having 9 to 26 axial folds on the last whorl. The Grand Cayman Island specimens have from 16 to 26 folds, usually 19 to 23. The Bahama specimens have 9 to 19, usually 13 to 16. The calcareous, thick operculum has a broad raised, arched, papillose ridge resembling a "comma". The "comma" in old specimens becomes indistinct.

Range.—Bahamas and the Greater Antilles.

Records.—BAHAMAS: Eleuthera Id., New Providence Id. CUBA: Habana; Cardenas. GRAND CAYMAN: all around the island on exposed reefs at 14 stations. Moderately abundant with *A. caelata.*

Astraea tecta papillata Potiez and Michaud 1838

1838 *Trochus papillatus* Potiez and Michaud, Galerie des Mollusques, vol. 1, p. 337, pl. 30, figs. 10 and 11 (foreign?).

1850 *Trochus papillosus* Philippi, Conchyl. Cab., ed. 2, vol. 2, pt. 3, p. 274, pl. 40, fig. 6 (non da Costa 1778).

1850 *Trochus saxosus* Philippi, ibid., p. 127, no. 146, pl. 22, fig. 3 ("probably Mexico").

1850 *Trochus olfersii* "Troschel" Philippi, ibid., p. 126, no. 144, pl. 22, fig. 1 (Brasil ?).

1843 *Trochus tuberosus* Philippi, abbild. Conch., vol. 1, pt. 3, p. 69, pl. 2, fig. 1. (locality unknown). Non Risso 1826.

Remarks.—This subspecies appears to be limited to the coast of Mexico. The shells are characterized by fewer axial folds on the last whorl (11 to 16) which are strongly noduled at their bases, but not or weakly fluted. The spiral lirae on the base are inclined to be beaded, and the color of the shell ranges from ash to purplish gray. ANSP no. 60995 contains 25 specimens from Vera Cruz. It is not found at Grand Cayman. It is possible that *olfersi* is really from Brasil, and, if so, may be a form of *tecta* or a fifth subspecies.

Astraea tecta tecta Solander 1786

1786 *Trochus tectus* Solander [or Humphrey], Portland Catalogue, p. 187, no. 3982; refers to Lister, pl. 628-14 (Island of All Saints, West Indies).
1791 *Trochus imbricatus* Gmelin, Syst. Naturae, 13th ed., p. 3581, no. 93; refers to Lister, pl. 628-14, and others (mari Americam Australem).
1861 *Trochus corolla* Reeve, Conch. Icon., vol. 13, Trochus, pl. 8, fig. and sp. 38 (West Indies).

Remarks.—The resurrection and validating of the Röding and Solander (or Humphrey) sales catalogues by W. H. Dall continues to plague us, and, once again, another familiar name (*imbricata* Gmelin) must give way to an earlier valid one. *Trochus tectum* Gmelin is an Indo-Pacific *Modulus*, but is not a homonym, since it is a substantive noun different from Solander's adjective *tectus*.

The typical *tecta* ranges from the Lesser Antilles across the north coast of South America, and possibly up to Honduras. The shell has a flat base and its last whorl has 18 to 21 strong axial folds which are fluted at their bases.

Subgenus LITHOPOMA J. E. Gray 1850

Astraea caelata Gmelin 1791

Range.—Lower Florida Keys and the West Indies.

Records.—A common species on Grand Cayman found with *A. tecta cubana* Philippi on exposed reef flats where dead and live coral are awash with open waters. The largest Cayman specimen, 55 mm. in length, contained a commensal crab.

Astraea tuber Linné 1758

Range.—Lower Florida Keys and the West Indies.

Records.—Oddly enough, no specimens of *A. tuber* were collected at Grand Cayman Island. This species is either absent or lives in depths of water beyond which collecting was done.

Subgenus ASTRALIUM Link 1807

Astraea phoebia Röding 1798 Map 6.

1798 *Astraea phoebia* Röding, Museum Boltenianum, p. 79, no. 1036 (refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1716, 1717).
1798 *Astraea titaina* Röding, ibid., p. 80, no. 1039 (refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1718, 1719).
1807 *Astralium deplanatum* Link, Beschr. Nat.-Sammlung, p. 135 (refers to Chemn. Conchyl.-Cab., vol. 5, figs. 1718, 1720).
1807 *Astralium calcar* "Gmelin in part," Link, ibid., p. 135 (refers to ibid., figs. 1718-20). Not *Trochus calcar* Linné 1758.
1822 *Trochus longispina* Lamarck, Anim. sans Vert., vol. 7, p. 10, no. 2 (East Indies).
1822 *Trochus spinulosus* Lamarck, ibid., p. 13, no. 15 (no locality).
1822 *Trochus costulatus* Lamarck, ibid., p. 14, no. 16 (Antilles ?).

1844 *Trochus latispina* Philippi, abbild. Conch., vol. 1, pt. 4, p. 90, pl. 3, fig. 2 (no locality).

1849 *Trochus (Calcar) armatus* Philippi, Zeitschr. für Malakoz., 1848, p. 102 (locality unknown); 1850, Conchyl.-Cab., ed. 2, pl. 41, fig. 1).

1849 *Trochus (Calcar) orichalceus* "Koch" Philippi, Zeitschr. für Malakoz., 1848, p. 110 (no locality).

1850 *Trochus aster* Philippi, Conchyl.-Cab., ed. 2, vol. 2, pt. 3, p. 56, no. 53 (refers to Conchyl.-Cab., vol. 5 figs. 1718-20). (West Indies).

1850 *Trochus heliacus* Philippi, ibid., p. 56, no. 52 (refers to Conchyl.-Cab., vol. 5, figs. 1716, 1717). (West Indies).

Remarks.—There are such gradual intergrades between the low, spinose, umbilicate form and the higher, less spinose, non-umbilicate form, that we are convinced that one variable species is involved in the so-called "*phoebia-deplanatum-longispina-costulata*" complex. For the opposite view, see Olsson and Harbison (1953, p. 345). We believe, however, that the shell with the bright orange-red columella which ranges along the north coast of South America should be treated as a good subspecies or distinct species: *A. brevispina* Lamarck 1822 (synonym: *Trochus aurispigmentum* "Jonas" Philippi 1849, Zeitsch. für Malako., p. 147).

The Chemnitz Conchyl.-Cab., vol. 5, figs. 1712, 1713, 1721, 1722, are possibly this species, although the figures are so poor, the axial folds on the shell so long, and so many authors consistently questioned their usefulness, that we think it wisest to consider names based upon them as dubious (*inermis* Gmelin 1791, *planus* Gmelin 1791 and *corrusca* Röding 1798).

The form found at Grand Cayman Island is the so-called *longispina* Lamarck. The shells do not exceed a diameter of 30 mm. and bear 13 to 18 triangular, sharp spines on the periphery of the last whorl. This species lives only in North Sound in warm quiet waters in depths of 5 to 18 feet on grassy and muddy sand bottom. It was collected at 14 dredging stations, and found especially abundant near the center of the sound.

Family **PHASIANELLIDAE**

Genus TRICOLIA Risso 1826

Tricolia thalassicola Robertson 1958

1958 *Tricolia thalassicola* Robertson, Johnsonia, vol. 3, no. 37, p. 271. (Great Abaco Id., Bahamas).

Diagnosis.—Shell 2.4 to 7 mm. in length, resembling a miniature Littorina, glossy, smoothish, except for microscopic, spiral threads on the early whorls of some specimens. Color very variable; rose to brownish, sometimes whitish, and with numerous, small round dots of pink, orange or purple-brown; sometimes with axial flames of color. Operculum calcareous, swollen, whitish in color.

Remarks.—This common south Florida and West Indian species was dredged abundantly at 32 stations at Grand Cayman Island in waters from 6 to 18 feet in depth.

A single dead specimen of *Tricolia tessellata* Potiez and Michaud 1838 was dredged in 5 feet of water in Frank Sound, Grand Cayman Island.

Superfamily *NERITACEA*

Family **NERITIDAE**

Subfamily **NERITINAE**

Genus NERITA Linné 1758

Nerita peloronta Linné 1758

Remarks.—The " Bleeding Tooth " shell is common in the West Indies, Bermuda and Grand Cayman where it occurs wherever there are rocky, wave-dashed shores. Collected at 6 stations on Grand Cayman, including Jackson Point, Colliers Point and Brinkleys.

It is possible that the name *peloronta* Linné belongs in the synonymy of *Nerita polita*, since Linné refers only to one figure (Rumphius, pl. 22, fig. k) which is a shell from Pocleron Island, Bandam, in the East Indies and probably the uncommon two- or three-banded form of *polita*. Furthermore, Linné's specific name was a barbaric Latinization of Rumphius' name for this shell, the " poelerontjes ". Rumphius says that this shell is very similar to his preceding species, which Linné later called *polita*. However, Linné's description is not in accord with this figure, and, furthermore, in the Museum Ulricae of 1764, his supplemental description strengthens the belief that he was describing the West Indian " Bleeding Tooth ". Hanley (Ipsa Linn. Conch., 1855, p. 404) states that Linné's type of *peloronta* is, indeed, this West Indian species.

Nerita versicolor Gmelin 1791

Remarks.—A common West Indian species found from Bermuda and southern Florida to the general Caribbean. It was collected at eight rocky shore stations at various sides of Grand Cayman. Found with *N. peloronta*.

Nerita tessellata Gmelin 1791

Remarks.—Florida to Texas and south (including Bermuda) throughout the West Indies to Brasil is the range of this common species. It was collected at 8 stations where rocks occur in the intertidal area.

Genus PUPERITA Gray 1857

Subgenus PUPERITA Gray 1857

Puperita pupa Linné 1767

Remarks.—This is a common species of " splash pools " along rocky coasts in the West Indies. One colony was sampled at Jackson Point, another just north of Georgetown, Grand Cayman. Russell (1941, p. 369) reports it from Georgetown and from Little Cayman Island. *P. tristis*

Orbigny is limited to larger islands, including nearby Cuba and Jamaica, but is not in the Caymans.

Genus NERITINA Lamarck 1816

Subgenus VITTA Mörch 1852

Neritina virginea Linné 1758

Remarks.—" This is a species of the mangrove swamps and is strictly a brackish water form. It does, however, prefer the lower margin of such swamps where there is only a short exposure to the air at low tide. The range extends from St. Augustine, Florida, and the Bermudas through the West Indian Islands and Central and South America as far south as Itabapinana Brasil " (Russell, 1943, p. 377). The Ostheimers collected this species on rocks near mangroves near Prospect; also the bay just north of Georgetown; on mud flats west of Red Bay in Southwest Sound; and near Gorling Bay at the east end. It is surprising that specimens were not collected along the shores of North Sound, and this may be due merely to lack of collecting of an abundant species.

Subfamily **SMARAGDIINAE**

Genus SMARAGDIA Issel 1869

Subgenus SMARAGDIA Issel 1869

Smaragdia viridis viridemaris Maury 1917

1917 *Neritina (Smaragdia) viridemaris* Maury, Bull. Amer. Paleontology, vol. 5, p. 316, pl. 50, fig. 11 (Bluff 3, Rio Mao, Dominican Republic, Cercado formation).

1940 *Smaragdia viridis weyssei* Russell, Mem. Soc. Cubana Hist. Nat., vol. 14, p. 257, pl. 46, figs. 5, 6; 1943 Bull. Mus. Comp. Zool., vol. 88, no. 4, p. 396; Abbott, American Seashells, p. 130, pl. 4h (in color).

Description.—3 to 5 mm. in length, glossy, smooth, bright pea-green, sometimes with chalk-white dots and mottlings. Operculum calcareous, greenish white.

Remarks.—True *viridis viridis* Linné 1758 comes from the Mediterranean. *S. viridis viridemaris* ranges from southeast Florida and Bermuda throughout the Caribbean where it is very common. It was found abundant at 26 dredging stations in depths from 2 to 15 feet where there was a mixed bottom of *Thalassia* turtle-grass and white sand. It was found on all sides of the island, except the west end within North Sound proper.

Family **PHENACOLEPADIDAE**

Genus PHENACOLEPAS Pilsbry 1891

Phenacolepas hamillei Fischer 1856

1856 *Acmaea hamillei* Fischer, Journ. de Conchyl., vol. 5, p. 276 (Guadeloupe); 1872, Journ. de Conchyl., vol. 20, p. 145, pl. 5, fig. 6).

1889 *Scutellina antillarum* "Shuttleworth" Dall, Bull. 18, Mus. Comp. Zool., "Blake Report", pt. 2, p. 342, pl. 31, figs. 10, 11; 1891; Pilsbry, Manual of Conch., first series, vol. 12, p. 130.

1900 *Phenacolepas hamillei* Fischer, Pilsbry, Nautilus, vol. 14, no. 6, p. 62 (see also Pilsbry, 1891, Nautilus, vol. 5, p. 89).

Description.—"Small thin shell, about 8 by 6 mm. at the base, and 3.0 mm. high. The apex is situated in the posterior fourth of the length, and has a minute dextral half-immersed spiral nucleus, whose extent is marked by a slight contraction where the conical shell begins. The anterior slope is prettily and evenly arched, the posterior slope steep and concave beneath the apex. The surface is of a brownish straw-color, the interior substranslucent white of brilliant polish but not nacreous. The sculpture is of very numerous, fine, radiating raised lines, with minute spines or vaulted scales closely set upon them, giving a rasp-like surface; there are no regular concentric lines, but only occasional lines of growth. (Dall 1889).

Remarks.—A single specimen was dredged in 5 feet of water off Conch Point, North Sound, Grand Cayman. Its range is from southeast Florida to the Lesser Antilles.

Order MESOGASTROPODA

Superfamily *LITTORINACEA*

Family **LITTORINIDAE**

Genus LITTORINA Ferussac 1822

Subgenus MELARHAPHE Menke 1828

Littornia ziczac Gmelin 1791

Remarks.—This is the most common and widely dispersed of the West Indian rock periwinkles (Bermuda, Florida and Texas south to Uruguay). It was found abundant at 8 stations on rocks on the southwest, west, north and east ends of Grand Cayman.

Subgenus NERITREMA Recluz 1869

Littorina mespillum Mühlfeld 1824

Remarks.—Only two small lots of this small, spotted periwinkle were obtained at Grand Cayman, (cove south of Jackson Point, and Pease Bay, near Breaker Point, south shore). This species ranges from southeast Florida and the Bahamas to Barbados and Curacao.

Subgenus LITTORARIA J. E. Gray 1834

Littorina angulifera Lamarck 1822

Remarks.—The Ostheimers collected this species at Red Bay, South Sound, and one mile north of Governors Creek, North Sound. Salisbury (1943, p. 45) reports it from "mangrove swamp, Booby Cay, North Sound, and at English Sound, off North Sound". This is a widely distributed,

common periwinkle found in mangrove areas from Florida and Bermuda to Brasil and West Africa. Mr. Jay Weber of Miami (*in lit.*) reports having seen females giving birth to live young snails.

Genus NODILITTORINA von Martens 1897

Subgenus ECHINOLITTORINA Habe 1956

Nodilittorina tuberculata Menke 1828

Remarks.—The anatomy and distribution of this and the next species were dealt with by Abbott (1954). It is common on the shore rocks at Grand Cayman, and was obtained at 8 stations.

Genus ECHININUS Clench and Abbott 1942

Subgenus TECTININUS Clench and Abbott 1942

Echininus nodulosus Pfeiffer 1839

Remarks.—It is easy to confuse this common West Indian species with *Nodilittorina tuberculata*, especially since their ranges overlap and their habitats are almost identical. *N. tuberculata* is usually 4 to 5 mm. smaller than *E. nodulosus* from the same small area. The nodules in each spiral row on the periphery of the whorl are always lined up under one another in *N. tuberculata,* while in *E. nodulosus* they are not, since the upper row bears fewer (and larger) nodules than the lower row. *E. nodulosus* is common on rocky shores at Grand Cayman.

Genus TECTARIUS Valenciennes 1833

Subgenus CENCHRITES von Martens 1900

Tectarius muricatus Linné 1758

Remarks.—This common West Indian littoral periwinkle is abundant at Grand Cayman according to the Ostheimers and Salisbury (1953, p. 44).

Family **RISSOIDAE**

Subfamily **RISSOINAE**

Genus ZEBINA H. and A. Adams 1854

Subgenus ZEBINA H. and A. Adams 1854

Zebina browniana Orbigny 1842

Remarks.—This is the second most common Rissoinid species at Grand Cayman, where it was dredged at 14 stations at depths of 4 to 18 feet. It is a common Florida, Bahama and Caribbean species. According to Desjardin (1949) the following are synonyms: *sloaniana* Orbigny 1842, *laevigata* C. B. Adams 1850, and *laevissima* C. B. Adams 1850.

Genus RISSOINA Orbigny 1840

Subgenus ZEBINELLA Mörch 1876

Rissoina decussata Montagu 1803 Plate 3k.

1803 *Helix decussata* Montagu, Test. Brit., vol. 2, p. 399; 1949, Dejardin, Journ. de Conchyl., vol. 89, no. 4, p. 200, pl. 9, fig. 11.

Diagnosis.—Shell 6 to 8 mm. in length, glossy, white, with 25 to 30 weak axial ribs which are finely and spirally striated or pitted between. Varix thickened and smooth. Upper end of parietal wall with a small, short, glossy, rounded ridge.

Remarks.—One specimen was dredged at each of 4 stations at Grand Cayman (off Conch Point, North Sound; West Bay; Barkers Cay, North Sound; and South West Sound; all in 6 to 8 feet of water). It is a moderately common species, ranging from North Carolina and the Bahamas to the Lesser Antilles.

Subgenus RISSOINA Orbigny 1840

Rissoina bryerea Montagu 1803

Diagnosis.—Shell 4.5 to 6 mm. in length, white, with 16 to 22 slightly slanting, strong ribs per whorl. Spiral threads may be present on the base of the shell.

Remarks.—This is the most common of the Rissoinid species at Grand Cayman, where it was dredged in large numbers at 25 stations on grass and sand bottoms in 3 to 20 feet of water. The species is abundant elsewhere in its range from Bermuda, the Bahamas, and the southern half of Florida, to the Lesser Antilles.

Subgenus PHOSINELLA Mörch 1876

Rissoina cancellata Philippi 1847 Plate 3l.

1847 *Rissoina cancellata* Philippi, Zeitschr. für Malakozool., p. 127 (Cuba); 1949 Desjardin, Journ. de Conchyl., vol. 89, no. 4, p. 204, pl. 10, fig. 3.

Diagnosis.—Shell 5 to 8 mm. in length, white to grayish white, strongly cancellate with the depressed interspaces large and square. The intersection of the axial and spiral cords sometimes forms raised, pointed beads.

Remarks.—This is the third most common Rissoinid species at Grand Cayman where it was dredged sparingly at 11 stations over sand in water 6 to 25 feet in depth. It ranges from Bermuda, the Bahamas and southeast Florida to the Virgin Islands. According to Desjardin (1949), *pulchra* C. B. Adams 1850 is a synonym.

Genus ALVANIA Risso 1826

Alvania auberiana Orbigny 1842

1842 *Rissoa auberiana* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 11 bis, figs. 34-36; text, vol. 2, p. 22 (Cuba, St. Thomas, Jamaica).

Remarks.—Several dead specimens were dredged in 6 feet of water in Gun Bay and Bluff Bay, Grand Cayman Island. It also occurs in Bermuda, the Lesser Antilles and at East Colon Id., Panama (T. L. McGinty).

Family **VERMETIDAE**

Several small masses of Vermetid mollusks were collected on the reefs at Grand Cayman, but because they were without soft parts and were in poor condition, we have not attempted to treat them here. One species appears to be *Petaloconchus irregularis* Orbigny (see pl. 21d in Abbott, 1954, American Seashells, N. Y.).

Family **VITRINELLIDAE**

Genus PSEUDOMALAXIS Fischer 1885

Subgenus PLEUROMALAXIS Pilsbry and McGinty 1945

Pseudomalaxis balesi Pilsbry and McGinty 1945

1945 *Pseudomalaxis balesi* Pilsbry and McGinty, Nautilus, vol. 59, no. 1, p. 10, pl. 2, fig. 8 (Missouri Key, Lower Florida Keys).

Diagnosis.—Shell 1.5 to 1.8 mm. in diameter, 0.6 mm. in height, discoidal, subtranslucent-white, the upper surface flat; peripheral zone flattened or slightly concave between two finely nodulose keels; base broadly umbilicate. Whorls 3½, the last one having about 24 slanting, small, low axial ribs, and numerous, microscopic spiral scratches. Aperture oblique and roundly oval.

Remarks.—This very small Vitrinellid has been previously reported from shallow water along the east coast of southern Florida. A single dead specimen was dredged in 6 feet of water in the coastal lagoon at Bluff Bay, Grand Cayman.

Genus COCHLIOLEPIS Stimpson 1858

Cochliolepis parasitica Stimpson 1858

1858 *Cochliolepis parasitica* Stimpson, Proc. Boston. Soc. Nat. Hist., vol. 6, p. 308, text figs. (Charleston, South Carolina).

Diagnosis.—Shell minute, 2 to 3 mm. in maximum diameter, thin, discoidal, flattened on top, with 3 rapidly increasing whorls. Color translucent white. Umbilicus wide and deep. Peristome thin, the upper margin arched forward. Sculpture of microscopic growth lines.

Remarks.—This is a moderately common species found from South Carolina to the West Indies. According to Stimpson, it is found living under the scales of the annelid worm, *Acoetes lupina*. Several dead specimens were dredged in about 6 feet of water north of Little Bluff and Palmetto Point, Grand Cayman.

Family **ARCHITECTONICIDAE**

Genus HELIACUS Orbigny 1842

Heliacus cylindricus Gmelin 1791

1791 *Trochus cylindricus* Gmelin, Systema Naturae, 13th ed., p. 3572, no. 32 (no locality; refers to Chemnitz, Conchyl.-Cab., vol. 5, figs. 1639 a and b).

Remarks.—A young dead specimen (4 mm. in diameter) was dredged at each of three stations from 9 to 30 feet at Rum Point and the Main Channel, North Sound, and off Little Bluff, Grand Cayman. At this young stage, the specimens resemble *H. bisulcatus* Orbigny, but bear 3 to 4 spiral rows of larger beads on the upper whorls. The genus name *Torinia* Gray 1842 is a nude name. *Architectonica nobilis* Röding 1798 was not found at Grand Cayman Island.

Family **CAECIDAE**

Genus CAECUM Fleming 1813

Subgenus FARTULUM Carpenter 1857

Caecum nebulosum Rehder 1943

Remarks.—Dredged sparingly at four stations in North Sound, Grand Cayman Island, in 5 to 12 feet of water. Young specimens have a long, cornucopia-like, unbroken apex. Several worn specimens of a longitudinally-ribbed *Caecum* were dredged in a few feet of water at Grand Cayman. They resemble *C. cooperi* S. Smith 1870.

Family **PLANAXIDAE**

Genus PLANAXIS Lamarck 1822

Planaxis lineatus da Costa 1778

Remarks.—Common at South West Point, Prospect, and Red Bay, and doubtlessly elsewhere, at Grand Cayman in the intertidal rocky areas. This is a common species found in southeast Florida and throughout the West Indian region.

Family **MODULIDAE**

Genus MODULUS Gray 1842

Modulus modulus Linné 1758

Remarks.—This common West Indian species is moderately abundant in 3 to 12 feet of water at 46 stations where there is protective algae in sand or mud bottom in the open lagoons along the entire outer coast of Grand Cayman, and in nearly every locality in North Sound, including the mangrove-protected areas. *Modulus carchedonius* Lamarck, common in Cuba and Jamaica was not obtained.

Family **POTAMIDIDAE**

Subfamily **POTAMIDINAE**

Genus CERITHIDEA Swainson 1840

Cerithidea costata da Costa 1778

Remarks.—This is a common Florida-Caribbean species which is common at Grand Cayman. It was obtained dead or freshly dead at 6 dredging stations in 5 to 10 feet of water in Frank Sound and Red Bay. It is very abundant in the brackish water lake near Brinkleys on the north shore.

Subfamily **BATILLARIINAE**

Genus BATILLARIA Benson 1842

Batillaria minima Gmelin 1791

Remarks.—Although this is a very abundant species throughout most of its range (Bermuda, Florida and the Caribbean area), only single specimens were collected in Frank Sound and North Sound, Grand Cayman. Further collecting would probably prove it to be common on this island.

Family **CERITHIIDAE**

Genus CERITHIUM Bruguière 1789

Cerithium litteratum Born 1778

1778 *Murex litteratus* Born, Index Rerum Natur. Mus. Caesarei Vind., p. 327 (no locality; refers to Lister, l 4, s. 15, f. 89, pl. 1024, fig. 89).

1780 *Murex literatus* Born, Test. Mus. Caesarei Vind., p. 323, pl. 11, figs. 14, 15 (no locality).

1954 *Cerithium literatum* Born, Abbott, American Seashells, p. 154, pl. 191.

Description.—Shell 15 to 30 mm. in length, stout, usually with only one former varix, and characterized by spiral rows of squarish blue-black or reddish spots, olive maculations, and by a spiral row of 9 to 12 sharp, small nodules just below the suture. Rarely entirely orange-yellow.

Remarks.—Common from Bermuda and southeast Florida to the Caribbean. It was dredged in large numbers in shallow water on all sides of Grand Cayman Island at 59 stations where quiet lagoon conditions exist.

Born's 1778 reference to Lister was evidently a poor choice and not this species, as is evident from his good description and his own 1780 figure. The original spelling of the species name is with two "t"s.

Cerithium variabile C. B. Adams 1845

Remarks.—This is a common West Indian species (south Florida, Texas and southward) which is common at Grand Cayman, although it was collected only at Red Bay and Prospect on intertidal flats near white mangroves. This is *C. ferrugineum* Say 1832, non Bruguière 1792.

Cerithium eburneum Bruguière 1792

Remarks.—This is a common and very variable West Indian and southeast Florida *Cerithium*. It is very common on Grand Cayman in shallow water (3 to 8 feet) over grass and sand where it was collected at 44 stations in company with *C. litteratum*. We believe that *C. algicola* C. B. Adams 1845 (see American Seashells, pl. 19p) may be merely a form of this species, since intergrades exist at Grand Cayman. This entire complex is in need of more thorough study.

Genus BITTIUM Gray 1847

Subgenus BITTIOLUM Cossmann 1906

Bittium varium Pfeiffer 1840

Remarks.—Four live specimens were dredged in 8 feet of water among turtle-grass and gray mud in North Sound, off George Town Barcadere, Grand Cayman. Elsewhere in the West Indies and in southeast United States this is a common shallow-water species. Oddly enough, it was collected only at this one spot.

Genus ALABINA Dall 1902

Subgenus CALOOSALABA Olsson and Harbison 1953

Alabina adamsi Dall 1889

1889 *Bittium* (*Alaba*) *adamsi* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 258 (Hatteras, southward).

1953 *Alabina* (*Caloosalaba*) *adamsi* Dall, Olsson and Harbison, Monograph 8, Acad. Nat. Sci. Phila., p. 293, pl. 48, fig. 7.

Remarks.—This 4 mm.-long, white species was dredged in goodly numbers at 6 stations in depths from 8 to 25 feet over sand and grass in the lagoons facing the open ocean and off West Beach at Grand Cayman.

Subfamily **LITIOPINAE**

Genus LITIOPA Rang 1829

Litiopa melanostoma Rang 1829

Remarks.—This common, widely distributed, pelagic species was found dead on the beaches at Grand Cayman. Upon examining the types of *Litiopa effusa* C. B. Adams and *L. obesa* C. B. Adams, we find them to be young *Cymatium*.

Subfamily **CERITHIOPSINAE**

Genus ALABA H. and A. Adams 1853

Alaba incerta Orbigny 1842

1842 *Eulima incerta* Orbigny, [in Sagra] Hist. L'Ile de Cuba (French edition), vol. 1, p. 218, Atlas pl. 16, figs. 7, 9 (Jamaique).

1845 *Rissoa tervaricosa* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 6 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 34, fig. 3 (lectotype).

1850 *Rissoa* (?) *melanura* C. B. Adams, Contrib. to Conch., no. 7, p. 116 (Jamaica); Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 33, fig. 2 (holotype).

Description.—Shell 5 to 9 mm. in length, slender and elongate, thin, translucent, with 10 to 12 rounded whorls, and after the 4th or 5th whorl there may be developed, at infrequent intervals, 2 or 3 large, swollen, rounded varices on each whorl. First two nuclear whorls minute, smooth, glossy, tan to translucent white; next 2½ whorls slightly swollen blackish purple, glossy and with about 2 dozen, minute, sharp, axial riblets per whorl; later whorls flattish, glossy, smooth, except for weak incised lines just above the suture. Last whorls with about a dozen spiral incised lines which are more prominent on the base. Suture even, well-impressed. Outer lip simple, sharp, fragile. Columellar thin, almost straight, subtruncate below. Umbilicus absent or chink-like. Color in fresh specimens yellowish tan with weak, opaque-white or chestnut squarish dots; varices lighter in color. Dead or beachworn specimens translucent white. Many specimens have a distorted appearance due to the varices, and the angle of spire varies from 15 to 30 degrees. Operculum corneous, thin, paucispiral.

Range.—Bermuda, Bahamas, southeast Florida to the Lesser Antilles and Central America.

Remarks.—Dredged in 5 to 16 feet of water over sand among rocky rubble and "lichen-like" seaweed at 11 stations where it was abundant in the lagoons facing the open ocean at Grand Cayman. Orbigny's species was evidently based upon a young specimen of this very distinctive species. C. B. Adams' specimens were beachworn.

Genus SEILA A. Adams 1861

Seila adamsi H. C. Lea 1845

1840 *Cerithium terebrale* C. B. Adams, Boston Jour. Nat. Hist., vol. 3, p. 320, pl. 3, fig. 7 (New Bedford, Mass.). *Non* Lamarck 1804; Clench and Turner, 1950, Occ. Papers on Moll., Harvard, vol. 1, no. 15, p. 349, pl. 37, figs. 5-7 (lectotype).

1845 *Cerithium adamsii* H. C. Lea, Trans. Amer. Philos. Soc., 2nd series, vol. 9, p. 42 (new name for *C. terebrale* C. B. Adams).

1847 *Cerithium terebellum* C. B. Adams, Cat. Genera and Species Recent Shells (Middlebury, Vt.), p. 19 (new name for *C. terebrale* C. B. Adams).

Description.—Shell 5 to 11 mm. in length, very slender, with about 8 to 12 flat-sided whorls, each bearing 3 strong, raised, smooth spiral cords. Numerous microscopic axial threads present between the spiral cords. Outer lip fragile. Color dark reddish brown to light lemon-yellow.

Remarks.—The specimens from the mainland of United States, from Massachusetts to Florida and Texas are usually 8 to 11 mm. in length, dark reddish brown in color, and have slightly convex whorls and an indented suture. Many West Indian specimens, including all our Grand Cayman

specimens, are 5 to 7 mm. in length, lemon-yellow to light orange-brown in color, and the suture is difficult to discern. It is possible that the West Indian forms represent a distinct subspecies, but, at present, more material is needed before the question can be settled.

This species was dredged at 11 stations at Grand Cayman where it is uncommon at depths of 6 to 25 feet over sand bottom in the north half of North Sound, in Frank Sound and in Gun Bay.

Family **MATHILDIDAE**

Genus MATHILDA Semper 1865

Subgenus FIMBRIATELLA Sacco 1895

Mathilda barbadensis Dall 1889

1889 *Mathilda* (*elegantissima* var.?) *barbadense* Dall, Bull. 18, Mus Comp. Zoöl., "Blake Report", pt. 2, p. 266, pl. 26, fig. 10 (Barbados, 100 fms.).

Remarks.—A single dead specimen of what appears to be this species was dredged in 6 feet of water in South West Sound, Grand Cayman. We have compared it with Dall's holotype (Mus. Comp. Zoöl. no. 7457).

Family **TRIPHORIDAE**

Genus TRIPHORA Blainville 1828

Triphora turris-thomae Holten 1802

1802 *Turbo turris-thomae* Holten, Enumeratio Systematica Conchyl. beat. J. H. Chemnitz, p. 71, no. 963 (refers to Chemnitz, Conchyl.-Cab., vol. 11, fig. 3022 from St. Thomas); 1817, Dillwyn, Descr. Cat. Recent Shells, vol. 2, p. 873 (refers to same fig.); 1943, Winkworth, Proc. Mal. Soc. London, vol. 25, p. 146.

1850 *Cerithium mirabile* C. B. Adams, Contrib. to Conch., no. 7, p. 118 (Jamaica); 1950, Clench and Turner, Occ. Papers on Mollusks, Harvard, vol. 1, no. 15, pl. 38, fig. 1 (lectotype).

Description.—Shell 6 to 7 mm. in length, sinistral, elongate-fusiform, with 15 to 16 whorls, the last enwrapping two former siphonal canals. Aperture almost round. Nuclear whorls brown, three in number, with numerous, axial microscopic fimbriations and 2 fine spiral lines. Postnuclear whorls with 2 spiral rows of large, glossy, bulbous, closely-packed, rounded beads. The lower row crossed by a prominent spiral band of yellow-brown.

Remarks.—This is a moderately common West Indian species. We have examined Adams' type from Jamaica, and the Academy collection contains specimens from Bermuda; St. Thomas; Buccoo Reef, Tobago Island, and at 7 stations on Grand Cayman where it was dredged sparsely over sand in 6 to 30 feet of water in lagoons facing the open ocean at Frank Sound, Gun Bay and North Sound.

Triphora melanura C. B. Adams 1850

1850 *Cerithium melanura* C. B. Adams, Contrib. to Conch., no. 7, p. 117 (Jamaica);

1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 38, fig. 10 (lectotype).

Description.—Shell sinistral, 5 to 6 mm. in length, pure-white, except for the 4 brownish nuclear whorls which bear two spiral rows of microscopic beads and fine axial threads. Eleven postnuclear whorls white, with 3 crowded rows of small, roundish beads which are joined by weak spiral and axial cords. Sides of spire and whorls flattish to slightly convex. Aperture round.

Remarks.—This is a moderately common West Indian species ranging from Boynton Beach, Florida, (ANSP 150750) to Puerto Rico (Dall and Simpson 1901, p. 423). It was dredged at 6 stations on Grand Cayman over sand in water from 6 to 12 feet in depth. Olsson and Harbison (1953, p. 295) have made this species the type of their subgenus *Cosmotriphora*, but we have not attempted to ascertain the value of the higher categories in this family.

Triphora decorata C. B. Adams 1850

1850 *Cerithium decoratum* C. B. Adams, Contrib. to Conch., no. 7, p. 117 (Jamaica); 1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 38, fig. 2 (lectotype).

Description.—Shell sinistral, 7 to 19 mm. in length, with 12 to 16 flat-sided whorls which bear 3 spiral rows of small beads. Color whitish with 2 to 4 squarish, irregular patches of light-brown on each whorl.

Remarks.—This moderately common species ranges from Bermuda and southeast Florida to the Lesser Antilles. It was dredged dead and sparingly at 7 stations on Grand Cayman Island over sand in water from 6 to 18 feet in depth.

Three dead specimens of a related species, more nearly resembling *T. samanae* Dall 1889, were dredged at Grand Cayman. However, the maculations are axially narrower, usually lined up one under the other, and the beads are flattened so that they nearly touch each other. Their poor condition does not warrant their being described at this time.

Triphora intermedia C. B. Adams 1850

1850 *Cerithium intermedium* C. B. Adams, Contrib. to Conch., no. 7, p. 119 (Jamaica); 1950 Clench and Turner, Occ. Papers on Mollusks, vol. 1, no. 15, p. 293, pl. 38, fig. 9 (lectotype).

Remarks.—Single dead specimens were dredged in 6 feet of water over sand in Frank Sound and East Channel, Grand Cayman. This species resembles *T. decorata*, but is whitish, except for a pale, solid brown spiral line on the row of beads just below the suture. It is an uncommon West Indian species.

Family **JANTHINIDAE**

Genus JANTHINA Röding 1798

Subgenus JANTHINA Röding 1798

Janthina janthina Linné 1758

Remarks.—This common, widely distributed, pelagic species was found on the beaches at Grand Cayman. The upper part of the angular whorls are whitish purple, the basal half deep purple.

Subgenus JODINA Mörch 1860

Janthina exigua Lamarck 1816

Remarks.—Two specimens were washed ashore at South West Point, Grand Cayman. These species rarely exceed a length of ¼ inch, and are pure purple in color except for a lighter band at the suture.

Superfamily *EPITONIACEA*

Family **EPITONIIDAE**

Genus EPITONIUM Röding 1798

Subgenus EPITONIUM Röding 1798

Epitonium krebsi Mörch 1874 Plate 3o.

Remarks.—One specimen was dredged in grass and sand at 6 feet in Frank Sound, and two specimens near Boat Channel, North Sound, in 6 feet over sand and rock. Full descriptions of these Epitoniid species appear in Johnsonia (Clench and Turner, 1950).

Subgenus CYCLOSCALA Dall 1889

Epitonium echinaticostum Orbigny 1842

Remarks.—A dead specimen was dredged in mud at 5 feet in Duck Pond, North Sound, Grand Cayman.

Subgenus GYROSCALA de Boury 1887

Epitonium lamellosum Lamarck 1822

Remarks.—Single dead specimens were obtained in beach drift at Old Man Bay and Bodden Bay, Grand Cayman.

Subgenus ASPERISCALA de Boury 1909

Epitonium novangliae Couthouy 1838 Plate 2i.

Remarks.—Dredged sparingly at 4 stations from 6 to 30 feet at the Main Channel in North Sound; off Little Bluff; Frank Sound; and South West Sound. The largest specimen was 19 mm. in length.

Genus OPALIA H. and A. Adams 1853

Subgenus NODISCALA de Boury 1889

Opalia pumilio Möch, form **morchiana** Dall 1889

Remarks.—One dead specimen was dredged in 6 feet of water, ¾ mile west of Prospect, South West Sound, Cayman, and a second dead specimen in 6 feet of water off Rum Point, North Sound.

Subgenus DENTISCALA de Boury

Opalia crenata Linné 1758

Remarks.—A single dead specimen was found in 3 feet of water off Bowse Bluff, Grand Cayman.

Superfamily *HIPPONICACEA*

Family **HIPPONICIDAE**

Genus CHEILEA Modeer 1793

Cheilea equestris Linné 1758

Remarks.—This is a common southeast Florida, Bahama and Caribbean species which was found on rocks well below the tide mark at 4 stations on Grand Cayman.

Genus HIPPONIX De France 1819

Hipponix antiquatus Linné 1767

Remarks.—This common West Indian species was taken at 23 stations on Grand Cayman. A few were taken alive on rocks below low tide level on the reefs, but many dead specimens were dredged in sand from 5 to 30 feet of water. No specimens of the common *Hipponix subrufus* Lamarck were found.

Family **FOSSARIDAE**

Genus FOSSARUS Philippi 1841

Fossarus orbignyi Fischer 1864

1842 *Narica sulcata* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 17, fig. 28 (probably Cuba); 1842, not text, vol. 2, p. 39 which is a *Vanikoro*. Not *Phasianema* (= *Fossarus*) *sulcata* S. Wood 1842 or 1848.

1864 *Fossarus orbignyi* Fischer, Journ. de Conchyl., vol. 12, p. 256 (Cuba); refers to Orbigny, pl. 17, fig. 28; 1908, E. A. Smith, Proc. Mal. Soc. London, vol. 8, p. 111.

Description.—Shell 2.0 mm. in length, equally wide, moderately solid, pure-white except for the 3 pimple-like, reticulated, translucent-brown nuclear whorls. 3 postnuclear whorls strongly shouldered, the last bearing 6 to 7 strong, raised, squarish, smoothish spiral cords, between which are 3 to 4 microscopic threads. Umbilicus narrow, slit-like, fairly deep.

Remarks.—A few freshly dead specimens were dredged in 12 feet over sand in the South Channel, Gun Bay and in Bluff Bay, Grand Cayman. The Academy also has specimens from St. Thomas, Virgin Islands, Tobago, near Trinidad, Port Antonio, Jamaica, and East Colon Id., Bocos del Toro, Panama (T. L. McGinty!).

Family **VANIKOROIDAE**

Genus VANIKORO Quoy and Gaimard 1832

Vanikoro oxychone Möch 1877

1877 *Vanikoro oxychone* Mörch, Malakozool. Blätter, vol. 24, p. 94 (St. Thomas); 1900, Verrill and Bush, Trans. Conn. Acad. Arts Sci., vol. 10, p. 540, pl. 65, fig. 9.

Remarks.—A single dead specimen was dredged in 6 feet of water in sand in the channel leading into Bluff Bay. This species is known from Bermuda, southeast Florida to the Virgin Islands.

Superfamily *STROMBACEA*

Family **XENOPHORIDAE**

Genus XENOPHORA Fischer von Waldheim 1807

Subgenus XENOPHORA Fischer von Waldheim 1807

Xenophora conchyliophora Born 1780

1780 *Trochus conchyliophorus* Born, Testacea Musei Caesarei Vindobonensis, p. 333, pl. 12, figs. 21, 22 (Oceano Americano).

1943 *Xenophora trochiformis* Born, Clench and Aguayo, Johnsonia, vol. 1, no. 8, p. 2 (not Born 1778).

1954 *Xenophora conchyliophora* Born, Abbott, American Seashells, p. 173, pl. 5b (in color).

Remarks.—Two dead specimens were obtained on Grand Cayman. It is an infrequently collected species, although widespread from off Cape Hatteras, North Carolina, south to Brasil. The *Trochus trochiformis* of Born, 1778 (Index Rerum Nat. Mus Caesarei Vind., p. 355) refers to Knorr, pt. 3, pl. 29, figs. 1 and 2 which represents the Peruvian *Trochita radians* Lamarck.

A fragment of *Tugurium* (*Trochotugurium*) *longleyi* Bartsch was dredged in 10 fathoms in West Bay, Grand Cayman.

Family **STROMBIDAE**

Genus STROMBUS Linné 1758

Strombus gigas Linné 1758

Remarks.—The Queen Conch is common in 20 to 30 feet of water near the outer passes of North Sound where the water is clear and pure and where

the bottom is sandy with scattered eelgrass. Elsewhere on the island it is uncommon or absent. Young specimens up to an inch in length were dredged in 6 to 20 feet of water in Frank Sound and the sound at the east end. The old, heavy, discolored specimens are a form named *samba* Clench, and are probably not a distinct species, although they may be hybrids between *gigas* and *costatus* Gmelin. Great numbers of *gigas* shells have been exported to the United States, and the meat is eaten by the natives. Half-inch young *gigas* were dredged alive in 12 to 20 feet at the east and west ends of the island, which may suggest that adults may live in those vicinities or that the larvae floated around from the North Sound area.

Strombus costatus Gmelin 1791

Remarks.—The Milk Conch is moderately common in 20 to 25 feet of water near the outer passes of North Sound, and in West Bay and is found living with *S. gigas*.

Strombus raninus Gmelin 1791

Remarks.—Four dead shells were found on the beach near Georgetown at the west end by Mrs. Ruth Ostheimer. Salisbury (1953, p. 47) reports one dead specimen from the same area. This common West Indian species appears to be very scarce or no longer living on the island. This is true also of *Strombus pugilis* Linné.

Family **ERATOIDAE**

Subfamily **TRIVIINAE**

Genus TRIVIA Broderip 1837

Trivia quadripunctata Gray 1827

Remarks.—This common south Florida and West Indian species is moderately common at Grand Cayman where it was found on or near reefs in shallow water at 7 stations on all sides of the island.

Trivia suffusa Gray 1832

Remarks.—Two poor specimens, probably belonging to this species, were collected on the north shore of the island. The species is common in the Bahamas and Lesser Antilles.

Trivia pediculus Linné 1758

Remarks.—This common Florida and West Indies species is rare at Grand Cayman, 3 worn specimens being found at Old Man Bay on the north coast.

Family **OVULIDAE**

Genus CYPHOMA Röding 1798

Cyphoma gibbosum Linné 1758 Map 5.

Remarks.—This is the common West Indian Flamingo Tongue which lives on the Rough Sea-whip *Muricea muricata* Pallas. It is common in oceanic reef waters around Grand Cayman, and was collected at 17 stations, including Low Point; reef off Gorling Bluff; reef off Old Isaacs; Frank Sound; reef at West Channel in North Sound; and reef near Brinkleys on the north shore.

Family **CYPRAEAIDAE**

Genus CYPRAEA Linné 1758

Subgenus TRONA Jousseaume 1884

Cypraea zebra Linné 1758

Remarks.—This common south Florida and West Indian species was collected alive on a reef on the north shore just east of Brinkleys, Grand Cayman, where it is uncommon.

Subgenus LURIA Jousseaume 1884

Cypraea cinerea Gmelin 1791

Remarks.—This is a very common reef-dwelling cowrie all around Grand Cayman where it was collected at 16 stations. It ranges from the south half of Florida to the Caribbean.

Subgenus EROSARIA Troschel 1863

Cypraea spurca acicularis Gmelin 1791

Remarks.—This common southern Florida and West Indian species is uncommon at Grand Cayman where only 5 specimens were collected on the reefs at South Sound, Frank Sound, and the north shore at Brinkleys and Old Man Bay. *C. spurca spurca* Linné comes from the Mediterranean.

Superfamily *NATICACEA*

Family **NATICIDAE**

Subfamily **POLINICINAE**

Genus POLINICES Montfort 1810

Polinices lacteus Guilding 1834

Remarks.—This common West Indian species was dredged abundantly at 56 stations at Grand Cayman in protected, sand-bottomed areas facing the open ocean. It occurs from just below the low tide mark to a depth of 56 feet; those in waters below 20 feet are generally only 10 mm. in length.

Polinices hepaticus Röding 1798

1798 *Albula hepatica* Röding, Museum Boltenianum, p. 21, no. 249 (no locality; refers to Chemnitz, Conchyl.-Cab., vol. 5, figs. 1932, 1933 from the West Indies).

1807 *Natica brunnea* Link, Beschr. Natur. Samml., Rostok, p. 140 (no locality; refers to Chemitz, Conchyl.-Cab., vol. 5, figs. 1932, 1933 from the West Indies).

1822 *Natica mamillaris* Lamarck, Anim. sans Vert., vol. 6, pt. 2. p. 197 (L'Ocean des Antilles; refers to Lister, pl. 566, fig. 14; Chemnitz, Conchyl.-Cab., vol. 5, figs. 1932, 1933; Favanne, pl. 11, fig. H4). Not *Helix Mamillaris* Linné 1767.

Remarks.—A single dead specimen of this moderately common West Indian species was found on West Beach, Grand Cayman. It probably lives well below the intertidal area. This species is characterized by its solid, smooth shell, brownish to purplish tan or orange-brown color, deep umbilicus which is bordered by a white band and which is half-enclosed by a white callus.

Subfamily **NATICINAE**

Genus NATICA Scopoli 1777

Subgenus GLYPHEPITHEMA Rehder 1943

Natica floridana Rehder 1943 Plate 2d and e.

1943 *Glyphepithema floridana* Rehder, Proc. U. S. Nat. Mus., vol. 93, p. 196, pl. 19, figs. 19-21 (Peanut Island, Lake Worth, Florida).

Description.—Adult shell 15 to 22 mm. in length, superficially resembling the common *Natica canrena* Linné, but with a thicker, rough, axially fimbriated epidermis; without axial streaks of brown; possessing two broad, irregular, spiral bands of light brown, each bounded above and below by oblong (not arrow-shaped) small dark-brown spots; umbilical callus smaller and more centrally located within the umbilicus; operculum calcareous, outer side with 2 broad ribs, one very deep, wide furrow, and at the outer edge 2 small ribs (while in *canrena* there are about 9 almost equal-sized ribs).

Range.—Southeast Florida and Grand Cayman Island.

Records.—FLORIDA: Lantana (Frank Lyman). GRAND CAYMAN: Fisherman's Rock, 12 feet over sand (one live specimen); Georgetown Harbor, 48 feet over clear sand (one dead specimen).

Subgenus NATICA Scopoli 1777

Natica livida Pfeiffer 1840

1840 *Natica livida* Pfeiffer, Archiv. fur Naturgeschichte, vol. 6, p. 254 (Cuba). Not *Nerita laevida* Laskey 1811, nor *Natica livida* "Laskey" Tryon 1886, p. 37.

1850 *Natica jamaicensis* C. B. Adams, Contrib. to Conch., no. 7, p. 111 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 41, fig. 11 (lectotype).

Description.—Shell 7 to 17 mm. in length, solid, shining; characterized by the dark-brown nuclear whorl, by the large brown-stained callus which

nearly fills the umbilicus, by the microscopic, axial, obliquely slanting incised furrows just below the suture, and by the grayish white or lead color of the outer shell which may also bear light-brown spots and axial streaks. Operculum calcareous, glossy white, and with an arching, non-glossy, weak callus over the nuclear region.

Remarks.—This is a common south Florida and West Indian species which was dredged in moderate numbers at 25 stations at Grand Cayman. Always found in coarse sand with or without algae or rubble, and rarely in 2 feet of water; more commonly in from 6 to 50 feet of water near the open ocean.

Subgenus NATICARIUS Dumeril 1806

Natica canrena Linné 1758 Plate 2a and b.

1758 *Nerita canrena* Linné, Systema Naturae, 10th ed., p. 776, no. 623 (O. Asiae).
1954 *Natica canrena* Linné, Abbott, American Seashells, N. Y., p. 191, pl. 5-1 (in color).

Remarks.—Three dead specimens were obtained on one of the north shore beaches by Dr. H. G. Richards in 1952. This common West Indian species has not been taken alive at Grand Cayman as yet.

I have examined poorly preserved animals of both *N. canrena* (Lake Worth, Florida ANSP no. 205811) and *N. floridana* Rehder (Fisherman's Rock, Grand Cayman Island ANSP no. 205808), and although there is little doubt that they are specifically distinct, there are few characters that would justify recognizing Rehder's *Glyphepithema* as a full genus. The radular teeth are almost identical, with the exception that the two small cusps bordering the central cusp in the central tooth are proportionately smaller in *floridana*. The two oblong, golden-brown jaws are squarer in outline in *canrena*, but the denticles making up the jaw are the same in each species. The long slender tentacles of *canrena* show evidences of having had bright-red color bands, but those in *floridana* were either lost in preservation or are absent. The right tentacle of our specimen of *floridana* is much longer than the left one, but this may be an individual abnormality.

The ridges and other calcifications on the opercula of *canrena*, *floridana* and *iodopoma* Pilsbry and Lowe (the latter being the type of Rehder's *Glyphepithema*) show a rather natural and gradual transition in their strength of sculpturing, so that this character is probably not distinct enough to be used in separating genera. Rehder's *Glyphepithema* may, if one wishes, be retained as a subgenus of *Natica* or as a subgenus of *Naticarius*, if one wishes to consider the latter as a full genus.

Genus SIGATICA Meyer and Aldrich 1886

Sigatica semisulcata Gray 1839

1839 *Natica semisulcata* Gray, in the Zoology of Beechey's Voyage of the "Blossom", London, p. 136 (no locality).

1889 *Natica* (*Lunatia*) *jordiana* Simpson, Proc. Davenport Acad. Nat. Sci., vol. 5, p. 72 (Sarasota Bay, Florida).

Description.—Adult shell 8 to 10 mm. in length, pure white, resembling the common *Polinices lacteus* Guilding, but is broader, thinner shelled, without an umbilical callus, with a well-impressed suture, below which are 4 to 5 microscopic, incised, spiral lines.

Remarks.—This is an uncommon south Florida and West Indian species which was obtained only twice at Grand Cayman: West Bay in 60 feet over sand, and off Water Point, North Sound, dead in 10 feet over sand.

Superfamily *TONNACEA*

Family **CASSIDIDAE**

Genus *CASSIS* Scopoli 1777

Cassis tuberosa Linné 1758

Remarks.—This common West Indian Helmet Shell was collected alive in about a dozen feet of water in Frank Sound, Grand Cayman where it is uncommon. It is distinguished from *Cassis flammea* by its larger size, more triangular parietal shield, and reticulated sculpturing.

Cassis flammea Linné 1758

Remarks.—Two dead specimens were found on the beach at the west end of Grand Cayman where apparently it is rare.

Genus PHALIUM Link 1807

Subgenus SEMICASSIS Mörch 1852

Phalium cicatricosum Gmelin 1791

1787 (non-binomial) *Cassis cicatricosa* Meuschen, Mus. Geversianum, p. 392, no. 1290.
1791 *Buccinum cicatricosum* Gmelin, Systema Naturae, 13th ed., p. 3475 (India; refers to Meuschen, 1781, Zooph. Gronovianum, p. v, pl. 19, figs. 1 and 2).
1944 *Phalium* (*Semicassis*) *cicatricosum* Meuschen, Clench, Johnsonia, vol. 1, no. 16, p. 8, pl. 4, fig. 4.

Remarks.—A single dead specimen of the dwarf, nodulated form was collected at Brinkley's on the north side of Grand Cayman where it is probably rare or uncommon.

Genus CYPRAECASSIS Stutchbury 1837

Cypraeacassis testiculus Linné 1758

Remarks.—This well-known and widely dispersed West Indian and West African species is moderately common on the outer fringing reefs all around Grand Cayman. An excellent example of the form *crumena* Bruguière 1789 with strong axial folds was found alive on the reef west of Breaker Point on the south shore and off Chapel, West Bay.

Genus MORUM Röding 1798

Morum oniscus Linné 1767

Remarks.—This common and widely-dispersed species was found at 7 stations on the exposed outer, fringing reefs of Grand Cayman in company with *Cypraecassis testiculus*. For a detailed treatment of this species see Abbott 1943 (Johnsonia, vol. 1, no. 9, pp. 4-5, pl. 3).

Family TONNIDAE

Genus TONNA Brunnich 1772

Subgenus CADUS Röding 1798

Tonna maculosa Dillwyn 1817

Remarks.—The Atlantic Partridge Tun ranges from southern Florida to Brazil. It is common at Grand Cayman where the Ostheimers collected it at 6 stations at the north and east end of the island. Three live specimens were collected early in the morning in shallow water on the reef at Colliers Point. The foot of the animal is large, truncate in front, tapering to a point posteriorly, and with thin edges; upperside with heavy maculations of grayish purple; underside of foot plum purple. This is *Dolium perdix* of authors, not Linné 1758.

Family CYMATIIDAE

Genus CYMATIUM Röding 1798

Subgenus CYMATIUM Röding 1798

Cymatium femorale Linné 1758

Remarks.—A single, worn, beach specimen of the Angular Triton was obtained by Dr. Horace G. Richards. Elsewhere in the West Indies this is a moderately common species.

Subgenus LAMPUSIA Schumacher 1817

Cymatium pileare martinianum Orbigny 1845

1845 *Triton martinianum* Orbigny, [in Sagra], Historia Isla de Cuba (Spanish edition), vol. 5, p. 249 (Cuba, Guadeloupe, etc; refers to Lister, pl. 924, fig. 29 from Jamaica and to Chemnitz, Conchyl.-Cab., vol. 4, figs. 1248, 1249).

1954 *Cymatium* (*Lampusia*) *martinianum* Orbigny, Abbott, American Seashells, N. Y., p. 195, pl. 91 (in color).

Description.—1½ to 3 inches in length; old varices strong, beaded, and spaces ⅔ of a whorl apart. Spiral sculpture of a dozen or so squarish, irregularly-sized, weakly-beaded cords. Aperture orange-brown to reddish with the parietal wall dark-brown between the white, spiral teeth. Outer lip with about 7 pairs of cream-colored teeth. Periostracum thick, matted, with thin axial lamellae, from which arise numerous long, thick periostracal

hairs. Nucleus of 4 to 5 translucent, light-brown, smooth whorls. The nuclear apex is slightly tilted to one side. Operculum corneous, dark-brown, unguiculate.

Remarks.—We can find no important or consistent differences between the adult shells of *C. martinianum* of the West Indies and *C. pileare* Linné of the Indo-Pacific. However, in two specimens from Mauritius we find the nuclear whorls to be one-half the size of West Indian specimens, darker brown, and not gradually increasing in size, so that the nucleus resembles a nipple. As indicated by our dissections, there are minor radulae differences that may justify our keeping our Atlantic form subspecifically separate. Although the identity of Linné's *pileare* is questionable, we are accepting his sole figure reference (Gualtieri, pl. 49, fig. G) as the type figure. His locality of "Maris Mediterraneo" is probably erroneous. Chemnitz, Gmelin, Reeve, Kiener, Hanley, and most recent authors have followed the course of accepting the name *pileare* for the *Cymatium* figured in Kiener, vol. 7 (1842), pl. 7, fig. 1. *C. veliei* Calkins 1878, and *Dissentoma prima* Pilsbry 1945 are synonyms of the Western Atlantic species. *C. aquatile* Reeve 1844 from the Philippines appears to be a good species separable from *pileare*.

Range.—North Carolina to southeast Florida, Bahamas and the West Indies.

Records.—GRAND CAYMAN: reef at the west end of South Sound (one live specimen); coral reef flat at Frank Sound Passage (one live specimen). Both A. J. Ostheimer, III, 1952.

Cymatium nicobaricum Röding 1798

1798 *Tritonium nicobaricum* Röding, Museum Boltenianum, p. 126, sp. 1630 (refers to Martini-Chemnitz, vol. 4, figs. 1246 and 1247. Pacific).

1822 *Triton chlorostomum* Lamarck, Anim. sans Vert., vol. 7, p. 185 (Antilles); 1842, Kiener, Coq. Viv., vol. 7, Triton, pl. 12, fig. 2.

1954 *Cymatium chlorostomum* Lam., Abbott, American Seashells, N. Y., p. 196, pl. 25q.

Description.—Shell 20 to 80 mm. (¾ to 3 inches) in length; early whorls angulate; coarsely corrugated by spiral, noduled cords; varices spaced ⅔ of a whorl apart. Shell ash-gray with brown flecks and occasional spiral, narrow bands. Aperture orange with white teeth, which on the outer lip are 7 in number. The uppermost tooth is the only one divided. Nuclear whorls 5 to 6 in number, smooth, translucent, usually light-brown or tan, rarely darkish purple. Periostracum of numerous axial rows of long (3 mm.) chitinous, brown hairs. Operculum brown, corneous, unguiculate.

Remarks.—This is a relatively common West Indian species which is well-represented at Grand Cayman Island. We can find no consistent difference between the shells of Western Atlantic and Indo-Pacific specimens, and must regretably employ Röding's earlier name in place of Lamarck's well-known *chlorostomum*.

Range.—(Western Atlantic): Bermuda, southeast Florida, Bahamas and the Caribbean region. (Indo-Pacific): East Africa to the Hawaiian Islands.

Records.—GRAND CAYMAN: (all live specimens) reef flat between Old Isaacs and Gorling Bluff; 4 feet, sand and eelgrass, off Gorling Bluff; reef flat, off Colliers Point; 8 feet, eelgrass, center of Frank Sound; 5 feet, sand and eelgrass, east end of Frank Sound; 10 feet, sand, ⅓ mi. N.W. Water Point, North Sound; outer reef, South Sound; Old Man Bay, North coast; West Bay, south of Chapel.

Cymatium vespaceum Lamarck 1822

1822 *Triton vespaceum* Lamarck, Anim. sans Vert., vol. 7, p. 185 (no locality); 1842 Kiener, Coq. Viv., vol. 7, Triton, pl. 3, fig. 2 (Indian Ocean).

?1844 *Triton thersites* Reeve, Conch. Icon., vol. 2, Triton, pl. 13, figs. 48a, 48b (locality unknown).

1844 *Triton gracilis* Reeve, Conch. Icon., vol. 2, Triton, pl. 15, figs. 58a, 58b.

1954 *Cymatium* (*Lampusia*) *gracile* Reeve, Abbott, American Seashells, N. Y., p. 195, pl. 25n.

Description.—Shell small for *Cymatium*, usually 25 to 30 mm. (1 inch) in length (rarely 40 mm.), not as heavy as most *Cymatium*, slender, with a moderately high spire and equally long siphonal canal. Axial sculpture strongest and consisting of raised, noduled ribs. Spiral sculpture of numerous, finely beaded cords. Varices 1 or 2, rounded and crossed by 6 or 7 whitish, spiral cords, and rarely with 2 broad bands of light brownish orange or grayish blue. Peristome and teeth white. In typical *vespaceum* from the Pacific, the shell and nucleus may be purplish. Periostracum matted, with axial rows of hair-like bristles, and colored whitish tan to light-brown. 4 nuclear whorls tan, brown or purplish, smooth, elevated, not tilted, and succeeded by 5 corded postnuclear whorls which soon show axial ribs.

Remarks.—Young *nicobaricum* differ in having 3 strongly-beaded spiral cords on the early postnuclear whorls. The young of *krebsi* Mörch lack the strong axial ribs in the early postnuclear whorls, and its nucleus is fairly strongly tilted and proportionately smaller. In adult *krebsi*, the spiral cords on the last whorl are large and wide in comparison to those of *vespaceum*.

This is a variable species in the Indo-Pacific, both in color and sculpture, although in the Western Atlantic we have seen only the light-colored, more delicate form which Reeve named *gracile*. This species is rare in the West Indies.

Range.—(Western Atlantic) Greater and Lesser Antilles. (Indo-Pacific) Philippines to Hawaiian Islands.

Records.—GRAND CAYMAN: one live specimen on outer reef, South Bay. CUBA: Varadero Park, Cardenas. VIRGIN ISLANDS: St. Croix (all ANSP).

Subgenus GUTTURNIUM Mörch 1852

Cymatium muricinum Röding 1798

1798 *Distorsio muricina* Röding, Museum Boltenianum, p. 133, sp. 1676 (refers to Martini Conchyl.-Cab., vol. 3, figs. 1050, 1051).

1807 *Tritonium nodulus* Link, Beschr. Natur.-Sammlung, Rostok, p. 122.
1822 *Triton tuberosum* Lamarck, Anim. sans Vert., vol. 7, p. 185 (East Indies; refers to Martini Conchyl.-Cab., vol. 3, figs. 1050, 1051, Lister and others).
1842 *Triton antillarum* Orbigny, [in Sagra], Hist. L'Ile Cuba, vol. 2, p. 161, pl. 23, fig. 20 (Cuba, Martinique, etc.).
?1849 *Triton pyriformis* Conrad, Jour. Acad. Nat. Sci. Phila., vol. 1, no. 4, p. 211.
1954 *Cymatium (Gutturnium) muricinum* Röding, Abbott, American Seashells, N. Y., p. 196, pl. 25r.

Remarks.—One immature specimen of this rather common species was dredged in a few feet of water in Old Man Bay on the north coast of Grand Cayman. Shells from the Indo-Pacific and West Indies (Southeast Florida, Bermuda and the Caribbean) are alike. The 4 brown, smooth, bulimoid, large nuclear whorls tilt to one side rather strongly.

Subgenus TRITONISCUS Dall 1904

Cymatium labiosum Wood 1828

1828 *Murex labiosus* Wood, Supplement to Index Testac., pl. 5, fig. 18a (no locality).
1852 *Triton loroisi* Petit de la Saussaye, Jour. de Conchyl., vol. 3, p. 53, pl. 2, fig. 8 (Guadeloupe).
1954 *Cymatium (Tritoniscus) labiosum* Wood, Abbott, American Seashells, N. Y., p. 196, pl. 25m.

Description.—Shell small for a *Cymatium* (15 to 24 mm. in length), solid, broad, strongly shouldered and nodulated. Outer lip and varix flaring. Aperture proportionately small, with 6 strong white teeth on the outer lip. Color of shell ash-gray, yellowish, or dark purple-brown, rarely with 2 spiral bands of darker color. Nuclear whorls 4, bulimoid in shape, covered with a thin pustulated sheath of tan or reddish brown material in some specimens. First nuclear whorl with numerous axial riblets. Suture in nuclear whorls (when outer sheath is worn off) well-indented.

Remarks.—One young specimen of this uncommon West Indian species was dredged in a few feet of water in Gun Bay, East Sound, Grand Cayman Island. This species is also recorded from the Indo-Pacific (*C. rutilum* Menke 1843).

Genus CHARONIA Gistel 1848

Charonia variegata Lamarck 1816

1816 *Triton variegatum* Lamarck, Le Liste, p. 5, Encylcop. Meth., pl. 421, figs. 2, a. b (no locality); 1825, Blainville, Manuel de Malac. et Conchyl., p. 399, pl. 18, figs. 3, 3a; 1844, Reeve, Conch., vol. 2, fig. 3a (West Indies).
1822 *Tritonia atlantica* Bowdich, Elements of Conchology, Paris, p. 36, pl. 10, fig. 4.
1849 *Triton nobilis* Conrad, Proc. Acad. Nat. Sci. Phila., vol. 4, no. 6, p. 121, 1848 (West Indies); Aug. 1849, Jour. Acad. Nat. Sci. Phila., vol. 1 (series 2), p. 212.
1954 *Charonia tritonis nobilis* Conrad, Abbott, American Seashells, N. Y., p. 197, pl. 5f (in color).

Remarks.—A single specimen of this moderately common West Indian species was taken in Frank Sound, Grand Cayman. The West Indian spe-

cies is characterized by a dark chocolate-brown columella which is crossed by thin, raised, cream lines, by the strong, raised, pairs of " teeth " along the entire inner edge of the outer lip, and sometimes by the shouldering of the body whorl. The Indo-Pacific species is characterized by much wider, less raised, cream lines in the columella and by the absence of strong, paired " teeth " on the lower half or lower third of the outer lip.

Conrad's holotype of *Triton nobilis* is in ANSP no. 42537.

Family **BURSIDAE**

Genus BURSA Röding 1798

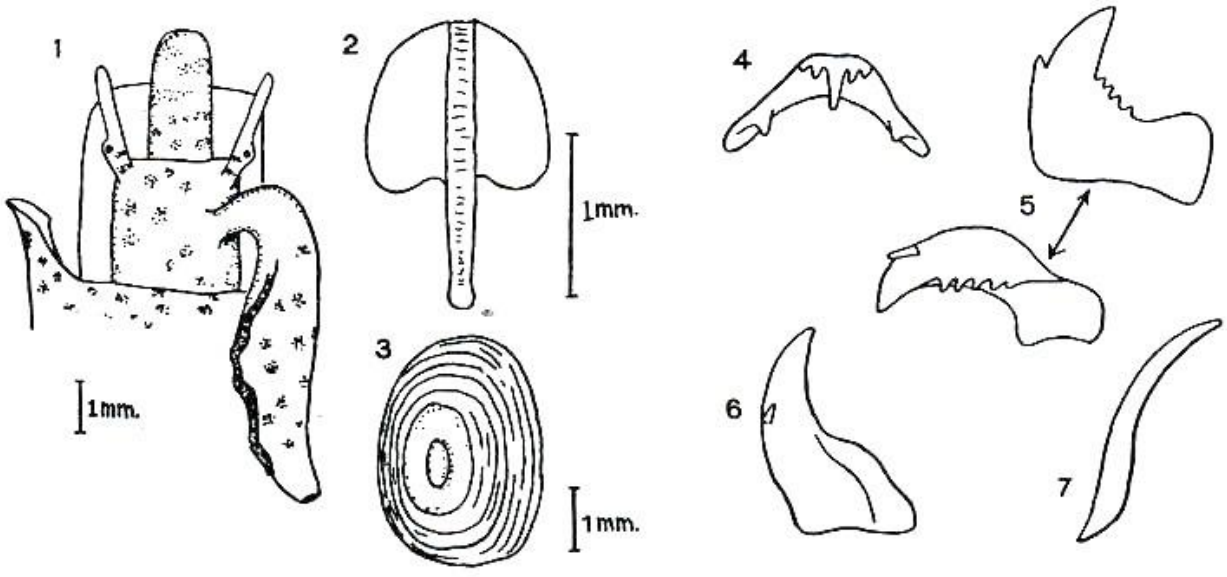
Subgenus BURSA Röding 1798

Bursa thomae Orbigny 1842 Text fig. 1; Plate 1j.

1842 *Ranella thomae* Orbigny, [in Sagra], Hist. L'Ile Cuba, vol. 2, p. 164, Atlas, pl. 23, figs. 23, 24 (l'ile Saint-Thomas).

1949 *Bursa (Bursa) thomae* Orbigny, Morrison, Annual Report Amer. Malac. Union of 1949, p. 10.

Description.—Shell small, 18 to 23 mm. in length, elliptical in apical view; varices two per whorl and lined up one below the other. Sculpture strong, with 3 large nodules at the periphery between the strong, swollen, beaded varices. Spiral sculpture of several strong, usually beaded cords. External color whitish to cream-brown with weak brownish flecks. Aperture round; peristome characteristically lavender or whitish purple with white, elongated, spiral teeth (8 to 9 on the outer lip). Posterior siphonal canal well-developed, partially closed, not appressed to the preceding whorl. Operculum thin, corneous, concentric with the nucleus near the center.



Text fig. 1. *Bursa thomae* Orbigny. Grand Cayman, ANSP no. 190501. 1, dorsal view of male animal. 2, odontophore. 3, outer surface of operculum. 4, central radula. 5, two views of lateral tooth. 6 and 7, inner and outer marginal tooth.

Animal preserved in alcohol colored cream with strong, large dots of maroon-red on the proboscis, tentacles, head and penis. Penis large, located behind the right tentacle, with a deep seminal groove running its length, and with a rounded distal end. In an 18 mm.-long shell, the radula ribbon was 1.6 mm. in length, delicate, clear, with a proportionately large attachment of wings, and with 80 to 85 transverse rows of teeth. Central with 2 strong basals, with a large central cusp which is flanked on each side by 3 strong, smaller cusps. See text figure 1.

Remarks.—This species is uncommon in both the West Indies and the Indo-Pacific. *Bursa rhodostoma* Sowerby 1841 from the Indo-Pacific is probably a different species.

Range.—(Western Atlantic) Southern Florida to Brasil. (Eastern Atlantic) St. Helena to the Cape Verde Islands. (Indo-Pacific) Mauritius to the Marquesas Islands.

Records.—GRAND CAYMAN: Old Crawl, north side, one live specimen on reef under rock (Ostheimer). FLORIDA: off Palm Beach, 30 fathoms, rocky bottom (T. L. Moise). SANTO DOMINGO: Puerto Sosua (W. J. Clench). VIRGIN ISLANDS: St. Croix (J. B. Thompson). Also *fide* Morrison (1949). BRAZIL: off Cape Roque. ST. HELENA. CAPE VERDE ISLANDS. *Indo-Pacific:* HAWAIIAN ISLANDS: off Waikiki, Oahu Island (D. Thaanum). MARQUESAS ISLANDS: Haavie Bay, Ua Huka Id. (H. A. Pilsbry). MAURITIUS.

Subgenus COLUBRELLINA Fischer 1884

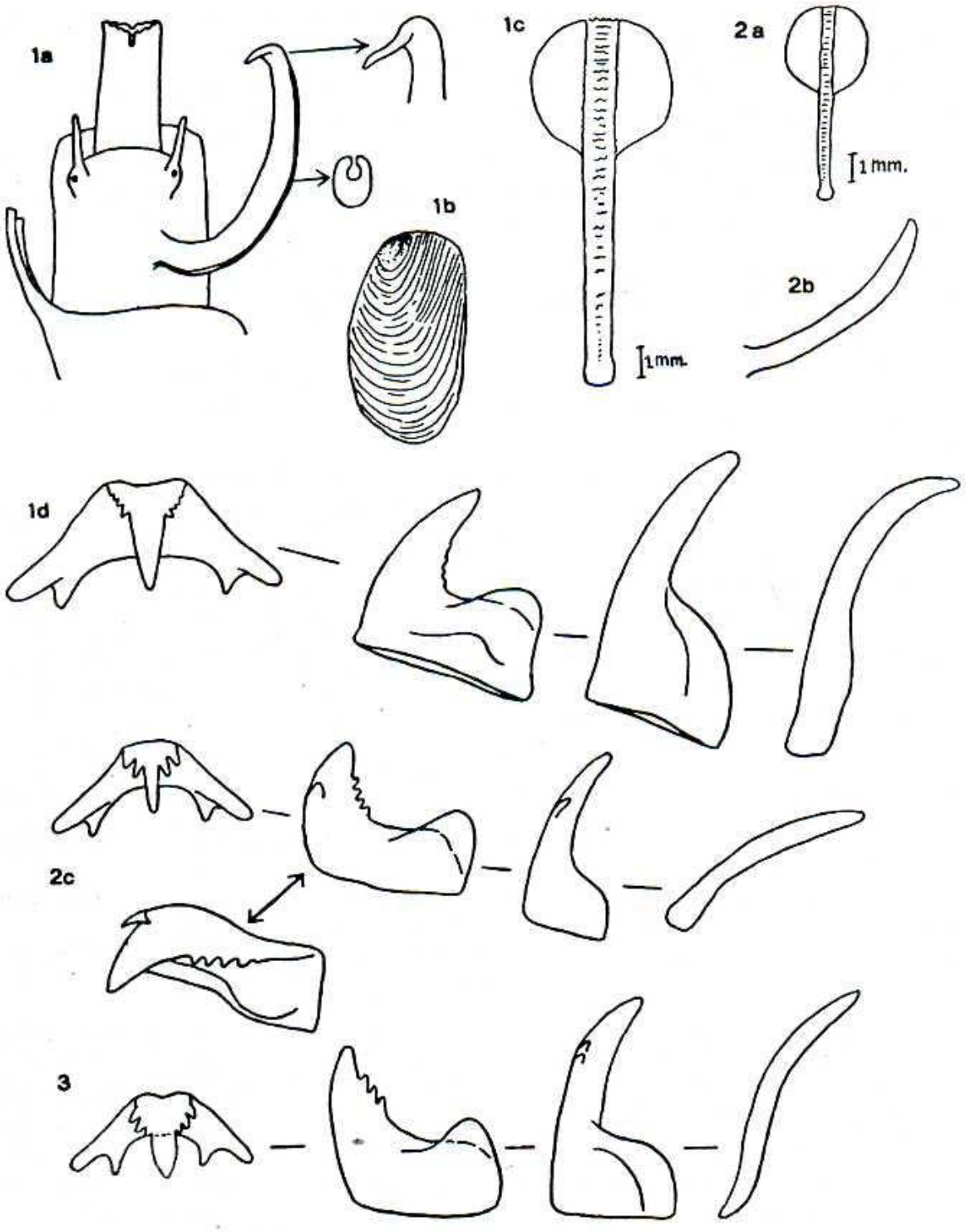
Bursa cubaniana Orbigny 1842 Text-fig. 2; Plate 1k.

1842 *Ranella cubaniana* Orbigny, [in Sagra], Hist. L'Ile Cuba, vol. 2, p. 165, pl. 23, fig. 24 (Cuba; Sainte-Lucie).

1949 *Bursa (Colubrellina) granularis* Röding, Morrison, Amer. Malac. Union Annual Report of 1949, pp. 10-12.

1954 *Bursa (Colubrellina) granularis* Röding, Abbott, American Seashells, N. Y., p. 198, but not pl. 25-0 which is *B. tenuisculpta*.

Description.—Shell 35 to 65 mm. (1½ to 2½ inches) in length, roughly sculptured, and slightly flattened laterally. Two strong, rounded varices per whorl are located one below the other. Just in front of each varix there is a thin, raised, crinkled, former outer lip. Spiral sculpture consists of about a dozen rows of beads or nodules of varying size. The row just above the periphery bears the largest nodules, usually 4 to 7 between each varix. Microscopic axial and spiral threads present. Aperture ovate, slightly trumpet-shaped, with a short, open posterior or anal canal, and a short, nearly closed, slightly recurved siphonal canal. Peristome glossy, cream to dark-tan, the parietal wall chocolate-brown. Columella and parietal region with broken, raised, whitish, spiral teeth, and rarely with pustules or beads. Outer lip reflected, glossy, sharp-edged, and with 13 to 16 (usually 14) whitish, raised teeth, but rarely with additional pustules. The upper 3 teeth are clumped together.



Text fig. 2. 1. *Bursa cubaniana* Orbigny. Grand Cayman, ANSP No. 197980. 1a, dorsal view of animal, also showing distal end and cross-section of penis. 1b, operculum. 1c, odontophore. 1d, radulae showing from left to right a central, lateral, inner and outer marginal tooth. 2. *Bursa granularis* Röding. Natal, South Africa, ANSP no. 209647. 2a, odontophore. 2b, penis. 2c, radulae. 3. Radulae of *Bursa corrugata* Perry. Grand Cayman, ANSP no. 197842.

Remarks.—Recent authors (Morrison 1949, and Abbott 1954) have previously considered *B. cubaniana* a synonym of the Indo Pacific *granularis*, but we believe that the two should be considered separate species on the basis of several anatomical and shell characters. We append below the synonymy of the Indo-Pacific species.

The Atlantic *cubaniana* Orbigny differs from the Pacific *granularis* in several important characters, although the shell shape and gross sculpturing, the operculum and nepionic whorls are very similar. The Atlantic species has a radular ribbon which is proportionately 2 to 2.5 times as large as that in the Pacific species from shells of the same size. The Atlantic radula is characterized by the absence of the 3 to 5 denticles and the subsidiary cusp on the lateral tooth, by the 3 to 4 weak (instead of 2 strong) denticles on each side of the central cusp of the central tooth, and by the absence of a small subsidiary denticle on the inner marginal tooth. The early postnuclear whorls of the Atlantic specimens bear microscopic axial threads which are as strong or stronger than the fine spiral threads, while in the Pacific specimens the spiral threads are nearly always strongest. In most, if not all, Atlantic specimens there is a grouping of 3 teeth on the upper lip, while in most Pacific specimens there are two. The penis of Atlantic males has a well-developed, elongate, flagellum at the distal end, while that of the Pacific species is merely rounded or slightly tapering. These comparisons were made on alcoholic specimens from Grand Cayman Island (Ostheimer) and Natal, South Africa (Virginia Orr, station 41).

This species is easily confused with *corrugata* Perry 1811 (*semigranosa* Lamarck 1822, *caelata* Broderip 1832, *ponderosa* and *pustulosa* Reeve 1844, and *caelata louisa* M. Smith 1948) which is also found in the West Indies. The differences are nebulous, particularly in the size of the nodules which tend to be larger in *corrugata*. However, the latter differs in having 8 to 10 teeth on the outer lip, instead of 13 to 16, in usually lacking the darker colored parietal wall, in having a uniformly colored orange to brownish orange outer surface, in having the early whorls decollate, and usually having a few fine pustules on the peristome. It is possible that *caelata* Broderip from Panama can stand as a good subspecies.

Range.—(Western Atlantic) Southeast Florida and the Caribbean.

Type locality.—Restricted here to Cuba (from Orbigny).

Records.—MEXICO: Vera Cruz. COSTA RICA. VIRGIN ISLANDS: St. Croix; St. Thomas. LESSER ANTILLES: St. Kitts: Barbados. GRAND CAYMAN: moderately common on reefs in shallow water at Prospect, South Sound, Boddentown, Gun Bay, Brinkleys, mouth of North Sound, and south of Chapel at the north end of West Bay (all ANSP).

Bursa granularis Röding 1798 Text-fig. 2.

1798 *Tritonium granulare* Röding, Museum Boltenianum, p. 127, no. 1641 (refers to Martini Conchyl.-Cab., vol. 4, figs. 1226, 1227, from Tranquebar, India).
?1811 *Biplex elegans* Perry, Conchology, pl. 3, fig. 3 (no locality).
1811 *Biplex rubicola* Perry, Conchology, pl. 3, fig. 5 (no locality).
1816 *Ranella granifera* Lamarck, Le Liste, p. 4 and Encyclopedie Methodique, pl. 414, fig. 4; 1822, Anim sans Vert., vol. 7, p. 133 (refers to Lister, Seba, etc. all of which are Indo-Pacific specimens). No locality.
1832 *Ranella affinis* Broderip, Proc. Committee Sci. Corresp. Zool. Soc., pt. 2, p. 179 (Oceano Pacifico. Annaa).
1844 *Ranella livida* Reeve, Conch. Icon., vol. 2, Ranella, pl. 6, fig. and species 28 (Annaa).
1862 *Bursa cumingiana* Dunker, Proc. Zool. Soc. London, for 1862, p. 239 (Nova Caledonia).

This is a sibling species from the Indo-Pacific which ranges from Natal to the Clipperton Islands. Its distinguishing characteristics are discussed above under *cubaniana*. Morrison (1949) put *semigranosa* Lamarck 1822 into the synonymy on this species, but it is probably, as Kiener has stated, the Panamanian subspecies of *corrugata* Perry 1811.

Bursa corrugata Perry 1811 Text-fig. 2; Plate 1i.

1811 *Biplex corrugata* Perry, Conchology, pl. 5, sp. 1 (no locality).
1822 *Ranella semigranosa* Lamarck, Anim. sans Vert., vol. 7, p. 153; Kiener, 1841, Coquilles Vivantes, vol. 7, p. 19, pl. 11, fig. 2 (Panama).
1954 *Bursa corrugata* Perry, Abbott, American Seashells, N. Y., p. 198, pl. 9k (in color).

Description.—Similar to *B. cubaniana*, but differing in having a decollate spire, having 8 to 10 (usually 9) major teeth on the outer lip, in having a proportionately smaller aperture, so that the siphonal canal seems longer, and in most cases having a uniformly orange-brown color to the outer shell. The Grand Cayman Island specimen has a darker brown peristome than the specimens of *cubaniana*. The radula is illustrated in text figure 2, and differs materially from that of *cubaniana*.

Remarks.—The synonym is listed in the remarks under *cubaniana*, although with larger geographical series we believe subspecies may be recogized. Morrison (1949) has employed Perry's name, and we are following him for convenience, although the Perry illustration leaves much to be desired. It shows 9 major teeth on the outer lip and is "reddish ochre" in color.

This is a rare species in the West Indies, and only one specimen was collected on the reef opposite the Old Crawl, near Brinkleys on the north side of Grand Cayman Island. With it were *B. cubaniana* and *B. thomae*.

Range.—(Western Atlantic) Southeast Florida and the Caribbean to Brasil. Also Eastern Atlantic and Eastern Pacific.

Records.—Santo Domingo: Puerto Plata (MCZ). Virgin Islands: St. Croix. Grand Cayman: Old Crawl (ANSP).

Order NEOGASTROPODA

Superfamily *MURICACEA* **Family MURICIDAE**

Subfamily **MURICINAE**

Genus MUREX Linné 1758

Subgenus PHYLLONOTUS Swainson 1832

Murex pomum Gmelin 1791

Remarks.—The common Apple Murex, so widely distributed in the West Indies (South Carolina to Trinidad and Panama) is evidently rare at Grand Cayman where one live specimen was collected at Low Point at the west end of the island and two others in North Sound over sand at a depth of 8 feet. It is common in nearby Cuba.

The shallow waters of Grand Cayman Island are wanting such common West Indian species of *Murex* as *brevifrons* Lamarck, *florifer* Reeve and *recurvirostris rubidus* F. C. Baker.

Murex margaritensis new name **Plate 1n and o.**

1831 *Murex imperialis* Swainson, Zoological Illustrations, ser. 2, vol. 2, p. and pl. 67 (Island of Margarita). [Non *M. imperialis* G. Fischer 1807, Mus. Demidoff, p. 198]; 1843, Kiener, Coquilles Vivantes, vol. 7, pls. 39, 40; 1845, Reeve, Conch. Icon., vol. 3, pl. 11, fig. 42.

1832 *Murex* (*Phyllonotus*) *imperialis* var. a, Swainson, Zoological Illustrations, ser. 2, vol. 3, p. and pl. 109.

1945 *Murex* (*Phyllonotus*) *pomum* Gmelin, Clench and Farfante (in part), Johnsonia, vol. 1, no. 17, p. 26.

Remarks.—In recent years this species from Isla Margarita, north coast of South America, has been synonymized with *pomum* Gmelin. It differs, however, in several important characters: it has 5 (rarely 6 or 4) varices per whorl (instead of 3 or 4 as in *pomum*), is proportionately wider with a shorter and broader siphonal canal; the latter bears one (rarely a second smaller) row of spines between the lower part of the varix and the end of the siphon, while in *pomum* there are generally two well-developed rows; there is usually one quite large nodule between the varices, while in *pomum* there are 2 to 4 smaller ones. The parietal wall is pale pink to pale yellow and lacking the concentrated brown patch at the posterior siphonal notch.

Kiener (1843) was the first to point out that this species is figured in Martini, Conchyl.-Cab., vol. 3, figs. 1024 and 1025. However, *M. imperialis* Swainson is the only name that has been associated specifically with these figures. Since this name is a homonym of *imperialis* Fischer 1807, we are proposing the new name *Murex* (*Phyllonotus*) *margaritensis*. Lister appears to have figured it on pl. 944, fig. 39a, and that figure should not be interpreted as being *pomum* (see Clench and Farfante's " type figure designation ", 1945, p. 27). *M. pomum* is figured by Lister on pl. 945, fig. 40

from Jamaica. The best of Gmelin's cited figures for *pomum* are Martini's 1021-23. It does not occur at Grand Cayman.

I have two specimens of *M. margaritensis* (ANSP no. 36079, R. Swift, Magarita Island) which have broad brown splotches on the parietal wall similar to those found in *M. regius* Wood from the Eastern Tropical Pacific. The latter has about 7 varices per whorl which bear open spines and have no intersticial nodules.

I believe it is very unwise to accept such names as *Phyllonotus, Chicoreus,* etc. on a generic level, and perhaps not even on a subgeneric level, because of the very nebulous characters which seem to appear in random combinations throughout the many recent and fossil species of *Murex.* The open, foliated spines of *Muricanthus* (*regius, radix, erythrostomus, fulvescens,* etc.) are well-developed in some specimens of "*Phyllonotus*" *pomum* from the West Indies. With regard to varices per whorl, they overlap from one species to another (none to 7). The radulae are of no better use.

The genotype of *Muricanthus* (*radix* Gmelin) is not very different conchologically from the genotype of *Hexaplex* (*foliacea* Perry 1811 = *cichoreus* Gmelin 1791). There are species which completely bridge the gap in their so-called generic characters, so that we are prone to abandon *Muricanthus* as a good subgenus.

Genus ASPELLA Mörch 1877

Subgenus ASPELLA Mörch 1877

Aspella paupercula C. B. Adams 1850 Plate 1m.

1850 *Murex pauperculus* C. B. Adams, Contr. to Conch., no. 4, p. 60 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, p. 323, pl. 39, fig. 16 (lectotype).

1853 *Triton cantrainei* Recluz, Jour. de Conchyl., vol. 4, p. 246, pl. 8, fig. 10 (Guadeloupe); 1854, Petit, Jour. de Conchyl., vol. 5, p. 156.

Description.—Shell usually 12 to 15 mm. in length (rarely 25 mm.). Resembling a small *Cymatium,* but without epidermis. The outer surface of the shell covered with a thin layer of white cellulose lime which under the microscope appears to be finely vermiculated. Color of shell white. Axial sculpture of 3 to 5 strong varices; in the early whorls smooth between the varices, in later whorls with 3 to 5 spiral cords which may be slightly nodulated. Nuclear whorls of 1½ turns, rather large, opaque white, glistening, with microscopic granulations. The top of the varices of the first postnuclear whorl extend up on to the last half of the nuclear whorl. Inside of outer lip with 3 to 6 denticles. Siphonal canal recurved, barely open along its length.

Remarks.—Dall (1889, "Blake Report", Bull. Mus. Comp. Zoöl., vol. 18, pt. 2, p. 206-210) introduced several old names of *Aspella* to the Western Atlantic fauna, but apparently only *paupercula* C. B. Adams is appropriate for any of our species. It is possible that *scalaroides* Blainville 1826

from the Mediterranean is our species, but a detailed anatomical study is needed. A second Florida species, *A. elizabethae* McGinty 1940 (Nautilus, vol. 54, p. 63) may be a malformed *paupercula* or a valid species. The latter ranges from off North Carolina to the Lesser Antilles.

Only four dead specimens were dredged in a few feet of water near reefs at Gun Bay and Gorling Bluff at the east end of the island, and at Boddentown on the south shore, Grand Cayman.

Genus MURICOPSIS Bucquoy, Dantzenberg and Dollfuss 1882

Muricopsis oxytatus M. Smith 1938

1816 *Murex hexagonus* Lamarck, Encyclop. Méth, pt. 23, le Liste, p. 5, pl. 418, figs. 3a, b (no locality). Non Gmelin 1791.

1938 *Murex hexagonus oxytata* M. Smith, Nautilus, vol. 51, no. 3, p. 89, pl. 6, fig. 6 (Pliocene, Clewiston and Recent, Florida).

1953 *Muricopsis hexagonus* Lamarck, Olsson and Harbison, Monograph 8, Acad. Nat. Sci. Phila., p. 247, pl. 37, fig. 4; Abbott, American Seashells, N. Y., p. 209, pl. 25h.

Description.—Shell 20 to 40 mm. in length, solid, elongate, with a high spire; with 6 to 7 narrow axial ribs which bear 5 to 6 rather long, pointed, anteriorly slit spines on the body whorl. Usually in the spire only one large spine appears midway between the indistinct suture. Siphonal canal long, slightly open along its length. Inside of outer lip with 3 or 4 small, raised, spiral teeth. Columellar lip slightly raised to form a weak shield. Operculum corneous, unguiculate, dark-brown. Color of shell usually dull white; rarely blushed with rose or yellow-brown.

Remarks.—Only a single dead specimen was collected on Grand Cayman (reef flat off Gorling Bluff). Elsewhere in the West Indies this species appears to be moderately common in water from 6 to 180 feet in depth over rocky bottom. It has not been recorded from Bermuda or the lower half of the Caribbean Sea. Since *hexagonus* Lamarck 1816 is a homonym (not Gmelin, 1791), the next available name, *oxytatus*, will have to be used.

Subfamily **PURPURINAE**

Genus DRUPA Röding 1798

Subgenus MORULA Schumacher 1817

Drupa nodulosa C. B. Adams 1845 Map 5.

Remarks.—Very common under intertidal rocks on reefs at 27 stations on Grand Cayman Island. The shell can be confused with *Engina turbinella*, although the latter often has a few white beads, and its parietal wall has many, tiny, well-defined, radiating, lirae.

Range.—Biscayne Bay, Florida, the Bahamas, Caribbean and south to Brasil.

Records.—FLORIDA: Ojus, Biscayne Bay (Paul McGinty); Key West; Tortugas (T. L. Moise). BAHAMAS: Bimini Id., New Providence Id., Berry

Id. CUBA: Habana (M. L. Jaume); Punta Alegre, Camaguey (H. A. Pilsbry); Cienfuegos. JAMAICA: (C. B. Adams, cotypes); HAITI: Yuma. SANTO DOMINGO: Puerto Sosua (W. J. Clench). VIRGIN ISLANDS: St. Thomas; St. Croix. LESSER ANTILLES: St. Kitts; Buccoo Reef, Tobago Id. (A. J. Ostheimer, 3rd). CARIBBEAN ISLANDS: Crab Cay, Old Providence Id. GRAND CAYMAN: 27 stations around the island (A. J. Ostheimer, 3rd). BRAZIL: Bahia (all ANSP).

Genus PURPURA Brugiuère 1789

Subgenus PURPURA Brugiuère 1789

Purpura patula Linné 1758

The common wide-mouthed Purpura of southeast Florida and the West Indies is common on the shore rocks at Grand Cayman.

Genus THAIS Roding 1798

Subgenus STRAMONITA Schumacher 1817

Thais rustica Lamarck 1822

Remarks.—This rock-dwelling, intertidal species is fairly common at Grand Cayman. Adults, and especially young, are apt to be confused with *Thais deltoidea,* but one or more of the following characters will generally identity *rustica:* spire greater than ⅓ the total length of shell; upper shoulder on outer lip finely crenulate; spiral teeth within the aperture usually present; upper third of parietal wall with spiral brown lines, sometimes closely packed together; adults with a narrow, whitish to bluish parietal wall. In contrast, *T. deltoidea* generally has the following characters: spire less than ⅓ the total length of the shell; upper shoulder on the outer lip almost smooth; spiral teeth within aperture rarely present; upper third of parietal wall with one to three large, solid, black-brown spiral bands; adults with a broad, whitish brown to weak rose parietal wall.

Thais haemastoma floridana Conrad 1837

Remarks.—A single, recently dead, specimen was collected on a reef in Frank Sound, Grand Cayman. It is strange that more specimens were not collected, since this is a common, widespread West Indian and Gulf of Mexico species.

Subgenus MANCINELLA Link 1807

Thais deltoidea Lamarck 1822

Remarks.—Although only collected in a few places, this species is fairly common on shore rocks at Grand Cayman. It ranges from Bermuda to Brazil. Distinguishing characters are listed under *T. rustica.* It is possible that Dillwyn's species *morbosa* (1817, Decr. Cat., vol. 2, p. 709, West Indies) is this species, but it would be best to allow it to remain a dubious name.

Family **MAGILIDAE**

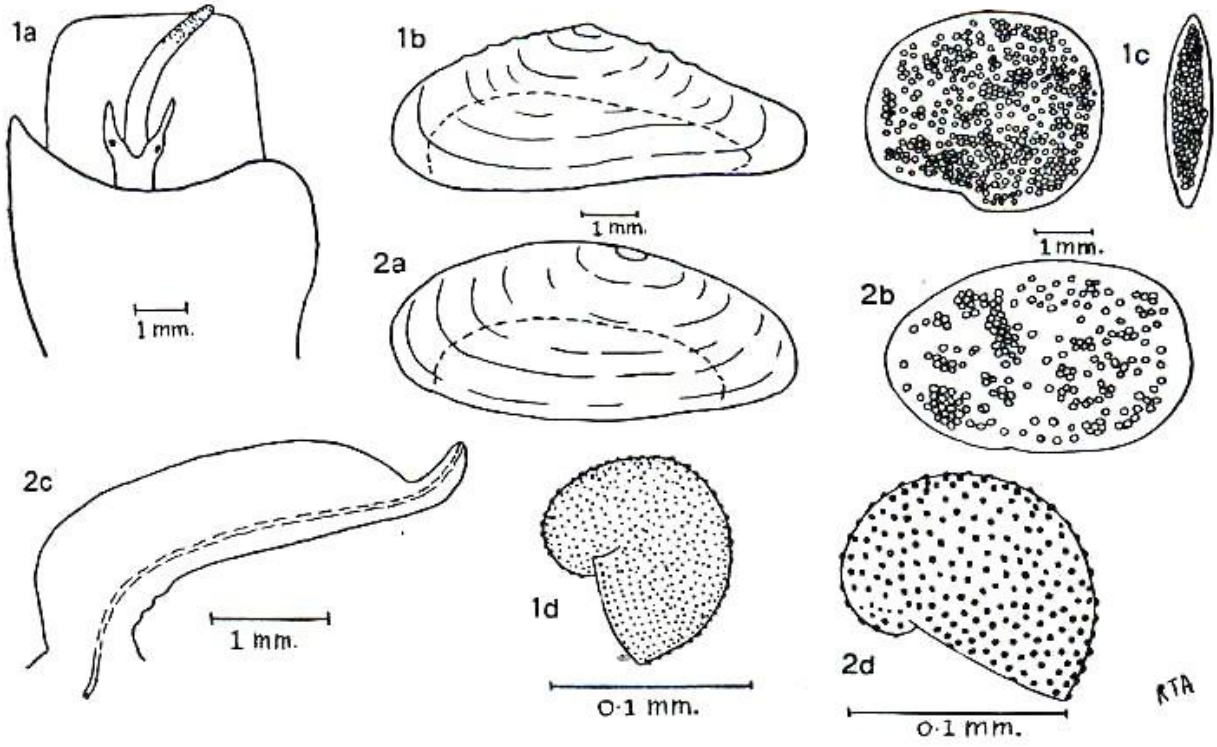
Genus CORALLIOPHILA H. and A. Adams 1853

Coralliophila abbreviata Lamarck 1816 Text-fig. 3; Plate 1e.

1816 *Pyrula abbreviata* Lamarck, Le Liste, p. 8; Ency. Method. (Vers), pl. 436, fig. 2a, 2b; 1822, Anim. Sans Vert., vol. 7, p. 146 (refers to Lister, pl. 896, fig. 16 and Chemnitz, Conchyl.-Cab, vol. 10, figs. 1518, 1519).

1846 *Purpura galea* " Chemnitz" Reeve, Conch. Icon., vol. 3, *Purpura*, pl. 12, fig. 65.

Description.—Shell about one inch in length (20 to 50 mm.), heavy, rotund, with rounded whorls, usually widely umbilicate, with numerous spiral, crowded, fimbriated cords, and sometimes weakly or rarely strongly plicated axially. Interior of aperture enamel white, usually tinted with yellow or orange, and usually with 6 to 12 weak or strong spiral ridges. Nuclear whorls 3, ending in a small, sharp, raised varix; glossy white, regularly increasing in size, with two spiral, finely beaded cords just above the suture, and with numerous even, axial riblets. Operculum chitinous, opaque, yellowish brown. Apparently no radula present. Verge small, meat-cleaver in shape, with a hooked end. Seminal groove open.



Text fig. 3. 1. *Coralliophila caribaea* Abbott. St. Thomas, Virgin Islands. 1a, dorsal view of mantle, head, proboscis and foot. 1b, operculum. 1c, side and end view of egg capsule. 1d, shell of veliger. 2. *Coralliophila abbreviata* Lamarck. St. Thomas, Virgin Islands. 2a, operculum. 2b, egg capsule. 2c, verge. 2d, shell of veliger.

Remarks.—This is the commonest *Coralliophila* in the West Indian region. It usually lives near coral, but rarely if ever within the bases of seafans as does *C. caribaea.* It ranges from southeast Florida and the Bahamas to the Lesser Antilles. The shape of the shell is very variable, but may

be distinguished from *caribaea* by its rotund shape, total lack of purple coloration within the aperture, and its yellow-brown, rather than wine-red, operculum. It was found to be abundant at 8 reef stations in shallow water around Grand Cayman Island.

C. abbreviata is related to the violet to whitish mouthed species of the Indo-Pacific which has a long synonymy, the earliest name apparently being *erosa* Röding 1798 based upon Chemnitz, Conchyl.-Cab., vol. 3, figs. 954, 955 (see also ibid., vol. 10, figs. 1577, 1578). The synonyms are *galea* Reeve 1846 (not Chemnitz), *Murex plicatus* Wood 1818 (not Gmelin 1791), *Murex neritoides* Gmelin 1791 (not Linné 1767), *Pyrula neritoides* Lamarck 1816 and 1822, *dorbignyanum* Petit 1851, *Purpura cantrainei* Montrouzier 1861, *exaratus* Pease 1861, *Purpura violacea* Kiener 1836, *Purpura diversiformis* Kiener 1836, *Pyrula deformis* Lamarck 1822, *Purpura squamulosa* Reeve 1846, *Purpura gibbosa* Reeve 1846, *Purpura bulbiformis* Conrad 1837 (type in ANSP no. 36799).

There appears to be two other species of *Coralliophila* in the Western Atlantic; but whether they represent ecological forms of one species or are actually distinct cannot be ascertained at present. Intergrades seem to exist between them. *C. scalariformis* Lamarck ranges from Florida and the Gulf of Mexico to the Virgin Islands. The type is figured in Kiener, 1836, Coq. Viv., vol. 8, *Purpura*, pl. 19, fig. 55. *C. mansfieldi* McGinty 1940 (Nautilus, vol. 53, p. 83, pl. 10 and vol. 63, p. 11, pl. 1) is probably this species, and tends to exhibit a great deal of variation in spinosity. The other species, found in deeper water, is *C. deburghiae* Reeve which Dall figured in Bull. 37, U. S. Nat. Mus., pl. 16, fig. 5. It probably belongs in the genus *Latiaxis* Swainson 1840.

Coralliophila caribaea new species Text-fig. 3; Plate 1g and h.

Coralliophila plicata of authors, not Wood 1818, Index Testaceologicus, p. 124, no. 56 (refers to Chemnitz, Conchyl.-Cab., vol. 3, fig. 954-955 which is *erosa* Röding from the Indo-Pacific); 1891, F. C. Baker, Proc. Acad. Nat. Sci., vol. 43, p. 60.
Coralliophila brevis of authors, not Blainville 1832 (Mediterranean).

Description.—Shell 15 to 26 mm. in length, moderately heavy, somewhat triangular in shape, strongly plicate, whitish, except for a purplish aperture, and with numerous, fimbriated spiral threads. Whorls about 8, angulate 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 to 40 degrees. Spiral sculpture of numerous, crowded, raised, finely fimbriated cords, those at the periphery and 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.

Measurements

Length	Width	
19.0 mm.	13.0 mm.	Holotype, ANSP no. 197054
25.0	17.0	Paratype, ANSP no. 29959 (St. Thomas)
13.5	9.0	Paratype, ANSP no. 29958 (Key West)

Type locality.—Vera Cruz, Mexico. Collected by Angelo Heilprin and F. C. Baker, April 1890.

Types.—Holotype, ANSP no. 197054. Paratypes from the type locality, ANSP no. 61054. Other paratypes cited in the locality records below.

Range.—Southeast Florida and the Caribbean.

Records.—(All ANSP paratypes) FLORIDA: 30 fms. off Palm Beach, T. L. Moise, coll. (194091); Key West, H. Hemphill (29958). HAITI: La Gonave Island (36673). JAMAICA: Port Antonio (36673). VIRGIN ISLANDS: St. John (196367); St. Croix (29962); St. Thomas (29959). GRAND CAYMAN: near Georgetown (190548); Gun Bay Reef (197056); off Little Bluff (197055). LESSER ANTILLES: Buccoo Bay, Tobago, A. J. Ostheimer, 3rd. (195857). Mus. Comp. Zool. paratypes no. 133415 from Montaloa Bay, Puerto Rico; no. 38548 from Nassau, New Providence Id., Bahamas.

Remarks.—This is the common *Coralliophila* of southeast Florida and the West Indies which is characterized by its triangular shape, its relatively narrow aperture which is either white or weakly tinted with violet, by its angular nodulated (rarely spined) shoulder, and by its elongate, arched, wine-red operculum. It occurs in nests under or in the holdfast of seafans. I can find no adequate figure of this species in the literature, although *Murex plicatus* Wood 1825 (*non* Wood 1818 and *non* Gmelin 1791) from the East Indies, *Purpura brevis* Blainville 1832 (p. 233, pl. 11, fig. 10) from the Mediterranean, and *Purpura costata* Blainville 1832 (p. 231, pl. 11, fig. 8) from Mazatlan all approximate it. I doubt if this species is an ecological form of the variable *deburghiae-scalariformis* complex of the West Indies.

Coralliophila aberrans C. B. Adams 1850 Plate 1f.

1850 *Purpura aberrans* C. B. Adams, Contrib. to Conch., no. 4, pp. 58-59 (Jamaica); 1950 Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 32, fig. 9 (holotype).

?1882 *Trophon lintoni* "Verrill and Smith" Verrill, Amer. Jour. Sci., ser. 3, vol. 24, p. 365 (70 fms. off Martha's Vineyard); 1884, Trans. Conn. Acad. Arts. Sci., vol. 6, p. 176, pl. 29, fig. 1; 1889, Dall, Bull. 37, U. S. Nat. Mus., pl. 44, fig. 1.

Coralliophila bracteata lamellosa Philippi, of authors, not of Philippi.

Remarks.—A single inch-long example was taken alive on the reef in Frank Sound, Grand Cayman. The shell is white within and without, and

does not appear to be the same species as *C. caribaea*, although it may possibly be a form of *scalariformis* Lamarck. It is remarkably close to *C. lintoni* Verrill which we believe is probably a synonym of *aberrans*. *Murex meyendorfii* Calcara 1845, a *Coralliophila* from the Mediterranean, is extremely close and may prove to be our West Indian species. This species and *aberrans* are sometimes put in the genus *Pseudomurex* Monterosato 1872, but we have no specimen with a perfect nucleus with which to ascertain its validity.

Superfamily *BUCCINACEA*

Family **COLUMBELLIDAE**

Genus COLUMBELLA Lamarck 1799

Columbella mercatoria Linné 1758

Remarks.—This very common and widely dispersed species (Bermuda, North Carolina to Brasil) is abundant in nearly all shallow water and sandy regions around Grand Cayman. It was found at 51 stations, ranging in depth of water from low tide mark to 20 feet.

Genus ANACHIS H. and A. Adams 1853

Subgenus COSTOANACHIS Sacco 1890

Anachis hotessieriana Orbigny 1842

1842 *Columbella hotessieriana* Orbigny, [in Sagra] Moll. L'Ile Cuba, Atlas, pl. 21, figs. 37-39; 1845, *hotessieri* Orbigny, Spanish edition, p. 234 (Guadeloupe); 1853, French edition, vol. 2, p. 138.

1846 *Colombella pretrii* Duclos, in Chenu, Illustr. Conchyl. (vol. 4), pl. 16, figs. 7, 8. (no locality).

1850 *Pleurotoma albella* C. B. Adams, Contributions to Conchology, no. 4, p. 63 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., p. 251, pl. 29, fig. 2 (holotype).

1861 *Columbella iontha* Ravenel, Proc. Acad. Nat. Sci. Phila., vol. 13, p. 42 (Charleston Bar, South Carolina).

Description.—Shell 4.5 to 6.0 mm. in length, slender, with 6 whorls, strongly plicate, with a high spire, and colored gray to white with varying degrees of light-brown mottlings. Apical whorl smooth, brownish white, later whorls glistening smooth, with about 14 strong, rounded, axial ribs per whorl with interstices of the same size. On the last whorl, the ribs disappear just below the periphery. Varix considerably swollen, smooth and broad. Spiral sculpture of fine, distinct, incised lines on the base of the shell, but sometimes over the entire whorls and ribs. Outer lip roundly notched posteriorly, sinuate, sharp, often stained brown, and with 4 to 6 strong denticles within. Height of aperture less than that of the spire. Columella arched, microscopically pimpled. Siphonal canal short, usually stained brown at the end. Parietal callus slightly raised. Suture broadly to moderately indented. Color variable, but usually yellow-cream to white, with sparse or heavy, light-brown mottlings, rarely broadly banded or solid orange-brown.

Remarks.—This is a moderately common Florida and West Indian species. It is moderately common at Grand Cayman where it was dredged at 17 stations, all over sand and grass between 5 and 20 feet of water. *C. acuta* Stearns 1873 (Proc. Acad. Nat. Sci. Phila., vol. 25, p. 345 from Egmont Key, Florida) is probably a synonym also. *Anachis albella samanensis* Dall 1889 ("Blake Report", Bull. Mus. Comp. Zoöl., vol. 18, p. 188) appears to be a form of this species. Orbigny's *hotessieriana* is an unusually strongly, spirally striate form which occasionally occurs in Cuba and Grand Cayman Island, but does not, in our opinion, represent a species distinct from the smoother forms.

Subgenus ANACHIS H. and A. Adams 1853

Anachis catenata Sowerby 1844

1844 *Columbella catenata* Sowerby, Proc. Zool. Soc. London, 1844, p. 52 (no locality); 1844, Thesaurus Conchyl., vol. 1, pl. 49, fig. 171.

Description.—Shell 8 to 10 mm. in length, moderately slender, with a high spire and with 16 to 19 prominent, rounded axial ribs per whorl; interstices smooth. Color of shell variable, usually whitish with heavy mottlings of brown-yellow, but sometimes with a few small bars or spots of color. Base of shell with about a dozen small spiral threads. Apex smooth, brownish. Shell with a thin, rough periostracum, glistening smooth underneath.

Remarks.—This species resembles a "many-ribbed" specimen of *C. avara* Say of eastern United States. It is fairly common in the West Indies and Bermuda. Sowerby's figure happens to be an abnormally colored specimen, of which we have a few examples from the Lesser Antilles. Only four living specimens were dredged in 5 feet of water off Governor's Creek, North Sound, Grand Cayman.

Genus *NITIDELLA* Swainson 1840

Nitidella nitida Lamarck 1822

1822 [August] *Columbella nitida* Lamarck, Anim. sans Vert., vol. 7, p. 295 (Antilles).
1822 [Sept.] *Columbella nitidula* Sowerby, Genera Rec. and Foss. Shells, pt. 9, pl. 248, fig. 7 (no locality).
1823 *Voluta gracilis* Dillwyn, in Index to Martin Lister, Barbados; refers to Lister, pl. 827, fig. 49b.

Diagnosis.—Shell 10 to 15 mm. in length, resembling an *Olivella*, elongate, glistening smooth, with slightly rounded shoulders, and a flat-sided, pointed spire. First nuclear whorl translucent-while, second whorl purplish brown, followed by smooth whorls which are fawn to yellow-brown with white mottlings and small roundish white splotches. Outer lip with about 7 weak, small teeth. Base of columella with 2 small spiral white plicae within. It differs from *N. laevigata* Linné which is generally shouldered and bears a half dozen spiral, incised lines at the base.

Remarks.—This common Florida and West Indian species has been known by most workers as *N. nitida* Lamarck, a name we consider to be the

earliest valid one available. According to Hanley (1855, p. 257) Linné's *Buccinum nitidulum* 1758 is unrecognizable. Dall in his various works and Abbott (American Seashells, p. 222, pl. 25dd) use the name *nitidula* Sowerby, apparently without justification. Single examples were found on Cayman near reefs at Boddentown, Brinkleys, Collier's Point, and Old Man Bay. Elsewhere in the West Indies and Florida it appears to be much more common. *N. laevigata* Linné was not found at Grand Cayman Island.

Genus MITRELLA Risso 1826

Subgenus MITRELLA Risso 1826

Mitrella idalina Duclos 1840

1840 *Colombella idalina* Duclos, Hist. Nat. Coq. Univ., pl. 9, figs. 5, 6; 1846 in Chenu, Illust. Conch., *Colombella*, pl. 9, figs. 5, 6 (no locality).

Remarks.—A single, broken example of this attractive, fragile *Columbella* was dredged in 4 feet of water in the lagoon off Gorling Bluff, eastern Grand Cayman. The apex is pointed, rose in color, with the remaining whorls translucent yellowish brown. The periphery of the last whorl bears alternating white and brownish spots. The species is known also from Cuba and the Virgin Islands.

Subgenus COLUMBELLOPSIS Bucquoy, Dautzenberg and Dollfus 1882

Mitrella fenestrata C. B. Adams 1850 Plate 3n.

1842 *Colombella fusiformis* Orbigny [in Sagra], Hist. L'Ile Cuba, Moll., Atlas, pl. 21, figs. 25-27 (Martinique et la Jamaique); 1845, Spanish text, p. 233; 1853, French edition, vol. 2, p. 136. Non Anton, 1839, p. 88.

1850 *Columbella fenestrata* C. B. Adams, Contr. to Conch., no. 4, pp. 57-58 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., vol. 1, no. 15, p. 280, pl. 41, fig. 2 (holotype).

Description.—Shell 6 to 8 mm. in length, very slender, its pointed, flat-sided, smooth spire about ⅔ the entire length of the solid, thick shell. Varix large and swollen, inside with one strong and 4 or 5 weaker teeth. Columella with 4 or 5 tiny nodules caused by the 6 or 7 spiral cords on the base of the shell. Periphery of whorl slightly angular. Color white to grayish with large, irregular patches of light-brown above the periphery of the whorl, and with sparse flames of tan on the base.

Remarks.—An uncommon species found from southern Florida to the Lesser Antilles. Single fresh specimens were dredged in 5 to 16 feet of water over grass and sand at 10 stations in lagoons facing the open ocean.

Genus PSAROSTOLA Rehder 1943

Psarostola monilifera Sowerby 1844

1844 *Columbella monilifera* Sowerby, Thesaurus Conchyliorum, vol. 1, p. 144, pl. 49, fig. 177 (West Indies).

1850 *Pleurotoma maculata* C. B. Adams, Contrib. to Conch., no. 4, p. 62 (Jamaica);

1850, Clench and Turner, Occasional Papers on Moll., Harvard, vol. 1, no. 15, pl. 29, fig. 3 (lectotype).

?1943 *Psarostola monilifera sparsipunctata* Rehder, Proc. U. S. Nat. Mus., vol. 93, no. 3161, p. 198, pl. 20, fig. 11 (45 fms. S. E. of Fowey Light, Florida).

Description.—Shell 4 to 5 mm. in length; with 7 whorls, the nucleus of 1½ white, glossy, smooth, rather swollen whorls, abruptly giving way to the strongly beaded postnuclear whorls (3 spiral rows on the first 2 whorls, 4 spiral rows on the penultimate, and 9 on the last). The beads are formed by the intersection of low axial ridges (12 to 14 on the last whorl) and low spiral cords. Color whitish with varying degrees of spotting, which usually consists of spirally elongate bars on the beads located in the first 3 spiral rows below the suture, and some on the base of the shell. Some specimens pure white, others with few spots (form *sparsipunctata*). Aperture elongate, narrow and slightly S-shaped; and with a strong posterior, rounded canal, below which there are 3 to 4 strong denticulations on the inside of the thick lip.

Remarks.—An anatomical study would determine the relationship of *Psarostola* to *Nassarina* Dall 1889 and *Zanassarina* Pilsbry and Lowe 1932. *P. fredbakeri* Pilsbry and Lowe from the Pacific side of Central America is very close to *monilifera*. It is not impossible that *Psarostola* belongs to the Mangelid turrids.

Rehder separated his *sparsipunctata* on the basis of sparse spotting with "only the two upper cords are furnished with short spots", but we have Florida specimens with spotting on the three upper cords. There seems to be considerable variation in the degree of spotting which does not, at present, show any special geographical distribution. *Pleurotoma minor* C. B. Adams is an allied West Indian species.

P. monilifera was dredged sparsely at 10 stations at Grand Cayman.

Genus PYRENE Röding 1798

Pyrene ovulata Lamarck 1822

1822 *Columbella ovulata* Lamarck, Anim. sans Vert., vol. 7, p. 295 (no locality); 1841, Kiener, Coq. Vivantes, vol. 9, p. 40, pl. 14, fig. 3 (no locality).

1840 *Conella picata* Swainson, Treatise on Malacology (in D. Lardner), p. 312, fig. 17a (no locality).

1850 *Columbella ovuloides* C. B. Adams, Contr. to Conch., no. 4, p. 53 (Turks Id., Bahamas); 1950, Clench and Turner, Occ. Papers Moll., vol. 1, no. 15, p. 321, pl. 41, fig. 4 (lectotype).

Description.—Shell 12 to 17 mm. in length, solid, ovoid with a rounded shoulder; spire concave with a papillate nucleus of 3 or 4 smoothish milk-white whorls. Spiral sculpture of minute cords, except on the periphery of the whorls. Color of shell black to brown (orange-tan in beachworn specimens) with sparse, white streaks or splotches. Aperture long, narrow, bluish white, with a dozen, faint spiral lirae inside the outer lip. Columella and parietal wall smoothish. Periostracum rather thick, axially laminate, especially at the top of the whorls.

Remarks.—An uncommon species of limited range. This and *P. dormitor* Sby. 1844 are probably the only two living representatives of Pyrene in the West Indies.

Range.—Bahamas, Greater and Lesser Antilles and the lower Caribbean.

Records.—BAHAMAS: Arthurstown, Cat Island (W. J. Clench); Long Island (W. J. Clench). GRAND CAYMAN: uncommon on reefs at Red Bay, Boddentown, and off North Sound. CUBA: Havana (M.C.Z.). VIRGIN ISLANDS: St. Croix. LESSER ANTILLES: St. Martin; Barbados. CARIBBEAN ISLANDS: Crab Cay, Old Providence Id. (C. C. G. Chaplin); Swan Id. (M.C.Z.).

Family **BUCCINIDAE**

Genus BAILYA M. Smith 1944

Bailya parva C. B. Adams 1850

1847 *Triton parvus* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 228 nude name; 1850, Contributions to Conch., no. 4, pp. 59-60 (Jamaica); 1950, Clench and Turner, Occ. Paper Moll., Harvard, vol. 1, no. 15, p. 322, pl. 40, fig. 12 (lectotype).

Description.—Shell 10 to 15 mm. in length, elongate, subfusiform, with 6 slightly shouldered whorls. Nuclear whorl rapidly increasing in size, smooth, translucent-white. Postnuclear whorls with 12 to 14 long, narrow, rounded, small ribs which are crossed (in the early whorls) by about 10 smaller, raised, squarish, spiral cords which are slightly swollen as they cross the axial ribs. Varix thin, rounded, rather highly developed. Outer lip strong, finely crenulate. Posterior canal bordered by an enlarged denticle on each side. Siphonal canal short, open. Color of shell whitish with sparse red-brown mottles or broken bands.

Range.—Bahamas, Greater and Lesser Antilles.

Records.—GRAND CAYMAN: dredged singly in 5 to 6 feet on sand at Frank Sound, East Sound, North Sound and Pease Bay lagoon.

Genus ENGINA Gray 1839

Engina turbinella Kiener 1836

1836 *Purpura turbinella* Kiener, Coquilles Viv., vol. 8, *Purpura*, p. 29, pl. 9, fig. 25 (locality not stated; refers to Lister, pl. 953, fig. 3 from Barbados).

1954 *Engina turbinella* Kiener, Abbott, American Seashells, N. Y., p. 232, pl. 25w.

Description.—Shell 10 to 15 mm. in length, black (or brown in beach-worn specimens) with about a dozen distinct white patches on the nodulated periphery of the whorls, and 2 to 3 rows of small white beads on the concave base. Outer lip thickened and bearing 5 or 6 small teeth, the two at the center being largest and close together. Base of columella with two slanting, glossy whitish plicae. Glossy parietal wall with 3 to 5 beads and above with fine radiating wrinkles. Nuclear whorls 1½, smoothish, except for microscopic granulations, translucent white brown maculations or all brown. First post-nuclear whorls with 3 rows of neat, round, white beads (about 15 per whorl).

Remarks.—This species is found in the lower Florida Keys, Bahamas and the Caribbean. It was moderately common at 9 stations on shallow reefs to 4 feet around Grand Cayman.

Genus COLUBRARIA Schumacker 1817

Colubraria obscura Reeve 1844 Plate 1-l.

1844 *Triton obscurus* Reeve, Conch. Icon., vol. 2, *Triton*, pl. 17, fig. and sp. 63 (East Indies).
1852 *Epidromus testaceus* Mörch, Cat. Conchyl. Yoldi, p. 107 (refers to Bonanni, pt. 3, fig. 48?). Nomen dubium.
1877 *Triton (Colubraria) testaceum* Mörch, Malakozool. Blätter, vol. 24, p. 25 (St. Thomas, St. Croix, etc.).

Remarks.—With a larger series than Mörch had before him, we are unable satisfactorily to separate the Western Atlantic and Indo-Pacific representatives of this species, and, therefore, adopt Reeve's name for our relatively common West Indian *Colubraria*. Two specimens were obtained by the Ostheimers on a reef off Gun Bay, East Channel, Grand Cayman. This species occurs in Bermuda, the Bahamas and Greater and Lesser Antilles.

Colubraria lanceolata Menke 1828

1828 *Ranella lanceolata* Menke, Synopsis Method. Moll., p. 87 (Puerto Rico).
1954 *Colubraria lanceolata* Menke, Abbott, American Seashells, N. Y., p. 232, pl. 25x.

Remarks.—A single specimen of this attractive Dwarf Triton was obtained on one of the north shore beaches by Mrs. James Bond of Philadelphia in January 1957.

Genus PISANIA Bivona-Bernardi 1832

Pisania pusio Linné 1758

1758 *Murex pusio* Linné, Systema Naturae, 10th ed., p. 754, no. 490 (Mediterraneo; refers to Bonanni, pl. 40 and Gualtieri, pl. 52, fig. 1). Not *M. pusio* Gmelin 1791.
1778 *Murex accinctus* Born, Index Rerum Nat. Mus. Caesarei Vind., p. 317, (no locality; refers to Martini, Conchyl.-Cab., vol. 4, fig. 1219).
1791 *Buccinum plumatum* Gmelin, Systema Naturae, 13th ed., p. 3494, no. 108 (insulis Americae; refers to Lister, pl. 822, fig. 41; Martini, Conchyl.-Cab., vol. 4, figs. 1218-1220; and Knorr, vol. 4, pl. 21, fig. 6.
1798 *Tritonium accinctum* Röding, Museum Boltenianum, p. 125, no. 1617 (refers to Martini, figs. 1218, 1219).
1807 *Buccinum fasciatum* G. Fischer, Museum Demidoff, Moscow, p. 177 (refers to Martini, vol. 4, figs. 1218-1220). Non Müller 1774.
1822 *Fusus articulatus* Lamarck, Anim. sans Vert., vol. 7, p. 132, no. 33 (no locality; refers to Encyclop., pl. 426, fig. 1, a, b).
1954 *Pisania pusio* L., Abbott, American Seashells, N. Y., p. 233, pl. 13-o.

Description.—Adult shell 20 to 50 mm. in length (those at Grand Cayman usually 30 mm.), solid, glossy, and smoothish. Apex half the length of the entire shell with an angle of about 45 degrees. Nuclear whorls 2, slightly

swollen, glossy smooth, translucent tan with a narrow spiral band of chocolate-brown near the periphery; first three postnuclear whorls opaque, and with 3 spiral rows of distinct but small beads; remaining whorls with about a dozen spiral threads of varying sizes which become obsolete in the last whorl. Aperture rather large, ovate, with a poorly developed posterior siphonal notch created by the 1 or 2 strong teeth on the upper part of the parietal wall. Outer lip with strong tooth-like crenulations on the lower half, and with about 15 spiral, smooth lirae within the aperture. Varix behind outer lip sometimes considerably swollen. Parietal shield slightly developed, highly glazed. Anterior siphon short, rather wide and open along its length. Base of columella with a small, low spiral tooth. Color of shell very variable from slate gray to light brownish olive, rarely dark chestnut-brown, over which are several spiral rows of small, squarish dark-brown spots which are placed on lighter spiral color bands. The periphery of the whorl usually bears a wider, whitish color band. Operculum corneous, thick, unguiculate and black-brown.

Remarks.—There has been some question as to the exact identity of *pusio* Linné, but from the original description, Hanley's remarks about the types (Ipsa Linnaei Conchylia, London, 1855, p. 304), and subsequent treatment by later authors, it would appear wisest that the name be retained for our Western Atlantic *Pisania* as illustrated by Kiener (Coquilles Viv., *Fusus*, 1840, pl. 26, fig. 2) and Abbott (American Seashells, pl. 13o).

This is a common shallow-water, reef-dwelling species on Grand Cayman where it was obtained at 13 stations, usually under rocks, but also dredged over sand near rocks in 3 to 8 feet of water. About 10 percent of the 50 collected specimens were pure black except for a light peripheral band on the body whorl. The species is found in southeast Florida, the Bahamas and the Caribbean area.

Genus CANTHARUS Röding 1798

Subgenus POLLIA Sowerby 1834

Cantharus (Pollia) auritulus Link 1807 Plate 2p.

1807 *Nassaria auritula* Link, Beschr. Natur.-Sammlung, Rostok, p. 124 (refers to Martini, Conchyl.-Cab., vol. 4, figs. 1148, 1149).

1822 *Buccinum coromandelianum* Lamarck, Anim. sans Vert., vol. 7, p. 270 (refers to Martini Conchyl.-Cab., vol. 4, figs. 1148, 1149; Coromandel, near Tranquebar).

Description.—Upper end of aperture flaring upward; 10 to 11 axial ribs prominent and crossed by strong spiral threads which form weak nodules; lower half of white columella with 3 to 5 fairly strong, spiral, glazed plicae. *C. tinctus* differs in being more elongate, with 12 to 14 weak, axial ribs and with more numerous, weaker spiral threads, in not being prominently flaring at the top of the aperture, and in having much weaker plicae on the lower half of the columella. Radula alike in both species.

Remarks.—There are several unanswered questions concerning the generic and specific standing of this rather common West Indian mollusk. Although the earliest writers attributed this species to the Indian Ocean,

later workers have construed Martini's figures 1148 and 1149 to be the Western Atlantic species. It is probably wisest to continue the present usage of *auritulus* Link. Intergrades exist in the shells of *auritulus* and *tinctus* Conrad 1846 in southern Florida, Bermuda (*bermudensis* Dall and Simpson 1901), the Bahamas and in a few places in the Lesser Antilles. Until larger collections and radular studies are made, the relationships of these forms will remain uncertain. The generic position is more confusing. The radula of the genotype of *Cantharus, tranquebaricus* Gmelin 1791, from the Indian Ocean is unknown. The teeth of *auritulus, tinctus* and *fumosus* Dillwyn (Indo-Pacific) are almost alike, but differ from the genotype of *Pollia* (*undosus* Linné) of the Indo-Pacific in having no small denticles on the inner edge of the lateral tooth. It is likely that the *auritulus* group is subgenerically distinct from *Pollia* sensu stricto, but the radula of *tranquebaricus* must be known before *Pollia's* true relationship with *Cantharus* is understood.

This species is found in Bermuda, Boynton Inlet, Florida, Bahamas, and south through the Antilles to Brasil. At Grand Cayman it was common at 11 reef stations on all sides of the island.

Family **NASSARIIDAE**

Genus NASSARIUS Dumeril 1806

Nassarius albus Say 1826 Plate 3r.

?1799 *Buccinum ambiguum* Pulteney, Cat. Birds, etc. Dorset, p. 42 (Weymouth, Portland and north shore at Poole). Non Solander 1766, in G. Brander, p. 28, 30.

1826 *Nassa alba* Say, Journal Acad. Nat. Sci. Phila., vol. 5, p. 212 (east coast of Florida and West Indies).

?1842 *Nassa antillarum* Orbigny, [in Sagra] Hist. L'Ile Cuba, Atlas, pl. 23, figs. 1-3; 1845, Spanish edition, p. 236 (Cuba, Santo Tomas, etc.).

1842 *Nassa candei* Orbigny, idem, pl. 23, figs. 4-6; 1845, Spanish edition, p. 236 (Guadeloupe).

1845 *Buccinum candidissimum* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 2 (Jamaica). Lost type rediscovered and returned to Harvard in 1956.

1953 *Nassarius* (*Uzita*) *floridensis* Olsson and Harbison, Monograph 8, Acad. Nat. Sci. Phila., p. 225, pl. 33, figs. 5, 5a (St. Petersburg, Pliocene).

1954 *Nassarius ambiguus* Montagu, Abbott, American Seashells, N. Y., p. 238, fig. 53a.

Description.—Shell 8 to 14 mm. in length, 6 to 7 whorls, solid, rotund, rarely shouldered, white or rarely with spiral lines of red-brown flecks. Axial ribs prominent, rounded, 10 to 18 per whorl, crossed on the body whorl by 15 to 20 small, raised, squarish, spiral cords. Parietal callus usually well-developed. Varix swollen, within bearing 5 to 7 strong, elongate teeth. Parietal shield with several raised pustules. Nuclear whorls 1½, smooth, slightly bulbous, opaque-white. Suture wavy, finely and well indented.

Remarks.—This is the common and morphologically very variable *Nassarius* of Bermuda, southern Florida, Bahamas and the West Indies which

has been formerly called *N. ambiguus* Montagu or *N. ambiguus* Pu
These two names are homonyms of *Buccinum ambiguum* Solande
There appears to be little doubt from the original description that
Nassa alba is this species, although the type has not been found
Academy collection. There is some question whether *antillarum* O
is a form of *vibex* Say or *albus* Say. We cannot see any significant
ence between *albus* and *floridensis* Olsson and Harbison 1953.

This species was taken in nearly all dredging hauls at Grand C
wherever there was a sand bottom and a depth of water of from 5 to
Most Cayman specimens taken at 50 stations were pure white in co
was the only species of this genus found on this island.

Family **FASCIOLARIIDAE**

Genus FASCIOLARIA Lamarck 1799

Fasciolaria tulipa Linné 1758

Remarks.—Four live specimens were obtained in shallow water
east end of Grand Cayman. The body whorl is smooth, except
strong, subsutural, incised lines and rows of beads. This species app
be uncommon here, although abundant in other areas in the West
and Florida. It is illustrated on pl. 13b in American Seashells (
1954).

Genus LATIRUS Montfort 1810

Subgenus POLYGONA Schumacher 1817

Latirus trochlearis Kobelt 1876 Text-fig. 4;

1876 *Turbinella trochlearis* Kobelt, Syst. Conchyl.-Cab., vol. 3, pt. 3a, p. 79, pl.
1 and 2 (St. John, Virgin Islands).

Remarks.—Two small, but apparently adult, specimens were colle
Frank Sound and at Collier's Point, on Grand Cayman. They diff
the typical *trochlearis* figured by Pilsbry in 1939 (Nautilus, vol. 52,
84, pl. 5, fig. 7) in being smaller (32 mm. in length), with more
axial ribs and shoulders, and in having a smaller umbilicus. The
brown axial color bars fill the interstices between the axial ribs. Th
character is absent in *L. mcgintyi* Pilsbry 1939 from Florida and el
in the West Indies. More material is needed to substantiate our su
that *mcgintyi* and our Cayman specimens are subspecies of the
trochlearis. For an illustration of *mcgintyi*, see Abbott, America
shells, pl. 11b. We have figured a radula from one of Grand Cayma
mens (ANSP no. 196414).

Latirus (Polygona) virginensis new species Text-fig. 4;

Description.—Shell 30 to 37 mm. in length, elongate, fusiform,
ately heavy, yellowish brown, and with strong axial, rounded ribs w

characteristically white in color. Whorls 8, bearing 8 to 9 strong rounded axial ribs which begin rather well below the fimbriated suture. They are usually white in color, especially in the early whorls and are crossed by 4 or 5 moderately developed, rounded spiral cords. These cords are almost obsolete between the ribs. Spire acute, slightly less than half the total length of the shell. Siphonal canal long, open along its length. Lower half of white columella with 4 to 5 weak, slanting, spiral plicae. Upper and inner corner of aperture with a strong bulbous callus and a weak posterior canal. Inside of last whorl with about 9 fine, sharp spiral cords which end in two or three pustules. Lowest pustule usually very large. Outer lip finely crenulated. Nuclear whorls smoothish, somewhat swollen. Periostracum yellowish brown, thin, axially crinkled, and covering the axial, shelly fimbriations just below the suture.

Operculum corneous, dark-brown, ungulate, smoothish on the outer side, except for distinct growth lines. Radular teeth strong, with a squarish central which has a thin base and 3 fairly strong cusps, the center one being the largest. Lateral tooth long, strongly arching with 9 long, comb-like cusps. There is a small subsidiary cusp at each end of the whole tooth.

Measurements

length	width	no. of whorls	
34.0 mm.	13.0 mm.	7.0	Holotype, ANSP no. 196459
36.0	13.0	7.5	Paratype, ANSP no. 34968
30.0	12.0	8.0	Paratype, ANSP no. 34969

Types.—The type locality is St. Thomas Island, Virgin Ids., R. Swift, collector. The holotype is ANSP no. 196459; 2 paratypes from St. Thomas, R. Swift (ANSP no. 34975); 2 paratypes also from St. Thomas, R. Swift (ANSP no. 34968 from which the radula was taken); and 4 paratypes without locality data (ANSP no. 34969).

Remarks.—This species was not obtained at Grand Cayman. Specimens in the Academy collection were erroneously labelled by G. W. Tryon, Jr. as "*infundibulum* Gmelin, young", "*fastigius* Reeve" and "*attenuatus* Reeve" *L. virginensis* resembles *L. infundibulum* Gmelin in shape (see American Seashells, pl. 11a), but differs in being smaller, in having white axial ribs in the early whorls, in having 4 to 5 spiral cords crossing the ribs (instead of 3 distinct, sharp, brown ones), and in having a strong tooth at the lower outer corner of the aperture. The spiral ribs in *virginensis* are usually obsolete between the ribs, and, in some specimens, may be weak on the axial ribs of the last whorl.

Range and records.—Known only from the Virgin Islands.

Genus FUSILATIRUS McGinty 1955

?1884 *Dolicholatirus* Bellardi; type: *Latirus bonni* Michelotti.

1955 *Fusilatirus* McGinty, Proc. Acad. Nat. Sci. Phila., vol. 107, p. 79; type by original designation: *F. pauli* McGinty 1955.

Fusilatirus cayohuesonicus Sowerby 1878 Text-fig. 4.

1878 *Latirus cayohuesonicus* Sowerby, Proc. Zool. Soc. London for 1878, p. 796, pl. 48, fig. 4 (Key West).

Description.—Adult 10 to 17 mm. in length, resembling a miniature *Latirus infundibulum* Gmelin, (see American Seashells, pl. 11a), fusiform, dark chocolate-brown in color, with 7 to 8 large, rounded axial ribs per whorl; spiral sculpture of several raised, strong, smoothish major cords (5 to 6 in the spire) between which may be a minor, spiral thread; axial sculpture of microscopic growth lines. Aperture small, ovate, dark-brown, with a sharply raised parietal wall bearing three strong, whitish teeth, the lowermost sometimes being obsolete, and all running perpendicular to the axis of the shell. Posterior siphonal notch small, but distinct. Inside of body whorl with 4 to 5 raised, whitish, spiral plicae. Anterior siphonal canal moderately long and nearly closed, its left edge continuous with the parietal shield. Periostracum dark-brown, moderately thick, and with fine axial threads.

Operculum corneous, light-brown, unguiculate, its exterior with crinkly, raised growth lines. Inner area of muscular attachment small, smoothish and sunken. Radula small and delicate, with a squarish, thin central which bears 3 cusps, the middle one being very long. Laterals highly modified, being long and fang-like with 2 cusps, one of which is small and delicate. We have figured the radula from a Grassy Key, Florida, specimen.

Type locality.—Key West, Florida (J. Cosmo Melville).

Range.—Florida and Bahamas to the Virgin Islands.

Records.—FLORIDA: Key West (H. Hemphill); Grassy Key (T. L. McGinty). BAHAMAS: Brown's Point, New Providence (Paul Ford); Abaco Island. GRAND CAYMAN: reef off Gorling Bluff (A. J. Ostheimer, 3rd). VIRGIN ISLANDS: St. Thomas Island (R. Swift); Guana Id., Tortola (M.C.Z.).

Remarks.—The radulae of *F. pauli* McGinty is similar to this moderately common, shallow-water species. They are the most highly modified of the Fasciolariidae radulae, and somewhat resemble those of Vasidae. It would be interesting to know whether the egg capsules of these species resemble those of *Latirus* of *Vasum*.

Genus LEUCOZONIA Gray 1847

Subgenus LEUCOZONIA Gray 1847

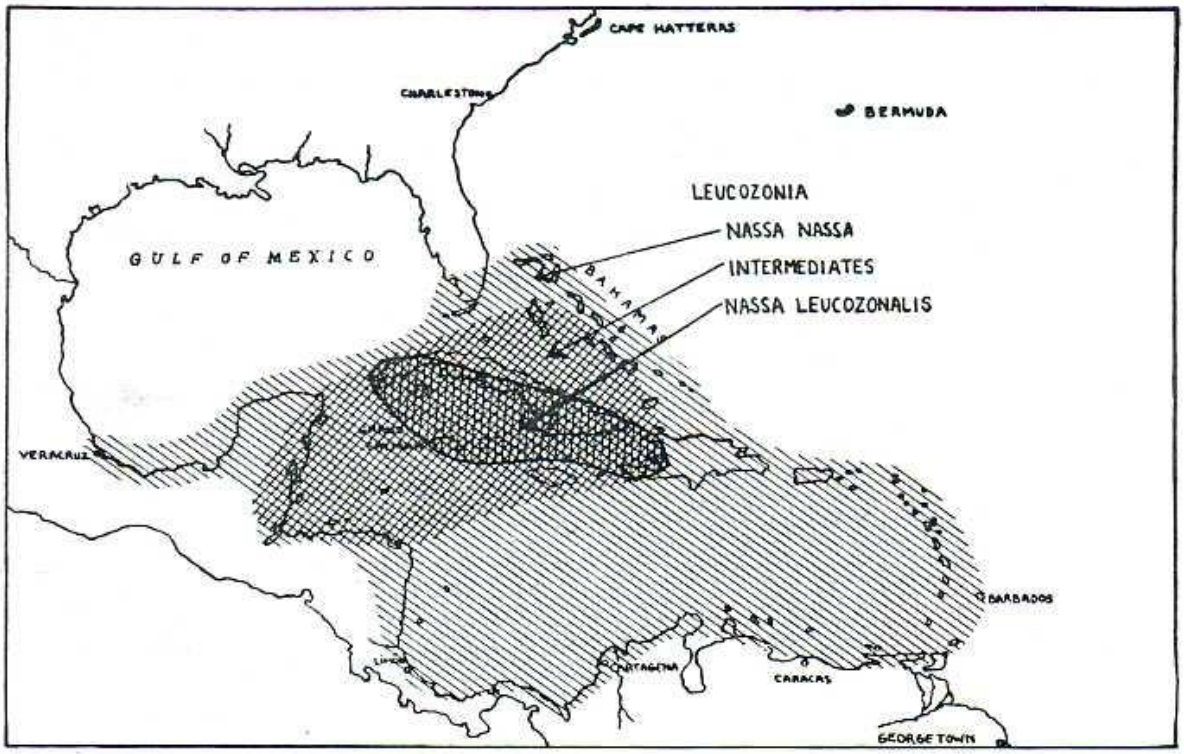
Leucozonia nassa nassa Gmelin 1791 Text-fig. 4; Plate 2m.

1791 *Murex nassa* Gmelin, Systema Naturae, ed. 13, p. 3551, no. 93 (locality unknown; refers to Lister, pl. 828, fig. 50, Martini, Conchyl.-Cab., vol. 4, figs. 1131-34, and others).

1954 *Leucozonia nassa* Gmelin, Abbott, American Seashells, N. Y., p. 240, pl. 11d (in color).

The typical subspecies of this common West Indian gastropod is apparently absent on Grand Cayman. Its synonymies include *Voluta fuscata* Gmelin 1791 (refers to a good illustration in Schroter 1783, pl. 1, fig. 15), *Fasciolaria cingulifera* Lamarck 1816, *Turbinella angularis* Reeve 1847, *Turbinella knorrii* Deshayes 1843 (an elongate form based on Knorr, pt. 6, pl. 20, fig. 7), possibly *Turbinella rudis* Reeve 1847. *Leucozonia brasiliana* Orbigny 1841 (Voy. Amer. Merid., p. 449, pl. 72, fig. 17, Rio de Janeiro)

appears to be a third subspecies, of which *Turbinella dubia* Petit 1853 (Jour. de Conchyl., vol. 4, p. 75, pl. 2, fig. 9; Bahia) is probably a synonym.

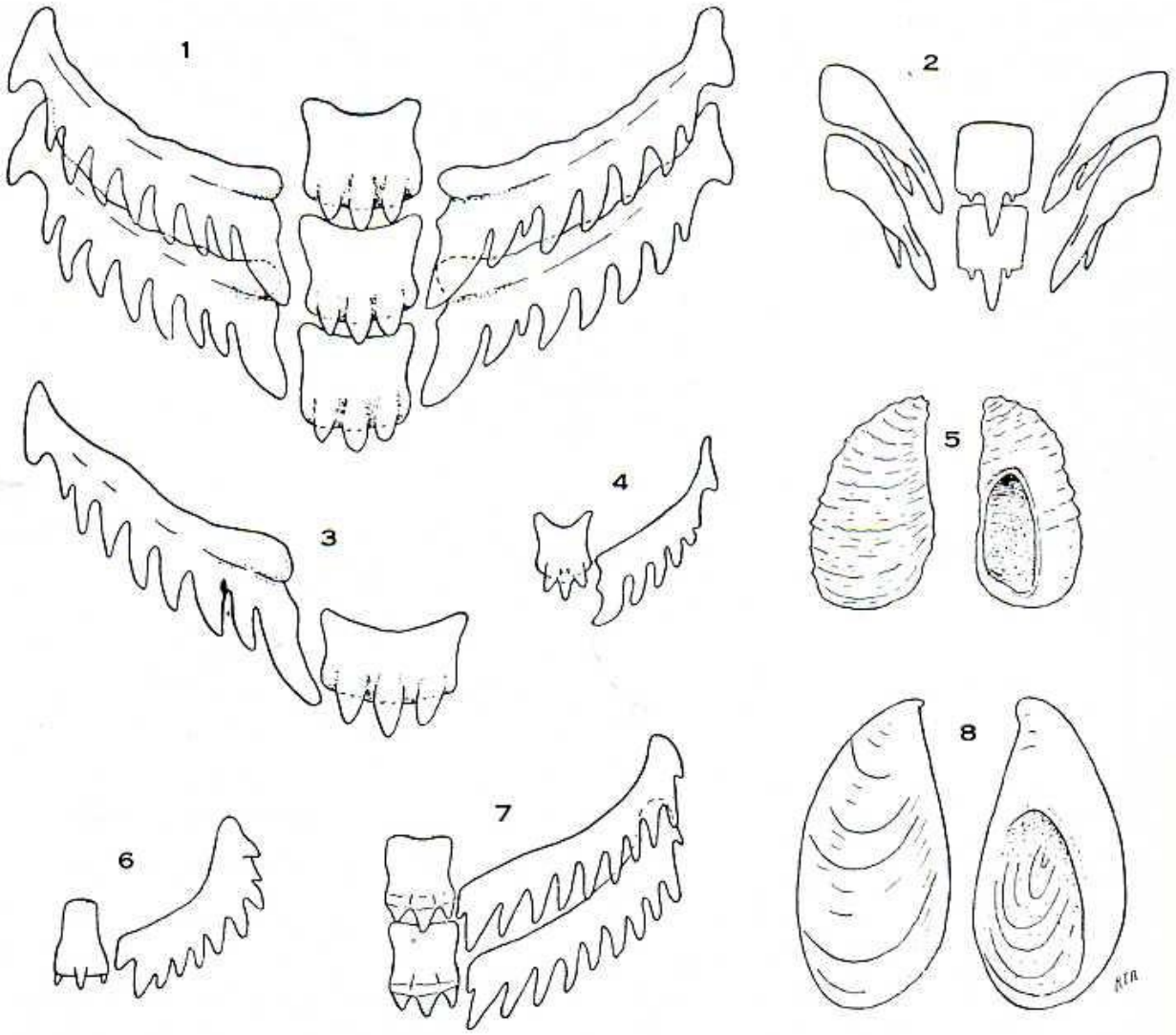


Map 11.—Distribution of the subspecies of *Leucozonia nassa*.

Leucozonia nassa subspecies **leucozonalis** Lamarck 1822 Text-fig. 4; Plate 2n.

1822 *Turbinella leucozonalis* Lamarck, Anim. sans Vert., vol. 7, p. 107 (no locality; refers to Favanne, Conch., pl. 35, fig. H2?); 1840, Kiener, Coquilles Vivantes, vol. 6, Turbinelle, p. 35, pl. 21, fig. 2 (not 3); Reeve, 1847, Conch. Icon., vol. 4, *Turbinella*, fig. 48; 1931, Lamy, Jour. de Conchyl., vol. 75, p. 273.

Description.—Shell 25 to 45 mm. in length, solid, heavy, rotund, smoothish, and black or cinnamon-brown in color. Whorls 7 to 8, rounded, with slightly flattened sides. Nuclear whorls, 2, glossy, opaque-white, but usually eroded away. First few postnuclear whorls rarely have very faint nodules just below the suture. Suture coarse, slightly indented and not wavy. Axial sculpture absent, except for microscopic, obliquely-slanting growth lines in the thick, smooth, black or light-brown periostracum. Spiral sculpture consists of numerous, fine, wavy, raised threads which are more prominent on the upper third of the whorl. On the lower third of the last whorl, there is a distinct, narrow, spiral, slightly-raised, white band which, at the edge of the outer lip, terminates in a small, pointed, two-toothed spine in older specimens. Aperture ovate, brownish cream, upper end with a swollen callus on the parietal wall; inside of outer lip with numerous, raised, irregular, spiral lirae. Lower part of columella with 3, rarely 4, spiral teeth. Siphonal canal open, comparatively short. Operculum horny, claw-shaped, black-brown, and with prominent growth lines.



Text fig. 4. Radulae and opercula (5 and 8) of Latirids. 1. *Leucozonia nassa leucozonalis* Lamarck, Grand Cayman, ANSP no. 196373. 2 and 5, *Fusilatirus cayohuesonicus* Sowerby, Lower Florida Keys, ANSP no. 195948. 3. *Leucozonia nassa nassa* Gmelin, Tobago Island, ANSP no. 195856. 4, the same from a young specimen. 6, *Latirus trochlearis* Kobelt, Grand Cayman, ANSP no. 196414. 7 and 8, *Latirus virginensis* Abbott, St. Thomas, Virgin Islands, ANSP no. 34968.

Remarks.—It is interesting that all of the numerous specimens collected at 22 stations at Grand Cayman should be the rotund, smooth subspecies, *leucozonalis*. It occurs abundantly on intertidal rock and sand reefs, but is not uncommon down to 8 feet of water. We have considered *leucozonalis* as a subspecies of the West Indian *nassa*. Clench collected pure colonies of *leucozonalis* in south and east Cuba. However, in Honduras, Jamaica, the north coast of Cuba and in the Bahamas, the smooth form occurs in only small numbers among colonies of typical *nassa*, while further from the Cayman-Cuban area the colonies are all of the ribbed *nassa* type (Vera Cruz, Mexico, Nicaragua to Panama and the Lesser Antilles to Trinidad). See map 11, page 79.

Records.—GRAND CAYMAN ISLAND: common at 22 stations on all sides of the island. CUBA: Marianao Beach, Habana, Cuba (M. S. Roig, 1908); Cienfuegos Bay (W. J. Clench); Matanzas Bay (M.C.Z.). JAMAICA: (M.C.Z.). BAHAMAS: Hog Island, New Providence (G. F. Kline); Fresh Creek, Andros (G. F. Kline); Wide Opening, Exumas (G. F. Kline).

Superfamily *VOLUTACEA*

Family **OLIVIDAE**

Genus OLIVA Bruguière 1789

Subgenus ISPIDULA Gray 1847

Oliva reticularis Lamarck 1811

Remarks.—A few freshly dead specimens were given by natives to the Ostheimers. It is surprising that none were collected alive, and it is quite possible that these specimens were brought in from the Bahamas for the tourist trade. Salisbury (1951) does not record it either.

Genus OLIVELLA Swainson 1831

Olivella dealbata Reeve 1850 Map 4.

1850 *Oliva dealbata* Reeve, Conchologica Iconica, vol. 6. Oliva, pl. 25, sp. 71 (no locality).

Description.—Shell 6 to 9 mm. in length, moderately slender, with a well-developed parietal callus which extends halfway on to the penultimate whorl. Columella slightly concave, with 7 to 9 strong, narrow, slanting teeth. Fasciole at base of shell pure white, bounded above by a fine, raised thread. Suture deep and cutting into the previous whorls. Nuclear whorls small, white, tan or rose. Color of shell variable; light phase from clear sandy areas: whitish with a rose, purple or white apex, and body whorl with sparse, irregular axial flames or zigzag streaks of light orange-brown; dark phase from shallow, muddy, protected areas: with dark chestnut-brown streaks and axial flames. Fasciole always white.

Remarks.—Mr. Axel Olsson kindly identified this species for us. However, Reeve's figure shows colored markings of the fasciole which are absent in all our many specimens. This species is closely related to *floralia* Duclos and may be a form or subspecies of it. This is probably the most abundant and widespread gastropod at Grand Cayman where it was obtained in large numbers at 80 stations in nearly every place where there was a sand or muddy sand bottom at depths from 4 to 48 feet.

Olivella nivea Gmelin 1791

Remarks.—Two live adults were obtained in 6 feet of sand in ocean-facing lagoons on the north side of Grand Cayman. The range of this common species is Bermuda, southeast Florida, the Bahamas, the Antilles and the Gulf of Mexico north to Yucatan. *O. jaspidea* Gmelin is evidently absent at Grand Cayman, the Bahamas and Bermuda.

Family **MITRIDAE**

Genus MITRA Lamarck 1799

Subgenus UROMITRA Bellardi 1887

Mitra nodulosa Gmelin 1791

Remarks.—This is a common southeast Florida and West Indian species which was found at 15 shallow-water, reef-flat stations facing the open ocean at Grand Cayman. It is very variable in shape and sculpturing. *M. granulosa* Lamarck 1811 appears to be a synonym.

Subgenus TIARA Swainson 1831

Mitra barbadensis Gmelin 1791

Remarks.—A common southeast Florida and West Indies species. Collected in shallow water on reefs facing the open ocean at 11 stations all around Grand Cayman where it is moderately common.

Genus PUSIA Swainson 1840

Pusia cubana Aguayo and Rehder 1936

1936 *Vexillum cubanum* Aguayo and Rehder, Mem. Soc. Cubana Hist. Nat., vol. 9, no. 4, p. 266, pl. 24, fig. 4 (no locality given, but presumably near Habana, Cuba).

Description.—Shell 10 to 13 mm. in length, ovate-fusiform, glossy, white, with the lower half of the whorl chestnut, yellowish brown or bluish gray; sometimes with small chestnut spots on the periphery between each rib; early whorls brownish to purplish. Nuclear whorls prominent, 3½, elevated, small, smooth, translucent-tan to brownish, succeeded by 2 brown and 4 white postnuclear whorls, the latter bearing 10 to 13 rounded, plications, concave and weakly and spirally threaded between. Outer lip, thin, simple; inner lip with four, strong, whitish columellar ridges. Interior of body whorl with strong, thin, sharp lirae. Distinguished from *P. hendersoni* Dall 1927 (Proc. U. S. Nat. Mus., vol. 70, p. 49 from off Georgia) by its shorter, squat, convex spire, evident bi-coloration and smaller size. *P. hendersoni* Rehder 1943 (Proc. U. S. Nat. Mus., vol. 93, p. 200) is a synonym and homonym of the latter.

Remarks.—Moderately common off the west and east ends of Grand Cayman where it was dredged at 5 stations in 5 to 9 fathoms over sand bottom. Hitherto, recorded only from northern Cuba.

Subgenus PUSIOLINA Cossmann 1921

Pusia gemmata Sowerby 1874

1874 *Mitra gemmata* Sowerby, Thesaurus Conchyl., vol. 4, Mitra, sp. 334, pl. 28, fig. 649 (no locality).

Description.—Shell 5 to 7 mm. in length, 6 whorls, fusiform, black-brown in color, with a broad white peripheral band, the latter color covering most of the short, broad, longitudinal nodules (11-13 per whorl). Suture well-indented, below which is a smooth, flattish black area which is

rarely cream-spotted. Spiral sculpture obsolete or of weak, broad spiral threads. Nuclear whorls only 1½, proportionately rather large and bulbous, smooth, brownish. Ribs obsolete below periphery. Base of shell with one strong, raised, white splotched cord, below which are 4 to 6 smaller, squarish, black spiral cords. Aperture black-brown to violet-black. Outer lip thin, sharp, sinuous, broadly and ovately notched above where there is a thick, button-like, parietal callus. Black columella with 4 black spiral teeth, the uppermost being considerably larger. Deep within the aperture there are 4 to 5 small, sharp lirae on the body whorl.

Remarks.—Only 13 specimens were dredged in 5 feet of water in clear water off Governor's Creek and off Conch Point, North Sound, Grand Cayman. Dall and Simpson (1901, p. 396) record this species from Puerto Rico. It may be possible that it is an oceanic form of the commoner *P. hanleyi* Dohrn, but at present we treat it as a valid species. *P. hanleyi* differs in being smaller, more elongate, pale tan with brown bands, and with tiny axial riblets just below the suture.

There are two other species, subspecies or forms in the West Indian region, one being "*microzonias* Lamarck" of authors (H. Hemphill, Key West and R. Swift, St. Thomas) which is slightly larger than *gemmata* and has fine axial riblets just below the suture. The second species or subspecies is *Mitra moisei* McGinty 1955 (Proc. Acad. Nat. Sci. Phila., vol. 107, p. 77 from off Florida) which is larger (10 mm.), broader, more fusiform like a *Latirus*, and which bears either short axial, broken riblets or two rows of fine pustules just below the suture. A sufficient series may indicate that these and *hanleyi* are one species as Dall and Simpson believed.

Pusia hanleyi Dohrn 1861

1861 *Mitra hanleyi* Dohrn, Malakozool. Blätter, vol. 18, p. 138, no. 3 (locality unknown).

Description.—(Grand Cayman specimens) Shell 4 to 5 mm. in length, fusiform, resembling *gemmata*, but with 13 to 16 ribs per whorl, narrower ribs, with numerous axial crinkles or riblets just below the suture, light tan to brownish in color, with a broader peripheral cream band which bears one or two fine spiral lines of brown, and with only 2 to 4 (instead of 4 to 6) small, spiral cords below the large rounded cord on the base of the shell. Interior of aperture light-tan with two broad darker brown bands above and below. Columellar teeth brownish.

Remarks.—Moderately common in 5 to 12 feet in muddy sand near Duckpond, and off Governor's Creek, both North Sound, Grand Cayman. We have a similar specimen from St. Thomas, Virgin Islands, and several lots from Florida, although the latter specimens are generally less colored, rarely whitish, and may be slightly more elongate.

Pusia puella Reeve 1845

1845 *Mitra puella* Reeve, Conch. Icon., vol. 2, Mitra, pl. 34, sp. 276 (St. Thomas, West Indies).

Remarks.—A single, worn specimen was picked up on the beach at Old Man Bay, north side of Grand Cayman Island. It is an uncommon species ranging from off North Carolina to the Bahamas and Lesser Antilles. It is characterized by its rotund shape (10 mm. in length), purple-brown color, except for large, irregular white splotches below the suture, and by its weak, reticulated sculpturing.

Pusia albocincta C. B. Adams was not found at Grand Cayman. This is what Johnson (1936), Rehder (1943, p. 201) and Abbott (American Seashells, p. 249, pl. 26a) call *sulcata* Gmelin 1791. The latter name is preoccupied by Gmelin 1791, p. 3436 (not p. 3455) which is *Solidula solidula* Linné. *Pusia microzonias* Lamarck 1811 is a well-known Indo-Pacific species (see Dautzenberg, 1939, Mem. Mus. Roy. Hist. Nat. Belgique, vol. 2, pt. 2, p. 159). Until more comparative material and radulae are available, we are considering these as separate species, although they are strikingly similar.

Family **MARGINELLIDAE**

Genus PRUNUM Herrmannsen 1852

Subgenus LEPTEGOUANA Woodring 1928

Prunum guttatum Dillwyn 1817

Remarks.—This common southeast Florida, Bahama and Caribbean species was collected at 11 stations in shallow water near reefs facing the open ocean, but was not collected in North Sound, Grand Cayman. Only 1 or 2 specimens were taken at each station.

Prunum apicinum Menke 1828

Remarks.—This common West Indian species was only found in 6 shallow-water localities in North Sound, and usually in 5 to 12 feet of water not far from shore. Most specimens were about 6 mm. in length and darkly pigmented with brown.

Prunum prunosum Hinds 1844 Plate 2j and k.

1844 *Marginella prunosa* Hinds, Proc. Zool. Soc. London, for 1844, p. 74 (West Indies); 1846, Sowerby, Thesaurus Conchyl., pl. 76, fig. 111.

1850 *Marginella nivea* C. B. Adams, Contrib. to Conch., no. 4, p. 56 (Jamaica); 1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 32, fig. 13 (lectotype).

Description.—Shell 8 to 12 mm. in length, resembling *guttatum*, but with its white spots half as small; with numerous, weak, uneven, denticulations on the inner lip; with 3 weak, diffused spiral bands of yellowish brown (or absent); without color spots on the outer lip, and with a slightly raised spire which is never covered by the labral callus.

Remarks.—This species has been united with *nivosa* Hinds 1844 by Tryon and others, but the large size of the latter (19 mm.), its dark purp-

lish flesh color, its lack of 3 subdued spiral bands, and the unknown type locality seem to refer to some other species.

This species was dredged commonly at 53 stations all around Grand Cayman, including most of North Sound. It was found in depths from 5 to 20 feet over sand and grass bottom. Specimens from the shallower, warmer areas of North Sound are darker in color, while those in deeper water facing the open ocean lack the orange-brown blush and bands.

Genus HYALINA Schumacher 1817

Subgenus VOLVARINA Hinds 1844

Hyalina albolineata Orbigny 1842 Plate 2h.

1842 *Marginella albolineata* Orbigny [in Sagra], Hist. L'Ile Cuba, Mollusques, vol. 2, p. 99 (Cuba); Atlas, pl. 20, figs. 27-29.

Description.—Shell 5 to 8 mm. in length, moderately elongate, with a short spire and white nucleus. Outer lip smooth, rather thin and white. Characterized by 3 very broad spiral bands of reddish brown, fawn, light yellow or rose of varying intensity. Distinguished from *avena* by its smaller size, stouter shell, lower spire, and the whitish bands between the color bands.

Remarks.—Orbigny's description is better than his figure, and we are accepting this name for this moderately common *avena*-like West Indian species. It was dredged at 5 stations in 5 to 7 feet of water in North Sound, near its south shore, Grand Cayman.

Hyalina avena Kiener 1834 Plate 2-l.

1834 *Marginella avena* "Valenciennes" Kiener, Coquilles Vivantes, Genre Marginelle, vol. 3, p. 17, pl. 6, fig. 24 (Indes Occidentales).

1954 *Hyalina* (*Volvarina*) *avena* Valenciennes, Abott, American Seashells, N. Y., p. 258, fig. 56i, pl. 11p.

Description.—Shell 11 to 13 mm. in length, slender; spire pointed, but short. Outer lip curled in, white and smooth. Aperture narrow above, wide below. 3 to 4 slanting, columellar teeth. Color whitish, cream, yellowish or flesh with 4 to 6 spiral bands of subdued orange-tan. Our Cayman Island specimens are grayish purple with dark rose-brown spiral bands (form *beyerleana* Bernardi).

Remarks.—This species was obtained at 14 reef and shallow water stations facing the open ocean on the north and south shores of Grand Cayman Island in company with *P. guttatum*. It was not found in North Sound or at the east and west ends, although it likely occurs in the latter regions. Two to five specimens were found under rocks at each station. The species is common throughout the West Indies.

Hyalina avenacea Deshayes 1844

1844 *Marginella avenacea* Deshayes, Anim. sans Vert., 2nd ed., vol. 10, p. 454 (Indes Occidentales); in part, not *avena* Kiener, pl. 6, fig. 24.

1954 *Hyalina* (*Volvarina*) *avenacea* Deshayes, Abbott, American Seashells, N. Y., p. 259, fig. 56k.

Diagnosis.—Shell 6 to 11 mm. in length, very similar to *H. avena*, but usually smaller, with a higher spire, more slender anterior end, and pure, opaque, glossy white, except for a very faint hint of straw color bands.

Remarks.—A single specimen was dredged in 6 feet of water in the lagoon at Bluff Bay on the North Shore of Grand Cayman. This is a common species from off North Carolina to both sides of Florida and the West Indies.

Hyalina tenuilabra Tomlin 1917 Plate 2f and g.

1801 *Bulla pallida* Linné, Donovan, Nat. Hist. British Shells, vol. 2, pl. 66; 1955, Dodge, Bull. Amer. Mus. Nat. Hist., vol. 107, article 1, pt. 3, pp. 86-88.

1917 *Marginella tenuilabra* Tomlin, Proc. Mal. Soc. London, vol. 12, p. 287 (West Indies, by inference); *Voluta pallida* Linné is considered a nomen dubium.

Diagnosis.—Shell 8 to 15 mm. in length, subcylindrical, with an almost flat apex, with a rather open aperture and thin, sharp outer lip. Lower part of columella arching and with 3 or 4 spiral folds. Color usually milky-white, rarely with a straw tint.

Remarks.—We believe that Tomlin, and not Dodge, is wisest in concluding that Linné's *pallida* is unidentifiable. This is a moderately common southeast Florida, Bahama and Caribbean species which was sparsely dredged at Grand Cayman at 10 stations around the island. It occurs near oceanic waters in 5 to 20 feet on a sand bottom.

Genus BULLATA Jousseaume 1875

Bullata ovuliformis Orbigny 1842

1842 *Marginella ovuliformis* Orbigny, [in Sagra] Hist. L'Ile Cuba, Mollusques, vol. 2, p. 101, pl. 20, figs. 33-35 (Martinique, St. Thomas, Guadeloupe).

1954 *Gibberulina ovuliformis* Orbigny, Abbott, American Seashells, N. Y., p. 259, fig. 56-o.

Description.—Shell 1.5 to 2.0 mm. in length, globular, glossy, milky-white. Aperture as long as the shell. Apex hidden under the top of the outer lip. Upper part of whorl slightly shouldered. Lower third of columella with 3 or 4 small slanting, spiral folds. Outer lip thickened and with a few minute denticulations on the inside.

Remarks.—This is a moderately common species occurring from off North Carolina to both sides of Florida and the West Indies. Six specimens were dredged in 6 feet of water over sand off Governors Creek, North Sound, and 2 specimens in the lagoon off Colliers Point, Grand Cayman. The genus *Gibberulina* Monterosato 1884 is an unnecessary substitute for *Bullata* Jousseaume 1875 (see Tomlin 1917, p. 244).

Genus PERSICULA Schumacher 1817

Subgenus GIBBERULA Swainson 1840

Persicula lavalleeana Orbigny 1842

1840 *Marginella minuta* Pfeiffer, Arch. für Naturgesch., vol. 1, p. 259 (Cuba). Non Gray 1826; Abbott, American Seashells, N. Y., p. 257, fig. 56m.

1842 *Marginella lavalleeana* Orbigny [in Sagra], Hist. L'Ile Cuba, Mollusques, vol. 2, p. 101; Atlas, pl. 20, figs. 36-38 as *lavalleana* Jamaica and Martinique).

Diagnosis.—2 to 3 mm. in length, resembling a miniature *apicinum*, but pure white in color. Parietal callus thickened; with 4 small columella folds; inside of outer lip with fine spiral teeth.

Remarks.—Orbigny gave two spellings for the name of this species, and, since it was derived from the Marquis de Lavallee, we are employing the text, rather than the plate caption, name of *lavalleeana*. It is a common form in southern Florida and the West Indies. It was dredged with *Bullata ovuliformis* at 5 stations on Grand Cayman Island.

Subgenus PERSICULA Schumacher 1817

Persicula fluctuata C. B. Adams Plate 2c.

1850 *Marginella fluctuata* C. B. Adams, Contributions to Conchology, no. 4, pp. 56-57 (Jamaica); 1950, Clench and Turner, Occasional Papers on Mollusks, Harvard, vol. 1, no. 15, pl. 32, fig. 3 (holotype).

1870 *Marginella sagittata* Hinds, Redfield, Amer. Jour. Conch., vol. 6, appendix, p. 255. Not Hinds 1844, not Reeve 1865.

Description.—Adult shell 4 to 5 mm. in length, ovuliform, glossy, light tan to cream with numerous, wavy longitudinal brown lines. Apex rounded and mostly covered over by a callus which is continuous with the rounded, downwardly sloping upper part of the outer lip. Whorls convex, evenly rounded. Aperture white, as long as the entire shell. Outer lip sharp, slightly incurved, and with exceedingly fine spiral serrations on the inside. Lower half of inner lip with 6 white columellar plaits, the uppermost being almost obsolete, second to the lowest twice as thick as any others. Body whorl with 16 to 18 longitudinal, fine brown, wavy lines. The "waves" are darkest at the crests, so that they resemble arrowheads or mountain peaks pointing away from or posteriorly from the outer lip. The waves are irregular and sometimes broken.

Remarks.—A single live specimen was dredged in 7 feet of water off Governors Creek, North Sound, Grand Cayman. The Academy collection contains specimens from North Bimini Island and High Ridge Cay, Andros Island in the Bahamas, and from Castillo de Jaqua, Cienfuegos, Cuba. It is evidently a coral-water species which lives in clear, coral sand and turtlegrass. Redfield and others have referred this species to *Marginella sagittata* Hinds 1849 (Proc. Zool. Soc. London for 1849, p. 76) presumably from Brazil. However, that species is 10 mm. in length and with only 4 columellar plaits. *P. catenata* Montagu of Florida and the Caribbean is similar, but less ovate, with a flatter spire, with its outer lip projecting at the top, with spiral rows of white dots, and with the arrow-like brown lines pointing anteriorly or towards the outer lip.

Family VOLUTIDAE

Subfamily VOLUTINAE

Genus VOLUTA Linné 1758

Voluta musica Linné 1758

Remarks.—The Ostheimers did not find this species at Grand Cayman. However, Salisbury reports " one specimen from station 31, 3 ft. dredged at 3½ meters. This is a rather highly coloured form named by Lamarck." This species is not found in Bermuda. Salisbury's record is in all likelihood erroneous, and is based upon a mixture from some other collection. This species occurs in the Lesser Antilles.

Family CONIDAE

Genus CONUS Linné 1758

Conus jaspideus Gmelin 1791 Map 10; Plate 3a-e, i, j.

1791 *Conus jaspideus* Gmelin, Systema Naturae, 13th ed., p. 3387 (locality unknown).
1792 *Conus pusio* Hwass [in Bruguière], Encyclopedie Methodique, vol. 1, pt. 2, p. 702 (Santo Domingo, Martinique and Guadeloupe).
1792 *Conus verrucosus* Hwass, ibid., p. 708 (Africa).
1830 *Conus pealii* Green, Trans. Albany Inst., vol. 1, p. 123, pl. 3, fig. 3 (Key Vache, Florida).
1844 *Conus pygmaeus* Reeve, Conch. Icon., vol. 1, pl. 47, fig. 260 (locality unknown).
?1849 *Conus nodiferus* Kiener, Icon. Coquilles Vivantes, vol. 2, p. 228, pl. 100, fig. 4 (Seas of the Indies).
1849 *Conus echinulatus* Kiener, ibid., p. 270, pl. 105, fig. 2 (locality unknown).
1849 *Conus papillosus* Kiener, ibid., p. 271, pl. 72, fig. 4 (locality unknown); non Tate 1890.
1854 *Conus sticticus* A. Adams, Proc. Zool. Soc. London for 1853, p. 117 (locality unknown). Tomlin, 1937, considered this " a smooth form of *verrucosus* ".
1862 *Conus duvali* Bernardi, Jour. de Conchyl., vol. 10, p. 404, pl. 13, fig. 3 (Guadeloupe).
1865 *Conus anaglypticus* Crosse, Jour. de Conchyl., vol. 13, p. 314, pl. 11, fig. 8-8a (Antilles).
1866 *Conus acutimarginatus* Sowerby, Thesaurus Conchyliorum, vol. 3, p. 328, pl. 288, figs. 640-641 (locality unknown).
1901 *Conus beddomei* Sowerby, Jour. of Malac., vol. 8, p. 101, pl. 9, fig. 1 (West Indies).
1903 *Conus boubeeae* Sowerby, ibid., vol. 10, p. 76, pl. 5, fig. 5 (locality unknown).
1944 *Conus verrucosus vanhyningi* Rehder, Nautilus, vol. 57, p. 105 (off Pompano, Broward Co., Florida).
1945 *Conus verrucosus piraticus* Clench, Johnsonia, vol. 1, no. 6, p. 14 (off Palm Beach, Florida).
1947 *Conus havanensis* Aguayo and Farfante, Revista Soc. Malac. Carlos de la Torre, vol. 5, p. 11, text figure (Avenas de la Chorrera, Habana, Cuba).
1953 *Conus jaspideus branhamae* Clench, Johnsonia, vol. 2, no. 32, p. 364 (Green Turtle Cay, Great Abaco, Bahama Islands).
1954 *Conus jaspideus* Gmelin, Abbott, American Seashells, p. 262, pl. 14n (in color).

Of the above synonymy, the following are referable to *Conus jaspideus* form *verrucosus: verrucosus* Hwass, *nodiferus* Kiener, *echinulatus* Kiener,

papillosus Kiener, *anaglypticus* Crosse, *vanhyningi* Rehder, *piraticus* Clench and *havanensis* Aguayo and Farfante. The others are the non-verrucose or smooth forms.

There are two problems connected with *jaspideus*, one being its relationship with *verrucosus* Hwass, the second being the delimiting of possible subspecies or races in the West Indian region.

In the 47 lots of this species we have from Grand Cayman Island, it is quite evident that *verrucosus* is merely a genetic form which may appear in varying proportions within any one colony. Our photographs of intermediates in the adult stage will show to what extent intergrades occur. We have examined intergrades from colonies at St. Croix, Santo Domingo and the Lower Florida Keys. Most collections in other museums and private collections have been divided into the non-pustuled form (*jaspideus*) and the pustuled form (*verrucosus*), but reexamination of these will usually show sculptural intergrades and the similarity in nuclear and color characters. It must be realized, however, that pustules are not developed in the *verrucose* form until the shell is about 7 mm. in length.

Tomlin (Proc. Mal. Soc. London, vol. 22, 1937) appears to have suspected that this species had two forms, for he speaks of *sticticus* A. Adams as being " a smooth form of *verrucosus* " and refers *acutimarginatus* Sowerby and *boubeeae* Sowerby (both smooth forms) to *verrucosus*. He did not connect *jaspideus* Gmelin with this species, but considered *verrucosus* Hwass the earliest recognizable name. There is some doubt as to just what Gmelin meant by *jaspideus*, since the figures he refers to are so poor, but we are following Clench in employing this name instead of *pealei* Green, of Dall and Tryon.

Certain geographical areas show a predominance of another character, namely the presence of strong spiral, incised lines over the entire whorl, but there does not seem, on the basis of what material is at hand, to be any evidence of a racial cline or subspecific distribution.

There may be a West Indian subspecies (Plate 3j) which has a more rounded shoulder and fatter shell as illustrated by Clench (see his *pygmaeus* Reeve, Johnsonia, vol. 1, no. 6, pl. 7, figs. 1 and 2). Most of our Cayman Island shells are of this shape, although their coloration is consistently much lighter and a few have a strong, *stearnsi*-like carina on the shoulder. The strongly developed carina is a Floridian and Bahamian character which appears in smooth *jaspideus* and *stearnsi*.

The nuclear whorls in both forms are papilliform, but may be one of four colors: white, amber, rose or violet. The latter color occurs in about 10 percent of our Cayman Island specimens, 25% off Key Largo, Florida, 50% off Pensacola, Florida, 50% off Destin, West Florida, and 75% off Naples, Florida.

The Cayman Island specimens are in general very pale in color and

small in size, the largest being 20 mm. in length, the average specimens 17 mm. The species is found in shallow water all around the island, although, from the results of the dredging samples, it appears to be sparsely distributed, since none of the samples contained more than a dozen specimens. None were obtained well within North Sound. It will be seen from our map No. 10 that there is a predominance of the verrucose forms on the windward sides (north and northeast) of the island where coral reefs are exposed to the waves of the open ocean. There is a pocket of verrucose forms at South West Sound, inshore from the coral patch reefs. Pure colonies of the verrucose form are commonest at the northwest end of North Sound. Pure colonies of the smooth form are found only off the sandy shores of the west end of the island and again at Frank Sound. The depth of water where *jaspideus* occurs ranges from 0.5 to 10 fathoms, with smooth forms tending to be at greater depths. The bottom is generally of coral sand, although in some places intermixed with grass and/or broken shell and rock.

At a station at the southeast end of the island, most specimens had a few gravid, egg capsules of *Marginella* attached to the last whorl or the spire.

Of late, there has been a popular custom of naming some of the more unusual variants of this variable species. Clench (Johnsonia, vol. 2, no. 32, p. 365, 1953) now has his subspecies *verrucosus piraticus* (finer pustules) occurring in Florida and Tobago, two widely separated localities at each end of the range of *verrucosus*. *C. havanensis* Aguayo and Farfante from the " La Chorrera " sand piles in Havana City is very similar to pustuled forms of large *jaspideus* from St. Croix, Virgin Islands, in which the pustules are proportionately small. The smooth forms (and their intermediates) from La Chorrera (ANSP 167227) are the same size and color as *havanensis*. We also consider *Conus jaspideus branhamae* Clench 1953 and *C. verrucosus vanhyningi* Rehder 1944 forms and not subspecies of *jaspideus*. There are many other forms awaiting the diligent describer, including a smooth pinkish form from Grand Cayman, a heavily corded form from Monti Cristi, Santo Domingo, and Grassy Key, Florida, and a form off Naples, Florida, with violet nuclear whorls. If one insists upon giving these forms scientific names, it is best that they be proposed as infra-subspecific or form names and not as geographical subspecies.

Conus jaspideus subspecies **stearnsi** Conrad 1869 Plate 3f and g.

1869 *Conus stearnsii* Conrad, Amer. Jour. Conch., vol. 5, p. 104, pl. 10, fig. 1 (Pine Key, West coast of Florida).

1942 *Conus stearnsi* Conrad, Clench, Johnsonia, vol. 1, no. 6, p. 9, pl. 5, figs. 1-4.

Formerly most authors have considered *stearnsi* as a species distinct from *jaspideus*. From a careful study of Florida material we conclude that it represents an American mainland subspecies which reaches the height of

its specialization along the west coast of Florida. Colonies (Plate 3h) along the Lower Florida Keys and dredging samples off the west coast of Florida show a graduation in characters towards the typical *jaspideus* type. A few typically *stearnsi* characters occasionally turn up in *jaspideus* specimens from the Cayman Islands and Yucatan. The typical *stearnsi* subspecies is diagnosed as follows:

Shell 17 to 22 mm. in length, quite slender (length to width ratio about 2.2 to 1). Ground color dirty gray to dark purplish brown with a dozen or so spiral rows of small, spirally lengthened whitish dots with a smaller light-brown dot between the white spots. Interior of aperture brownish to whitish. Shoulder of whorl with a strong, raised, smooth, white, brown-dotted carina. 10 to 12 spiral incised lines are limited to the lower half of the whorl. Nucleus amber-brown.

The above characters are present in most specimens found in inshore waters on the west coast of Florida. However, even at Sarasota and Tampa specimens may show red-brown maculations or almost entirely white coloration. Offshore, where the West Indian fauna appears, colonies show a mixture of characters, some *stearnsi* having incised lines over the upper part of the whorls as in typical *jaspideus*. The colonies along the Lower Florida Keys are made up mainly of *jaspideus*, although about 10 percent of the specimens are slender, while others possess the spiral rows of white dots. In the Cayman Islands, some of the smooth forms of *jaspideus* possess these rows of white spots and the shells are quite slender. However, they are light in coloration and do not have a strongly developed carina on the shoulder. This latter type is also found in Yucatan, Mexico. All *stearnsi* examined by us lacked pustules in the shell, and all had amber-brown nuclear whorls.

Conus regius Gmelin 1791

1791 *Conus regius* Gmelin, Systema Naturae, 13th ed., p. 3379 (no locality).
1791 *Conus leucostictus* Gmelin, ibid., p. 3388 (Oceano Americano).
1791 *Conus insularis* Gmelin, ibid., p. 3389 (no locality). Refers to Martini, pl. 61, fig. 683.
1792 *Conus cedonulli grenadensis* Hwass [in Bruguière], Encyclopédie Méthodique, vol. 1, pt. 2, p. 603 (Grenada). Refers to Martini, pl. 61, fig. 683.
1792 *Conus nebulosus* Hwass, ibid., p. 606 (Santo Domingo). Non Gmelin 1791.
1792 *Conus eques* Hwass, ibid., p. 705 (Coast of Florida).
1798 *Cucullus corona civica* Röding, Museum Boltenianum, p. 38 (no locality).
1954 *Conus regius* Gmelin, Abbott, American Seashells, p. 262, pl. 14m. (in color).

Remarks.—We have removed from Clench's synonymy of *regius* the following varieties of the Indo-Pacific *Conus varius* Linné which Hwass described as varieties of *cedonulli: curassaviensis, trinitarius* and *martinicanus*. If Martini's pl. 61, fig. 683 can be interpreted as a smooth-shouldered freak or form of *regius*, then *C. insularis* Gmelin 1791 and *C. grenadensis* Hwass 1792 may remain in the synonymy. Clench also included *C. armil-*

latus C. B. Adams with *regius;* however, it is probably a distinct species, being characterized by a lavender aperture and base, and in having large, low, white nuclear whorls. (See Abbott, 1958, Nautilus, vol. 71, p. 117).

C. regius is fairly common in shallow water on the reefs at Grand Cayman where it was found under large coral blocks at 17 stations on all sides of the island.

Conus regius form **citrinus** Gmelin 1791

1791 *Conus citrinus* Gmelin, Systema Naturae, 13th ed., p. 3389 (Curacas [Curacao]).
1954 *Conus regius* form *citrinus* Gmelin, Abbott, Amercian Seashells, N. Y., p. 262.

Remarks.—This is merely a light-color form of regius in which the dark browns, reds and purples are absent. Intergrades are found between the pure yellow form and typical regius even in the same individual. Some specimens show faint spiral lines and rows of brownish dots. One pure orange-yellow specimen, 58 mm. in length, was collected on the reef north of Betty Bay Point, Grand Cayman Island.

Clench (1942, p. 7) applied the name *citrinus* Gmelin to the well-known species, *mus* Hwass, but we feel this was unjustified. Gmelin gave a description which could apply either to *mus* or the yellow variety of *regius* Gmelin. However, his sole figure reference is to Martini's pl. 61, fig. 681, a shell from Curacao (not Caracas). Martini states that the aperture is white, a characteristic of *regius* and its color forms, and not of *mus* which always has two broad bands of chocolate within its aperture. Martini does not mention brown spots on the shoulders, and we believe the three spots on his figure represent shadows from the tubercules rather than color marks. For these reasons, we are employing *citrinus* to the yellow color form of *regius*, thus making the long-established name of *mus* once more available for the Mouse Cone of the West Indies.

Conus cardinalis Hwass 1792

1792 *Conus cardinalis* Hwass [in Bruguière], Encyclopédie Méthodique, vol. 1, pt. 2, p. 632 (Indian Ocean, Santo Domingo, Martinique).
1792 *Conus magellanicus* Hwass, ibid., p. 633 (Straits of Magellan).
1798 *Conus cinamomeus* Röding, Museum Boltenianum, p. 43 (refers to Martini, pl. 57, fig. 680 and 681, the former being *cardinalis*).
1861 *Conus lubeckianus* Bernardi, Jour. de Conchyl., vol. 9, p. 169, pl. 6, figs. 7-8 (Guadeloupe).
1942 *Conus roseus* Lamarck, Clench, Johnsonia, vol. 1, no. 6, p. 5 (not Lamarck 1810, not Kiener 1846).
1942 *Conus regius cardinalis* Hwass, Clench, ibid., p. 5, pl. 4, fig. 1.

Remarks.—This species was not found in the Cayman Islands, but we have included it for the purpose of revising its synonymy. Clench's figure of *cardinalis* is the form which Bernardi named *lubeckianus*, although Clench included the latter in the synonymy of his *citrinus* (our *mus*). We are strongly inclined to consider *cardinalis* a full species and not as a sub-

species of *regius*. *C. cardinalis* apparently does not exceed a length of about 20 mm., and *regius* of this size are always much more slender; furthermore, the aperture of *cardinalis* is always tinted with rose, lavender or light violet, while that of regius is generally white, except for a bluish tint which is secondarily caused by the strong colors of the outer shell which may show through the shell material, particularly near the edge of the lip.

We cannot judge from the figures and descriptions whether *C. ornatus* Sowerby 1833 or *C. speciossissimus* Reeve 1848 are young *regius* or *cardinalis*. *Conus roseus* Lamarck 1810 is an Indo-Pacific species, similar to *mus*, but larger, with a dark purple-brown base and with coarser spiral threads. The latter species is probably *C. punctatus* Hwass 1792.

Conus mus Hwass 1792

1792 *Conus mus* Hwass [in Bruguière], Encylopédie Méthodique, vol. 1, pt. 2, p. 630 (Guadeloupe).
1792 *Conus barbadensis* Hwass, ibid., p. 632 (Barbados, Guadeloupe and Santo Domingo).
1792 *Conus jamaicensis* Hwass, ibid., p. 700 (Jamaica).
1942 *Conus citrinus* Gmelin, Clench, Johnsonia, vol. 1, no. 6, p. 7, pl. 4, figs. 5-6. Not Gmelin 1791.
1954 *Conus mus* Hwass, Abbott, American Seashells, p. 262, pl. 14-o (in color).

Remarks.—*Conus barbadensis* Hwass is a mixture of two species, the first variety A (le gourgouran rouge) representing the Indo-Pacific species, *C. roseus*, by reference to Martini's pl. 63, fig. 707 and Favanne's fifth variety of species 15, p. 445. The second variety, le gourgouran ponctué of Hwass, refers to the common West Indian *C. mus* as clearly shown in Lister's pl. 784, fig. 31. Revisors have generally chosen the latter to represent *C. barbadensis*, therefore making it a synonym of *C. mus*.

We have eliminated the following species from the synonymy given by Clench in Johnsonia, vol. 1, no. 6, p. 7: *citrinus* Gmelin; *magellanicus* Hwass, *lubeckianus* Bernardi, and *minutus* Reeve. For their disposition see remarks under *C. regius* and *cardinalis*.

C. mus is the commonest of the reef cones at Grand Cayman where it was taken in intertidal waters on inshore and offshore reefs at 21 stations around the entire island, but not within North Sound.

Conus daucus Hwass 1792

Remarks.—Several large, recently killed specimens were obtained at the west end of Grand Cayman. In all likelihood, this uncommon, but widely distributed, cone lives in water below six fathoms outside the reefs in the same habitat as *Conus ranunculus*. The lemon-yellow and the carrot-red color forms are present here. The periostracum, when present, is light-brown and fairly thick and rough.

Conus ranunculus Hwass 1792 Plate 2u.

1792 *Conus ranunculus* Hwass [in Bruguière], Encyclopédie Méthodique, vol. 1, pt. 2, p. 671 (American Ocean). Refers to Seba, pl. 43, fig. 36.

1942 *Conus ranunculus* Hwass, Clench, Johnsonia, vol. 1, no. 6, p. 32, pl. 15, figs. 6-7; 1953, ibid., vol. 2, no. 32, p. 375.

A single recently-killed specimen, 45 mm. in length, was dredged in one fathom south of Chapel, North West Point, Grand Cayman. Periostracum thin, smooth and translucent yellow-brown. This is the most westerly record for this Caribbean-African cone. It has been our experience that this is not a shallow-water reef-top species. It probably lives below a fathom on the outer edge of the fringing reefs. For a complete synonymy of *ranunculus*, see Clench, 1942, cited above.

Family **TEREBRIDAE**

Genus TEREBRA Bruguière 1789

Subgenus HASTULA H. and A. Adams 1853

Terebra hastata Gmelin 1791

Remarks.—This was the only species of Terebridae found at Grand Cayman Island where it was found common at 13 stations on sand at 5 to 25 feet in lagoons facing the open ocean. It is a southeast Florida, Bahama and Antilles species.

Family **TURRIDAE**

Subfamily **CLAVINAE**

Genus CRASSISPIRA Swainson 1840

Subgenus CRASSISPIRELLA Bartsch and Rehder 1939

Crassispira fuscescens Reeve 1843

1843 *Pleurotoma fuscescens* Reeve, Conch. Icononica, vol. 1, *Pleurotoma*, pl. 15, sp. and fig. 125 (Hab. unknown).

1830 *Pleurotoma solida* C. B. Adams, Contrib. to Conch., no. 4, p. 61 (Jamaica); 1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 29, fig. 8 (lectotype).

1890 *Drillia ebenina* Dall, Trans. Wagner Free Inst. Sci. Phila., vol. 3, no. 1, p. 33, pl. 2, fig. 8 (Miocene of Santo Domingo; Pliocene, Caloosahatchie beds; Recent, Florida to Vera Cruz); 1954, Abbott, American Seashells, N. Y., p. 268, fig. 57j.

Description.—Shell 10 to 15 mm. in length, heavy, black to dark black-brown in color with a slight sheen. With 14 to 17 short axial ribs per whorl. Below the suture there is a very large, smooth spiral cord, below which is a concave area bearing 2 to 4 small spiral threads. About 16 spiral threads between the ribs on the last whorl. Anterior sinus well-developed, round, deep.

Remarks.—Our series of specimens from the West Indies show considerable variation in color, fresher specimens being black, rather than brown.

In most cases, the subsutural spiral keel is smooth, but we have one from St. Thomas Island which is granulose, as is stated for some of Reeve's types. We have examined Adams' type and believe that Dall's *ebenina* is a synonym of Reeve's species. This is not *nigrescens* C. B. Adams [Jan.] 1845; however, it is quite likely that *nigrescens* Reeve [Nov.] 1845 (pl. 26, fig. 235 from St. Vincent Island) is also a synonym. The black color phase may be referred to as form *ebenina* Dall. This uncommon species ranges from southeast Florida to Vera Cruz, Mexico, to the Lesser Antilles. A single live specimen was dredged in 10 feet of water in sand off Water Point, North Sound, Grand Cayman.

Attention is drawn to a very similar species or subspecies, *C. (C.) mesoleuca* Rehder 1943 from off the east coast of Florida (Proc. U. S. Nat. Mus., vol. 93, no. 3161, p. 202, pl. 20 fig. 15). *C. hondurasenis* Reeve 1846 may be Rehder's species.

Crassispira nigrescens C. B. Adams 1845

1845 *Pleurotoma nigrescens* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 3 [Jan.] (Jamaica); not Reeve [Nov.] 1845; Clench and Turner, 1950, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 29, fig. 11 (lectotype).

Description.—Shell 5 to 6 mm. in length, black-brown in color, rarely with a lighter band at the shoulder. Resembles a miniature *fuscescens*, but the concave area below the smooth subsutural cord is finely decussate, and the rows of beads (1 to 3 in the upper whorls, 6 in the last) are crowded together and joined by spiral and axial cords, thus giving a neat reticulate appearance to the shell. Varix very thick and bulbous, with a deep, rounded sinus. First 1½ nuclear whorls smooth brownish and glossy, and followed by a half whorl of axial riblets.

Remarks.—This small, dark, attractively sculptured species was dredged at four stations in North Sound, Grand Cayman where the water was 5 to 20 feet deep and the bottom sandy. The species occurs in Jamaica and probably elsewhere in the West Indies.

Subgenus COMPSODRILLIA Woodring 1928

Crassispira leucocyma Dall 1883

1883 *Drillia leucocyma* Dall, Proc. U. S. Nat. Mus., vol. 6, no. 21, p. 328, pl. 10, fig. 8 (Key West, Fla.)

1954 *Monilispira leucocyma* Dall, Abbott, American Seashells, p. 271, pl. 57d (copy of Dall's fig., poor); 1955, Perry and Schwengel, Marine Shells Western coast Fla., Ithaca, pl. 38, fig. 263 (good).

Remarks.—This common shallow water turrid is found from the south half of Florida, and the Bahamas to the Virgin Islands. 6 specimens were dredged in 5 to 10 feet over sand and algae off Governor's Creek, North Sound, Grand Cayman.

Genus DRILLIA Gray 1838

Subgenus NEODRILLIA Bartsch 1943

Drillia cydia Bartsch 1943

1943 *Neodrillia cydia* Bartsch, Mem. Soc. Cubana Hist. Nat. F. Poey, vol. 17, no. 2, p. 84, pl. 7, fig. 6, pl. 10, fig. 3, pl. 14, fig. 1 (off Fowey Light, Florida in 25 fathoms).

1943 *Neodrillia euphanes* Melville, Bartsch, loc. cit., p. 86, pl. 7, fig. 4, pl. 14, fig. 2. Not Melville 1923.

1943 *Neodrilla antiguensis, encia, barbadensis,* and *jamaicensis* all Bartsch, *loc. cit.,* pp. 86-89, pl. 7.

Remarks.—This species is more variable in the number of ribs per whorl, the accentuation of the spiral threads, the shape of the basal end, and the degree of small brown spotting than Bartsch was willing to admit. Melville's *euphanes* from Cuba appears to be distinct from this species (see pl. 4, fig. 4, Proc. Mal. Soc. London, vol. 15, 1923).

One adult and two younger specimens were dredged in 10 fathoms off Chapel, West Bay and in 5 feet in South West Sound, Grand Cayman. The Academy also has specimens from St. Thomas, Virgin Islands, 10 fathoms off Palm Beach, Florida, and 14 fathoms off Destin, N.W. Florida.

Subfamily MANGELIINAE

Genus ITHYCYTHARA Woodring 1928

Ithycythara parkeri new species Text-fig. 5.

Description.—Shell 5.7 mm. in length, 1.9 mm. in width, slender, with 7 whorls (nucleus eroded). Postnuclear whorls flattish with 5 slightly protractively slanting, straight, strong, rather sharp and narrow ribs which are slightly shouldered. Interstices wide and slightly concave. Spiral sculpture of numerous, fine, raised threads (about 26 between sutures) which also cross the axial ribs. Fine growth lines cut across these spiral threads. Aperture elongate and narrow, its borders stained orange-brown. Color of shell opaque, chalk-white, with a large, faint, orange-brown splotch near the center of the whorl between each rib.

Type and type locality.—Holotype in ANSP no. 198919. Off Bowse Bluff, Grand Cayman Island in sand in 3 feet of water. A. J. Ostheimer, 3rd and John Dyas Parker, collectors Nov. 21, 1953. A paratype in ANSP 209867 is from the west end of Bluff Bay from 6 feet of water.

Remarks.—This species is closest to *Ithycythara ischna* Woodring 1928 from the Miocene of Bowden, Jamacia, but the latter has 8 ribs per whorl, and traces of spiral grooves only on the upper part of the whorl. *I. lanceolata C. B. Adams* (Florida and the West Indies) has 6 to 7 ribs per whorl and lacks strong spiral sculpturing.

Genus PYRGOCYTHARA Woodring 1928

Pyrgocythara coxi Fargo 1953 Plate 3t.

1953 *Pyrgocythara coxi* Fargo, Monograph 8, pt. 2, Acad. Nat. Sci. Phila., p. 384, pl. 20, figs. 3, 3a (North St. Petersburg, Florida. Pliocene).

Remarks.—A single adult specimen was dredged in 7 feet of water over white sand in Gun Bay, Grand Cayman Island. Fargo records recent specimens from Madeira Beach, Pinellas County, Florida.

Genus MANGELIA Risso 1826

We are employing this genus with some reservation, since time has not permitted a thorough study of this group. Although Wentz (Handbüch Palaozoologie, Gastropoda, pt. 6, p. 1431, 1943) uses *Cythara* Schumacher 1817, we agree with Woodring (1928, p. 168) that it should be considered a *nomen dubium.* We have employed Woodring's genera at a subgeneric level, merely as a temporary expediency. For a discussion of the type species of *Mangelia,* see Woodring, 1928, p. 177.

Subgenus TENATURRIS Woodring 1928

Mangelia bartletti Dall 1889 Plate 3s.

1889 *Cythara bartletti* Dall, Bull. Mus. Comp. Zoöl., 18, pt. 2, p. 101, pl. 12, fig. 6, pl. 14, figs. 5, 8 (off Havana, in 127 to 450 fms. ; also Key West, between tides).

Remarks.—This common south Florida and West Indian species was dredged at 13 stations at Grand Cayman in 16 to 40 feet of water over clean sand. Elsewhere in the West Indies it also occurs at greater depths.

Mangelia trilineata C. B. Adams 1845 Plate 3q.

1845 *Pleurotoma trilineata* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 3 (Jamaica); 1950, Clench and Turner, Occ. Papers on Mollusks, Harvard, vol. 1, no. 15, pl. 29, fig. 15, pl. 49, fig. 5.

Description.—Shell 6 mm. in length, 2.2 mm. in width, slender, elongate, with the spire slightly longer than the aperture. Whorls 7, the postnuclear one being slightly shouldered and bearing 15 to 17, slightly slanting, evenly spaced, rather strong, well-beaded axial ribs. Nuclear whorls smooth, brownish orange, and with microscopic axial riblets. Spiral sculpture of small, distinct, squarish cords (11 in the penultimate whorl, about 25 in the last). Suture impressed, wavy and bordered below by narrow, deep orange-brown color band which covers 2 of the spiral cords. Second narrow color band is midway between the sutures. The third and fourth are evenly spaced below on the base of the shell and run on to the thick, corded varix. Upper end of outer lip developed upward because of the round, distinct posterior canal. Below the latter on the inside of the outer lip is a small, but distinctly raised nodule. Siphonal canal somewhat constricted and short. Columella slightly wavy, white, and smooth.

Remarks.—This distinctive and attractive species is characterized by its somewhat netted sculpturing and the 4 very narrow, spiral bands of orange-brown. It differs from *M. quadrilineata* C. B. Adams 1850 in that the latter has four lines crowded together at the periphery which are broken by the eleven axial ribs per whorl. Only one specimen was obtained off Conch Point, Grand Cayman, at a depth of 6 feet.

Subgenus BRACHYCYTHARA Woodring 1928

Mangelia biconica C. B. Adams 1850 Plate 3p.

1850 *Mangelia biconica* C. B. Adams, Contrib. to Conch., no. 4, p. 65 (Jamaica); Clench and Turner, Occ. Papers on Mollusks, Harvard, vol. 1, no. 15, pl. 32, fig. 2 (lectotype).

Remarks.—This small (5 to 6 mm.), white, well-shouldered and strongly ribbed species is rather common throughout the West Indies, and 2 to 5 specimens were dredged in each of 15 stations at Grand Cayman in coastal sounds at depths of 8 to 18 feet over clean sand.

Subgenus CYROTURRIS Woodring 1928

Mangelia cf **quadrilineata** C. B. Adams 1850

?1850 *Pleurotoma quadrilineata* C. B. Adams, Contrib. to Conch., no. 4, p. 64 (Jamaica); 1950 Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 29, fig. 12.

Remarks.—We have several dozen specimens of a delicate elongate, weakly shouldered, white turrid which compares reasonably well with the lectotype specimen of *quadrilineata*, except that some of our specimens bear only two spiral bands of yellow or are all white. Our specimens show a remarkable variation in ribbing, spiral sculpture and coloring, with intergrades existing at the same station. We believe that they represent one species, and some of the varieties are close matches for *Daphnella elata* Dall (1889, p. 105) and *Cyroturris aptera* Woodring (1928, p. 182).

This species or mixture of species was dredged commonly at 10 stations at Grand Cayman in 8 to 18 feet of water in the coastal sounds.

Subfamily **DAPHNELLINAE**

Genus DAPHNELLA Hinds 1844

Daphnella lymneiformis Kiener 1840

1840 *Pleurotoma lymneiformis* Kiener, Coquilles Vivantes, vol. 5, *Pleurotoma*, p. 62, pl. 22, fig. 3 (l'ile de France [error?]).

1850 *Pleurotoma decorata* C. B. Adams, Contrib. to Conch., no. 4, p. 62 (Jamaica); 1950 Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 29, fig. 4 (lectotype).

Description.—Shell 14 to 17 mm. in length, elongate, thin-shelled, somewhat resembling a *Scaphella* or *Lymnaea* in shape. 1½ nuclear whorls

small, brownish, and with a microscopic, reticulate sculpturing. First four postnuclear whorls with strong axial rows of distinct, round beads, some brown, some white. Last two whorls smoothish except for numerous, fine wavy (rarely beaded) raised spiral threads. Color of shell whitish yellow with yellow-brown mottlings or axial, wavy streaks.

Remarks.—Kiener's name will have to give way to that of Adams' if the type locality of "l'ile de France" [Mauritius] is correct and if the Indo-Pacific species proves to be distinct from our common West Indian species. Two dead specimens were dredged one mile northeast of Palmetto Pt., Grand Cayman.

Subclass OPISTHOBRANCHIA

Order TECTIBRANCHIA — Family **BULLIDAE**

Genus BULLA Linné 1758

Bulla occidentalis A. Adams 1850

Remarks.—We are not convinced that an actual difference exists between the so-called *Bulla striata* Bruguière, *B. amygdala* Dillwyn 1817 and *B. occidentalis*. Intergrades exist in the shape and sculpturing of these species. Most if not all, of our numerous Grand Cayman specimens from 45 stations could be considered *occidentalis*. Over half of our specimens are quite pale in color, while others from more mangrove-like areas are quite dark. They also vary considerably in thickness of shell.

Family **ATYIDAE**

Genus ATYS Montfort 1810

Atys riiseana Mörch 1875

1875 *Atys riisiana* "Dunker" Mörch, Malakozool. Blätter, vol. 22, p. 173 (St. Thomas, St. Martin, New Providence . . . etc.).

1895 *Atys caribaea* Orbigny, Pilsbry, Manual of Conchology, series 1, vol. 15, p. 274, pl. 48, fig. 12a only, (in part, not Orbigny 1841); 1954, Abbott, American Seashells, N. Y., p. 278, fig. 59c.

Description.—Shell 7 to 11 mm. in length, oblong-oval, somewhat more compressed above than below, moderately thick, translucent-white in color. Center of shell smoothish, the ends with about a dozen, fine, spiral, incised grooves. From the center of the narrow, concave vertex rises the distinct plicated, slightly twisted lip. Columella vertical, thickened but not toothed, the edge reflexed, partly concealing the narrow but distinct umbilicus.

Remarks.—Mörch recognized that this species differed from *caribaea* Orbigny, the latter being faintly and spirally grooved in the center of the shell. Mörch's description is very brief, but he likens his *riiseana* to the distinctive and common Indo-Pacific *A. cylindrica* Helbling. ANSP no. 57305 contains six specimens from St. Martin, Lesser Antilles, from R. Swift who probably obtained them from Krebs or Mörch. The original label

read, "*Atys* n. sp. Mörch". One of these six specimens was figured by Pilsbry in the Manual of Conchology (pl. 48, fig. 12a) as *A. caribaea* Orbigny, but was later re-labelled in the collection by Pilsbry as *riiseana* Mörch. *A. caribaea* differs in being smaller (5 to 7 mm.), narrower, more fragile, and in having, in addition to microscopic spiral lines on the center of the shell, numerous microscopic spiral lines on the center of the shell, numerous microscopic axial threads at the upper end.

A. riiseana was found sparnigly at 6 localities at Grand Cayman, in waters from 8 to 20 feet in depth. The Academy collection also contains specimens from Boynton Beach, Florida; off Gun Cay (9 fathoms), Bahamas; and Guadeloupe Island, Lesser Antilles.

Atys caribaea Orbigny 1841

1841 *Bulla caribaea* Orbigny, [in Sagra] Hist. L'Ile Cuba, Mollusques, vol. 1, p. 127 (Martinique, Jamaique, Cuba . . . etc.); 1842, Atlas, pl. 4, figs. 21-24.

?1901 *Atys sharpi* Vanatta, Proc. Acad. Nat. Sci., Phila., for 1901, p. 183 (St. Martin, West Indies), pl. 5, fig. 9.

Remarks.—The distinguishing characters are given under *A. riisiana.* Orbigny's figure is slightly "fatter" than his measurements and description would imply. Only an examination of the type in the British Museum would determine if his species is the common West Indian form which Vanatta later described as *sharpi.* In all likelihood it is. *A. caribaea* is common in the Greater and Lesser Antilles, is present in the Bahamas and southeast Florida, and was dredged in large numbers at 13 stations at Grand Cayman in water from 6 to 18 feet in depth.

Genus HAMINOEA Turton and Kingston 1830

Haminoea petiti Orbigny 1841

1841 *Bulla petitii* Orbigny, [in Sagra] Hist. L'Ile Cuba, Mollusques, vol. 1, p. 130 (Cuba); 1842, Atlas, pl. 4 bis, figs. 13-16.

Description.—Shell fragile, 7 to 10 mm. in length, cylindric-oval, translucent greenish yellow in color, smoothish, except for microscopic growth lines, glistening. Vertex wide, imperforate, usually with chalky yellow callus. Columella thick, whitish, slightly reflected.

Remarks.—This uncommon *Haminoea* was collected alive in large numbers at 5 stations at the southeast end of North Sound, Grand Cayman, in warm, protected waters from 5 to 16 feet over muddy sand and grass.

Haminoea antillarum Orbigny 1841

1841 *Bulla antillarum* Orbigny, [in Sagra] Hist. L'Ile Cuba, Mollusques, vol. 1, p. 124 (Saint Thomas); 1842, Atlas, pl. 4, figs. 9-12.

Description.—Shell 5 to 10 mm. in length, very fragile, very globose with a large, copious aperture. Color translucent yellowish to greenish yellow or whitish. Growth striae moderately coarse; spiral sculpture absent or rarely with a few indistinct scratches.

Remarks.—A moderately common species found from Florida to the Lesser Antilles. A single dead specimen was picked up near mangroves in intertidal waters at South West Point, Grand Cayman.

Haminoea elegans Gray 1825

1825 *Bulla elegans* Gray, Annals of Philosophy (London), new series vol. 9, p. 408 (Mare Britannicum et Mediterraneum).

1895 *Haminea elegans* Gray, Pilsbry, Manual of Conchology, first series, vol. 15, p. 355, pl. 41, figs. 37-39, pl. 40, fig. 88.

Description.—Shell 10 to 20 mm. in length, very fragile, transparent whitish, roundly oval or somewhat cylindrical. With numerous, minute, spiral incised lines. Vertex concave and minutely and deeply perforate. Outer lip arising from the left side of the perforation.

Remarks.—This moderately common species ranges from Florida to Brasil. Single specimens were dredged in 6 to 18 feet off Rum Point, North Sound and West Bay, Grand Cayman.

Genus RHIZORUS Montfort 1810

Rhizorus acutus Orbigny 1841

1841 *Bulla acuta* Orbigny, [in Sagra] Hist. L Ile Cuba, Mollusques, vol. 1, p. 126 (Cuba, Saint Thomas, Jamaique, etc.); 1842, Atlas, pl. 4, figs. 17-20.

1954 *Rhizorus acutus* Orbigny, Abbott, American Seashells, N. Y., p. 281, pl. 26-1.

Remarks.—This is a moderately common species found om North Carolina to the West Indies. Only one dead specimen was dredged in the Duck Pond, North Sound, Grand Cayman. *Bulla acuta* Orbigny is preoccupied by *Bulla acuta* Grateloup 1828, but a new name should not be proposed until *R. minutus* Bush and *aspinosus* Dall have been carefully examined to see whether or not these names might apply to this species.

Family **RETUSIDAE**

Genus RETUSA Brown 1827

Retusa canaliculata Say 1826

Remarks.—It is possible that *R. candei* Orbigny 1841 may be this species or a West Indian subspecies of it. This fairly common, wide-spread species was dredged sparsely at 10 stations at Grand Cayman in 8 to 18 feet of water over sand and grass in lagoons facing the open ocean. For a discussion of the use of the genus *Retusa* see Lemche, 1948, p. 50 (Det Kongelige Danske Videnskabernes Selskab, Biol. Skr., vol. 5, no. 3).

Superfamily *APLYSIACEA*

No attempt was made to collect shell-less mollusks at Grand Cayman, so the absence of some of the common West Indian tectibranchs, such as *Gastropteron, Aplysia, Bursatella, Pleurobranchus,* or any of the nudi-

branchs, must not be considered significant. In all probability, the shell-less opisthobranchs at Grand Cayman Island would consist of about a dozen species, all, as yet, uncollected.

Superfamily *PYRAMIDELLACEA*

Family **PYRAMIDELLIDAE**

Genus PYRAMIDELLA Lamarck 1799

The genus *Pyramidella* Lamarck 1799 is in need of being made a nomen conservatum by the International Commission for Zoological Nomenclature. Forcart has discussed the problem in detail in Archiv. für Moll., vol. 80, p. 85, 1951.

Pyramidella dolabrata Linné 1758

Remarks.—This common West Indian species is moderately common at Grand Cayman where it was dredged alive at 15 stations at depths of 6 to 24 feet where there was sand, broken coral and green algae. It was not dredged in North Sound.

Genus ODOSTOMIA Fleming 1813

Subgenus ODOSTOMIA Fleming 1813

Odostomia laevigata Orbigny 1842 Text-fig. 5.

1842 *Chemnitzia laevigata* Orbigny [in Sagra] Hist. L'Ile Cuba, Mollusques, vol. 1, p. 227, pl. 17, figs. 7-9 (St. Thomas).

1850 *Odostomia ovuloides* C. B. Adams, Contrib. to Conch., no. 7, p. 109 (Jamaica); 1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, pl. 40, fig. 4 (lectotype).

1893 *Odontosomia (Syrnola) caloosaensis* Dall, 1892, Trans. Wagner Free Inst. Sci. Phila., vol. 3, pt. 2, 252, pl. 15, fig. 12b (Pliocene of the Caloosahatchie; living, North Carolina to Florida . . . Bahamas . . . etc.).

1955 *Odostomia acutidens* Dall, Perry and Schwengel, Marine Shells Western Coast Fla., Ithaca, pl. 46, fig. 321 (not description, p. 121). Not Dall, 1884.

1955 *Odostomia (Evalea) pomeroyi* Bartsch, Smithsonian Misc. Coll., vol. 125, no. 2 publ. 4186, p. 84, pl. 17, fig. 2 (Pliocene of North St. Petersburg, Fla.).

1955 *Odostomia (Odostomia) cooperi* Bartch, loc. cit., p. 93, pl. 18, fig. 4 (non Dall and Bartch 1907).

1955 *Odostomia (Odostomia) stearnsi* Bartsch, loc. cit., p. 93, pl. 18, fig. 8 (non Dall and Bartsch in Arnold 1903).

1955 *Odostomia (Odostomia) pinellasensis, bassleri, matsoni, gunteri, schwengelae, stephensoni, conradi,* and *heilprini,* all Bartsch, loc. cit., pp. 87-92.

Description.—Shell 3 to 5 mm. in length, pupoid to elongate-ovate, translucent grayish white (alive) to opaque white or brownish (dead), with 4 to 6 postnuclear slightly rounded whorls; nucleus small and deeply and obliquely buried in the apex. Suture even, slightly to well-impressed. Umbilicus varying from obsolete to chink-like, rarely moderately developed. Spiral sculpture absent or consisting of exceedingly fine incised microscopic lines which may be crossed up equally fine axial lines; rarely with one or

two more prominent, but very fine, spiral, incised lines just below the suture. Parietal callus absent or sometimes moderately-well developed. Columellar tooth weak and sometimes visible only from within.

Remarks.—From several dozen specimens from 8 stations at Grand Cayman Island, it is obvious that this species is quite variable in size, shape, sculpture, and degree of development in the parietal wall, columellar tooth and umbilicus. Dead and fossil specimens usually, although not always, lack any signs of spiral sculpture. *O. acutidens* Dall is less pupoid in shape, with a more angulate base, and with a much stronger and larger columellar tooth. I believe that the astute Dall was correct in crediting his *caloosaensis* with a reasonable degree of morphological variability and reasonably wide distribution both in time and geographically. He was unaware, however, that Orbigny and C. B. Adams had previously named it. It is probably that *O. canaliculata* C. B. Adams, 1850, is also a synonym. One will never be able to ascertain the distinctiveness of Bartsch's *O. emeryi, willcoxi, johnsoni, gabbi, nicoli, burnsi* and *coxi,* all described from the same shovelful of dirt from North St. Petersburg, until more specimens are at hand. Most of these are based upon a single example, and probably represent malformed specimens of this variable species. The caliber of Bartsch's work (which amounts to descriptions of specimens, rather than species) is attested by the homonyms created by him, and the comparative differences described by him in his key (1955, p. 86) and remarks under each species. For instance, " shell small . . *heilprini* " is 2.4 mm. in length (a young specimen), and " shell not small . . . *stephensoni* " is 2.7 mm. in length. In another case: " The much larger size [2.5 mm.] will readily differentiate this species from *Odostomia burnsi* [2.2 mm.]." The latter has 0.9 whorls less than the former. According to this peculiar method of distinguishing " species ", these shells must be incapable of growth, and hence do not vary in size. Such taxonomic work smacks of " species-mongering " and is likely to add to the difficulties of future workers. Unless Bartsch's concept of a species proves to be wrong, we can foresee the day when mollusks will outnumber insects in described species.

As Dall states, this species (like many other species in *Seila, Rissoina, Atys, Haminoea,* etc.) has a range from off North Carolina, the Bahamas and Florida to the Lesser Antilles. It was dredged in moderate numbers in 2 to 12 feet of water over weed and sand bottoms in lagoons facing the open ocean at Grand Cayman.

Genus TRIPTYCHUS Mörch 1875

Triptychus niveus Mörch 1875 Plate 3m.

1875 *Obeliscus (Triptychus) niveus* Mörch, Malakozool. Blätter, vol. 22, p. 159 (St. Thomas; Vieques; St. Martin).

1943 *Triptychus nivens* Mörch, Rehder, Proc. U. S. Nat. Mus., vol. 93, no. 3161, p. 195.

Description.—Shell 6 to 8 mm. in length, slender, pure white in color. Nucleus of 1 large, bulbous smooth whorl. Suture broad and indented. Spiral sculpture of 3 raised, rounded cords on the upper whorls, the 2 uppermost being nodulated, the lower smooth; last whorl with 6 cords, the lower 4 being smooth. Columella with 2 strong spiral cords; aperture produced below.

Remarks.—A dead specimen was dredged in North Sound off Rum Point, and in South West Sound, Grand Cayman. Rehder (1943, p. 195) points out that *T. biseriata* Gabb 1881 is a different species from the Pliocene of Costa Rica. *T. niveus* is moderately common from Southeast Florida to the Virgin Islands.

Genus CINGULINA A. Adams 1860

Cingulina babylonia C. B. Adams 1845

1845 *Chemnitzia babylonia* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 6 (Jamaica). Type lost *fide* Clench and Turner, 1950, p. 259.

1900 *Odostomia* (*Cingulina*) *babylonia* C. B. Adams, Verrill and Bush, Trans. Conn. Acad. Arts Sci., vol. 10, p. 534, pl. 15, fig. 11 (Bermuda).

Remarks.—Our four specimens agree with Verrill and Bush's description and figure. They were dredged in Gun Bay, one in 6 feet, the other in 12 feet of water and at Bluff Bay, Grand Cayman. This may be a Pyramidellid species.

Genus TURBONILLA Risso 1826

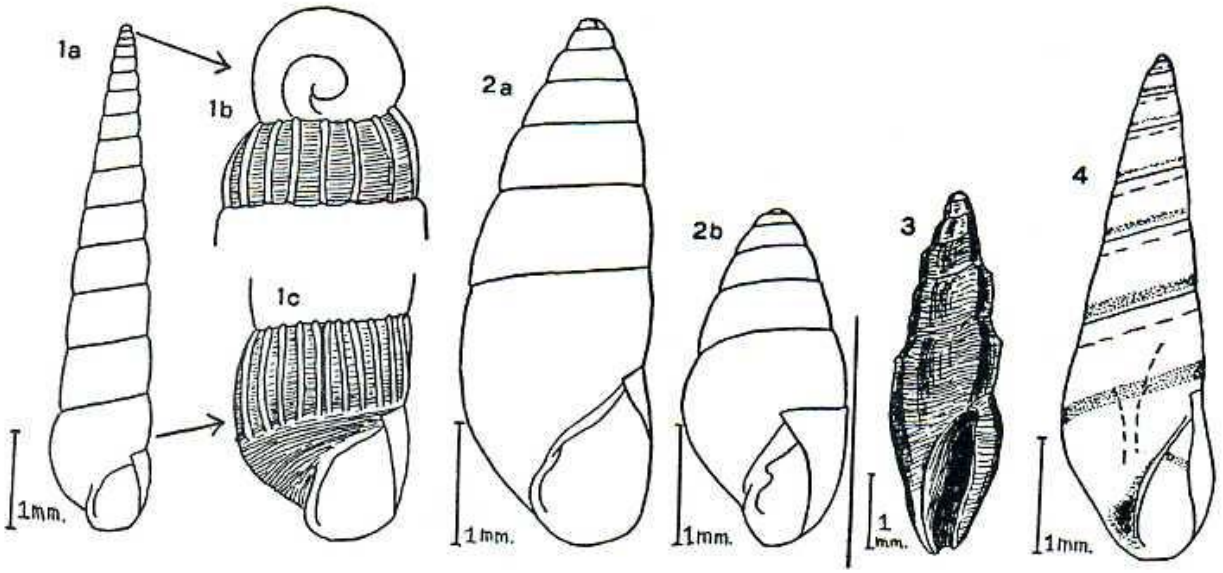
Subgenus PYRGISCUS Philippi 1841

Turbonilla (Pyrgiscus) alfredi new species Text-fig. 5.

Description.—Shell 6.5 to 7.5 mm. in length, elongate-turrited, whitish in color. Nucleus of 2 bulbous, rounded whorls that form a depressed helicoid spire whose axis is at right angles to that of the postnuclear whorls. Postnuclear whorls 11 to 12, flat-sided, bearing numerous vertical, slightly arching, smooth-topped, squarish ribs (28 to 30 on the last whorl; 22 to 24 on the penultimate whorl). On the last whorl, the ribs disappear just below the periphery. Intercostal spaces 1½ times as wide as the ribs. Spiral sculpture between the ribs consists of 35 to 45 microscopic incised lines (also expressed as microscopic raised threads) which also appear on the curved edges of the ribs. There is a single broad incised line located just above the point midway between the suture, and another broader and deeper incised line just above the suture. The latter gives the appearance of a rounded pit between each rib. Base of shell with about 25 spiral, raised, vermiform, threads. Aperture subquadrate; columella short, moderately stout, reflected, and with a weak, oblique fold at its insertion. No spiral lirations seen within the outer lip. Umbilicus chink-like.

Measurements

length	width	no. whorls (postnuclear)	
6.5 mm.	1.4 mm.	11	Holotype, ANSP no. 198692
7.0	1.6	12	Paratype, ANSP no. 198693
7.5	1.6	12	Paratype, Ostheimer collection



Text fig. 5. 1a-c. *Turbonilla* (*Pyrgiscus*) *alfredi* Abbott. Holotype ANSP 198692 from Grand Cayman. a, outline of shell; b, nuclear whorls; c, details of last whorl. 2a and b. *Odostomia laevigata* Orbigny, Grand Cayman. 3. *Ithycythara parkeri* Abbott. Holotype ANSP 198919 from Grand Cayman. 4. *Strombiformis auricincta* Abbott. Holotype ANSP 199840 from Grand Cayman.

Type locality.—South end of North Sound, Grand Cayman Island. Bottom: grass and sand; depth: 9 feet. Alfred J. Ostheimer, 3rd, coll. Nov. 1, 1954.

Types.—Holotype in ANSP no. 198692 from above station. 1 paratype (ANSP no. 198693) in 8 feet of water, over grass and sand, northeast of Booby Point, North Sound, Grand Cayman Island. 1 paratype in the Ostheimer collection from North Sound.

Remarks.—This species resembles *Turbonilla ornata* Orbigny, although, in the latter, the ribs appear to extend well below the periphery and the whorls are more rounded. In shape, our species resembles *T. buteonis* Bartsch 1909 from Massachusetts, but the latter has fewer and more uneven spiral lines, and fewer axial ribs. *T. alfredi* is named after Mr. Alfred J. Ostheimer, 3rd, who has done much to increase our knowledge about mollusks by his many collecting expeditions.

Subgenus STRIOTURBONILLA Sacco 1892

cf **Turbonilla unilirata** Bush 1899

1899 *Turbonilla unilirata* Bush, Proc. Acad. Nat. Sci. Phila. for 1899, p. 165, pl. 8, fig. 6 (St. Thomas).

Remarks.—A single specimen, possibly representing this species, was dredged in 5 feet of water off Governor's Creek, North Sound, Grand Cayman. This species is unique in possessing only one, rather weak spiral thread a little distance below the suture. In our specimen, the axial ribs are

strongly arching, rather crowded, 28 on the last whorl, 22 on the penultimate whorl.

Subgenus MORMULA A. Adams 1864

Turbonilla pupoides Orbigny 1842

1842 *Chemnitzia pupoides* Orbigny, [in Sagra] Hist. L'Ile Cuba, Atlas, pl. 16, figs. 32-36; 1843, text, vol. 1, p. 224 (Cuba and St. Thomas); 1900, Verrill and Bush, Trans. Conn. Acad. Arts and Sciences, vol. 10, p. 531, pl. 15, fig. 21.

Remarks.—A few recently killed specimens of this species were dredged in 12 feet of water in South Channel, Gun Bay, and off Palmetto Point, Grand Cayman.

Family MELANELLIDAE

Genus MELANELLA Bowdich 1822

Subgenus POLYGIREULIMA Sacco 1892

Melanella jamaicensis C. B. Adams 1845

1845 *Eulima jamaicensis* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 6 (Jamaica); 1950, Clench and Turner, Occ. Papers on Mollusks, Harvard, vol. 1, no. 15, pl. 36, fig. 6 (lectotype).

1901 *Eulima conoidea* Kurtz and Simpson, Dall and Simpson, Bull. U. S. Fish Commission for 1900, vol. 1, p. 413. (for true *conoidea*, see Olsson and Harbison, 1953, p. 332).

Description.—Shell 6 to 9 mm. in length, slender, glossy, milk-white, nearly straight, except for the apex which is slightly bent. Whorls 12 to 14, the last sometimes faintly subangulate. Aperture ovate, narrow above, and well advanced in the middle.

Remarks.—This is a common West Indian species which was dredged at 3 stations in 6 to 25 feet of water in the outer reaches of North Sound, Grand Cayman. This is what most American authors call *M. intermedia* Cantraine and *conoidea* Kurtz and Stimpson.

Genus STROMBIFORMIS Da Costa 1778

Strombiformis auricincta new species Text-fig. 5.

Description.—Shell 3 to 5 mm. in length, slender, elongate, polished, with 7 to 10 whorls, the first three or four early whorls increasing slowly in size, the fifth or sixth more rapidly, which lends the outline of the spire a somewhat constricted appearance near the summit. Early whorls well-rounded, others flat to slightly convex. External suture difficult to discern, but the suture inside the shell shows through the semi-transparent shell. Aperture ovate, constricted above. Columella and parietal wall sharp and distinct. Umbilicus broad and shallow, bounded on the left by a pinched, raised basal keel and on the right by the slender, raised columella. Outer lip advanced in the middle, and broadly and slightly flaring below. Color of shell semi-transparent to translucent white with a single, solid, distinct, narrow, spiral band of brownish orange just above the outside suture (but

midway between the more visible internal suture). Base of columella may be tipped with orange.

Measurements

Length	Width	Whorls	
4.6 mm.	1.3 mm.	10 mm.	(Holotype, ANSP no. 199840)
3.5	1.0	8	(Paratype, ANSP no. 199841)

Types and type locality.—One mile northwest of Palmetto Point, northwest Grand Cayman Island, in 6 feet of water over sand. A. J. Ostheimer, 3rd, coll., Nov. 17, 1953. Holotype, ANSP no. 198840; 1 paratype from above, ANSP no. 199841; 1 paratype from off Water Point, North Sound in 9 feet of water, U. S. Nat. Mus. no. 619550; 1 paratype in 8 feet of water, east end of Frank Sound, all Grand Cayman Island. One paratype labelled "West Indies" in ANSP no. 75855.

Remarks.—This distinctive little shell has been known for some years under the name of *acuta* Sowerby. The latter species, however, is from the Pacific side of Central America. Sowerby's original description does not mention the presence of spiral color bands nor any distinctive umbilical characters. For these reasons, we consider the species reported by Dall, Simpson and others from off southeast United States, Cuba and Puerto Rico as hitherto unnamed. All of our specimens possess one orange-yellow band, and we have not seen the unbanded form or species referred to by Dall. *S. bilineata* Alder of the West Indies and Gulf of Mexico has two bands.

Order PTEROPODA

Only one pteropod gastropod was recovered in shallow water at Gun Bay, Grand Cayman. It was *Styliola subula* Quoy and Gaimard (see Abbott, 1954, American Seashells, N. Y., p. 294 fig. 64-o). Other species are probably common offshore.

Class AMPHINEURA

Eleven species of Chitons were collected on rocks on the shores and reefs of Grand Cayman Island. We are listing their identification and occurrences below. Synonymies and descriptions may be found in volumes 14 and 15 of the Manual of Conchology by H. A. Pilsbry (1893-1894). *Chaetopleura reesi* Salisbury 1953 (Proc. Mal. Soc. London, vol. 30, p. 41, pl. 7 from Jackson Point, Grand Cayman) was not obtained. It looks suspiciously like a very young specimen of *Chiton viridis* Spengler.

Ceratozona rugosa Sowerby 1841. Two specimens at Jackson Point.

Cryptoconchus floridanus Dall 1889. One specimen on reef off Old Isaacs.

Acanthochitona spiculosa Reeve 1847. One specimen at South West Point.

Acanthochitona hemphilli Pilsbry 1893. Several specimens at 8 stations on all sides of the island. The largest specimen from rocks at West Bay measured 62 mm. in length.

Callistochiton shuttleworthianus Pilsbry 1893. One specimen at South West Point.

Ischnochiton purpurascens C. B. Adams 1845. One to three specimens at 12 stations on rocks from 3 to 18 feet of water.

Chiton tuberculata Linné 1758. Common at 7 stations on rock shores and intertidal reefs. Every specimen at Grand Cayman has a central brown spot on the fifth middle valve.

Chiton squamosus Gmelin 1791. Common at Jackson Point.

Chiton viridis Spengler 1797 (? *Chaetopleura reesi* Salisbury). Common at 11 stations around the island, especially at Gun Bay.

Chiton marmoratus Gmelin 1791. Several specimens at Jackson Point; South West Point; and Gun Bay Reef.

Acanthopleura granulata Gmelin 1791. Common at 7 stations, especially Jackson Point.

Class SCAPHOPODA

Family **SIPHONODENTALIIDAE**

Genus CADULUS Philippi 1844

Subgenus POLYSCHIDES Pilsbry and Sharp 1897

Cadulus quadridentatus Dall 1881

Remarks.—This moderately common *Dentalium* was obtained sparingly at 4 stations at Grand Cayman at depths from 6 to 48 feet (South West Sound; Georgetown Anchorage; off Sanders Rocks; and off Palmetto Point).

Family **DENTALIIDAE**

Genus DENTALIUM Linné 1758

Subgenus DENTALA da Costa 1778

Dentalium antillarum Orbigny 1842 Plate 5g.

1842 *Dentalium antillarum* Orbigny [in Sagra], Hist. L'Ile Cuba, atlas, pl. 25, figs. 10-13; 1853, text, vol. 2, p. 202 (St. Thomas).

Description.—Shell 20 to 30 mm. in length, solid, roundish in cross-section. Primary ribs 9, but increasing to 12 near the middle, and finally to about 24 near the aperture. Microscopic, transverse lines present between the ribs. Color opaque-white, rarely yellowish or with a greenish tint. Encircled with weak, zigzag bands or tiny spots of translucent gray.

Remarks.—This is a very common *Dentalium* at Grand Cayman where it was obtained at 30 stations at depths from 6 to 48 feet around the island and in North Sound wherever there was a sandy bottom.

Subgenus GRAPTACME Pilsbry and Sharp 1897

Dentalium semistriolatum Guilding 1834

1834 *Dentalium semistriolatum* Guilding, Trans. Linn. Soc. London, vol. 17, pt. 1, p. 34, pl. 3, figs. 1-5; 1920, Henderson, Bull. 111, U. S. Nat. Mus., p. 69, pl. 11, figs. 1-3, 8, 9.

Remarks.—This common, glossy *Dentalium* which is characterized by an apical slit on the side, by fine, longitudinal scratches at the apical third, and by the numerous, milky-white patches was dredged sparsely at 8 stations offshore at depths of 20 to 48 feet. It has been found from Bermuda, southeast Florida and the Bahamas to Barbados.

Class PELECYPODA

Order FILIBRANCHIA — Suborder *TAXODONTA*

Superfamily *ARCACEA*

Family **ARCIDAE**

Subfamily **ARCINAE**

Genus ARCA Linné 1758

Arca zebra Swainson 1833

1833 *Byssoarca zebra* Swainson, Zoological Illustr., Shells, 2nd series, vol. 3, pl. 118 (Jamaica). Not Reeve 1844.

1845 *Arca barbadensis* Orbigny, [in Sagra] Historia La Isla de Cuba, Spanish edition, vol. 5, Moluscos, p. 345 (Cuba).

1847 *Arca occidentalis* Philippi, Abbild. Conch., vol. 3, p. 29. *Arca,* pl. 4, fig. 4 (*ad Cubam*).

1954 *Arca zebra* Swainson, Abbott, American Seashells, N. Y., p. 342, pl. 27n.

Diagnosis.—40 to 75 mm. in length, half as high. Color tan with flecks and zebra-stripe markings of reddish brown. Periostracum brown, matted. Ribs low and of irregular sizes.

Remarks.—Although this is an abundant and widespread species (from Bermuda and off North Carolina to the Lesser Antilles), it is uncommon at Grand Cayman where only 4 single specimens were dredged in 6 to 12 feet of water near the open ocean at the entrance to North Sound.

Arca imbricata Bruguière 1792

1792 *Arca imbricata* Bruguière, Encyclop. Méthod., vol. 1, p. 98 (mer des Indies; cap de Bonne-Espérance; Senegal; refers to Lister, pl. 367, fig. 207 from Jamaica; and to others); 1907, Lamy, Jour. de Conchyl., vol. 55, p. 26.

1819 *Arca umbonata* Lamarck, Anim. sans Vert., vol. 6, p. 37 (Jamaique; refers to Lister, pl. 367, fig. 207); 1954, Abbott, American Seashells, N. Y., p. 342, pl. 27j.

Diagnosis.—20 to 40 mm. in length; similar to *A. zebra,* but with finely beaded ribs and a very large byssal opening. The posterior end is usually more bulbous, the zebra stripes are lacking, and the periostracum may be quite heavy and foliated.

Remarks.—Like *A. zebra,* this common and widespread species is uncommon at Grand Cayman where 5 live specimens were taken under rocks just below low tide mark on the shore reefs. This species has been popularly known as *umbonata* Lamarck.

Genus BARBATIA Gray 1847

Key to the Genus *Barbatia* in the Western Atlantic

a Interior of valves reddish brown ..... *cancellaria*
aa Interior of valves whitish ..... b

b Ligament very small, between umbones ..... *adamsi*
bb Ligament very elongate c

c Prodissoconch, glossy, visible ..... *candida*
cc Prodissoconch not visible ..... e

e Shell thick, coarsely beaded ..... *domingensis*
ee Shell moderately thin, radial ribs finely beaded ..... *tenera*

Subgenus BARBATIA Gray 1847

Barbatia cancellaria Lamarck 1819

1819 *Arca cancellaria* Lamarck, Anim. sans Vert., vol. 6, p. 41 (mers australes?); 1907, Lamy, Jour. de Conchyl., vol. 55, p. 55.
1954 *Barbatia cancellaria* Lamarck, Abbott, American Seashells, p. 343, pl. 27q.

Diagnosis.—15 to 35 mm. in length; rather compressed; characterized by it fine, beaded sculpturing and dark red-brown color throughout, except for a whitish hinge line. Periostracum arranged in radial rows of fine tufts.

Remarks.—This is an exceedingly abundant ark shell at Grand Cayman where it was found at 48 stations among rocks and rubble from low tide mark to 12 feet all around the island, but not in North Sound. *B. barbata* Linné is from the Mediterranean according to Lamy (1907, p. 49).

Barbatia candida Helbling 1779

1779 *Arca candida* Helbling, Abh. Privatges. Bohm, vol. 4, p. 129, pl. 4, fig. 39, 40 (West Indies).
1791 *Arca candida* Gmelin, Systema Naturae, 13th ed., p. 3311 (Oceano Americano; refers to Conchyl.-Cab., vol. 7, fig. 542 which, in turn, refers to Helbling, *loc. cit.*).
1907 *Arca nivea* Chemnitz, Lamy, Journ. de Conchyl., vol. 55, p. 59.
1954 *Barbatia candida* Helbling, Abbott, American Seashells, N. Y., p. 342, pl. 27r.

Remarks.—Although this is a very common and widely distributed Western Atlantic ark (off North Carolina to Brazil), it is quite rare at Grand Cayman where 4 specimens were obtained on reef flats near shore. This is the only West Indian *Barbatia* which clearly shows a smooth, tiny prodissoconch on the umbo.

Subgenus FUGLERIA Reinhart 1937

Barbatia tenera C. B. Adams 1845

1845 *Arca tenera* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 9 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 43, figs. 1-2 (lectotype).
1939 *Arca* (*Barbatia*) *balesi* Pilsbry and McLean, Notulae Naturae, Phila., no. 39, fig. 1a, b (Missouri Kay, Lower Florida Keys).
1954 *Barbatia* (*Fugleria*) *tenera* C. B. Adams, Abbott, American Seashells, N. Y., p. 343, pl. 27k.

Remarks.—A single, live specimen of this moderately common ark was found among rock rubble on the intertidal reef at Gorling Bluff, Grand Cayman. The range of the species is from the south half of Florida and Texas to Venezuela and the Virgin Islands.

Subgenus ACAR Gray 1857

Barbatia domingensis Lamarck 1819

1819 *Arca domingensis* Lamarck, Anim. sans Vert., vol. 7, p. 40 (S. Domingue, Antilles; refers to Lister, pl. 233, fig. 67).
1907 *Arca plicata* Chemnitz, Lamy, Journ. de Conchyl., vol. 55, p. 80-87.
1954 *Barbatia (Acar) domingensis* Lamarck, Abbott, American Seashells, N. Y., p. 343, pl. 27u.

Remarks.—This is the most common ark at Grand Cayman where it was obtained at 8 shallow-water, reef stations. It is a common species from off North Carolina to the Lesser Antilles. None of the Cayman specimens exceed 25 mm. in length. This is *Barbatia reticulata* of authors, not Gmelin 1791.

Genus ARCOPSIS von Koenen 1885

Arcopsis adamsi E. A. Smith 1888

1888 *Arca (Acar) adamsi* "Shuttleworth" E. A. Smith, Jour. Linn. Soc., Zool., vol. 20, p. 499, pl. 30, fig. 6.
1954 *Arcopsis adamsi* E. A. Smith, Abbott, American Seashells, N. Y., p. 344, fig. 26b on p. 80.

Remarks.—This common West Indian species is moderately common at Grand Cayman where it was taken at 16 stations in shallow water near ocean-front reefs and inside North Sound in 6 feet of quiet water over sand and grass bottom. It was dredged dead in depths of 8 to 20 feet.

Subfamily **ANADARINAE**

Genus ANADARA Gray 1847

Subgenus LARKINIA Reinhart 1935

Anadara notabilis Röding 1798

1798 *Arca notabilis* Röding, Mus. Boltenianum, p. 173 (refers to Chemnitz, Conchyl.-Cab., vol. 7, fig. 549 which is from the West Indies).
1843 *Arca deshayesi* Hanley, Cat. Recent Bivalve Shells, p. 157 (footnote); 1844; Reeve, Conch. Icon., vol. 2, Arca, pl. 7, fig. 47; 1907, Lamy, Jour. de Conchyl., vol. 55, p. 218.
1954 *Anadara notabilis* Röding, Abbott, American Seashells, N. Y., p. 344, pl. 27p.

Remarks.—This is *auriculata* of authors, not Lamarck 1816 which is from the Red Sea. It is a common Bermuda, Florida, and West Indies ark which was taken singly and alive at 4 stations in North Sound and Duck Pond in 5 to 15 feet of water on sand and grass bottom. Young specimens (up to 30 mm. in length) are quite quadrate in outline and well endowed

with periostracum, but mature specimens (50 to 70 mm. in length) become more elongate, have a less prominent posterior dorsal edge, and have less periostracum.

Family GLYCYMERIDAE

Genus GLYCYMERIS Da Costa 1778

Subgenus TUCETONA Iredale 1931

Glycymeris pectinata Gmelin 1791

Remarks.—This common species is found from off North Carolina and both sides of Florida, through the Bahamas to the Virgin Islands. It was dredged sparingly at 22 stations in water 6 to 18 feet deep over grass and sand in the ocean-facing lagoons and in most parts of North Sound.

Subgenus GLYCYMERELLA Woodring 1925

Glycymeris decussata Linné 1758

Remarks.—This common West Indian clam was not obtained by the Ostheimers, but Dr. H. G. Richards of the Academy found two dead valves on one of the Grand Cayman beaches.

Family PHILOBRYIDAE

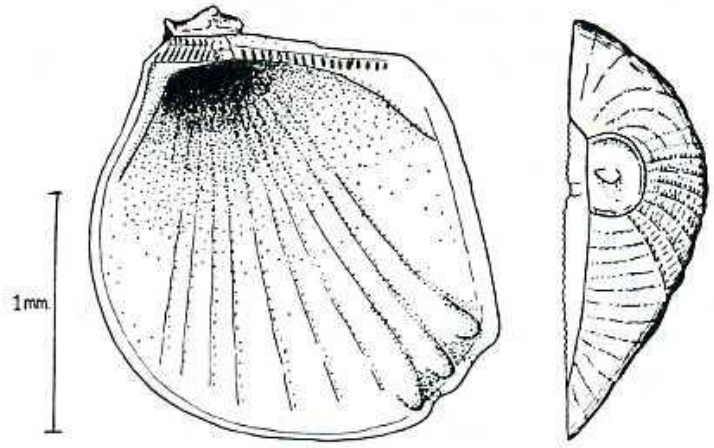
Genus COSA Finlay 1926

1926 *Cosa* Finlay, Trans. and Proc. New Zealand Institute, vol. 57, p. 449 (type by original designation: *Hochstetteria costata* Bernard 1878).

This is the first record that I can find for this genus in the Caribbean area. The hinge of the genotype is beautifully illustrated by Bernard (1897, Journ. de Conchyl., vol. 45, p. 33, figs. 1-4). There are several other very closely related genera in New Zealand and Australian waters which perhaps should be considered subgenera. Our Caribbean species and *C. scabra* Hedley 1906, *C. serratocostata* Powell 1933, *C. laevicostata* Powell 1933, *C. tatei* Hedley 1901 and *C. pectinata* Hedley 1902 lack the lateral teeth exhibited by the genotype. I hesitate to create a special subgenus for this group, since this character may not be of phylogenetic significance. There is one cold-water species with a periostracum from off the southern end of Argentina (*Philobrya atlantica* Dall 1895). It resembles *P. setosa* Carpenter 1864 from the Eastern Pacific.

Cosa caribaea new species Text-fig. 6.

Description.—Shell very small, quadrate, moderately inflated. Color translucent white throughout. Prodissoconch distinctly raised, its diameter about one fourth the length of the hinge, with a sharp raised periphery, and with a small raised spike near the center. Surface of prodissoconch microscopically granulated. Hinge with a small, narrow, slightly oblique ligamental pit anterior to which are 8 or 9 very tiny vertical, narrow teeth and



Text fig. 6. *Cosa caribaea* Abbott. Grand Cayman, ANSP no. 205419 (paratype). Interior and dorsal view of right valve.

posterior to which are about 20 similar teeth. The grooves between the teeth are slightly wider than the teeth. Inner margin of the valves consists of a narrow, thin, flat, smooth rim, except at the lower posterior corner of the valve where it is interrupted by 3 rather large swollen, internal, radial ridges. External sculpture of valves very fine, consisting of numerous, concentric threads which are weakly beaded. Radial sculpture of 11 to 13 larger but weak, rounded, weakly beaded ribs which are concentrated on the middle third of the valve.

Measurements

	Left valve (holotype)	Right valve (paratype)
Length	1.7 mm.	1.5 mm.
Height	1.6	1.5
Width (one valve)	0.5	0.5
Maximum diameter of prodissoconch	0.2	0.2

Types.—Holotype (1 left valve) in ANSP no. 200064; paratype (1 right valve) in ANSP no. 205419.

Type locality.—Dredged dead in sand in 6 feet of water in channel to Bluff Bay, Grand Cayman. A. J. Ostheimer, 3rd, Nov. 16, 1954.

Remarks.—This very small species closely resembles *Cosa scabra* Hedley 1906 in hinge characters. However in the Queensland species, the prodissoconch cap is proportionately larger, the shell is thicker and the sculpture much coarser. *C. caribaea* is unique in having two (left valve) or three (right valve) internal ridges near the lower posterior margin of the shell. Externally, *caribaea* closely resembles *Cratis retiaria* Powell 1937 from off northern New Zealand.

It may be pointed out here that *Limopsis antillensis* Dall 1881 probably belongs to the *Philobryidae*.

Suborder *ANISOMYARIA*

Superfamily *MYTILACEA* Family **MYTILIDAE**

Genus MODIOLUS Lamarck 1799

Modiolus americanus Leach 1815

1815 *Modiola americana* **Leach, Zool. Misc., vol. 2, p. 32, pl. 72, fig. 1 (Oceano Americano).**

1819 *Modiola tulipa* Lamarck, Anim. sans Vert., vol. 6, p. 111.

1955 *Modiolus americanus* Leach, Abbott, American Seashells, N. Y., 2nd printing, p. **351, pl. 351** (in color).

Remarks.—**This** common mussel is uncommon at Grand Cayman where it was obtained dead at two stations in North Sound. This was formerly known as *Volsella tulipa* Lamarck.

Genus BRACHIDONTES Swainson 1840

Subgenus BRACHIDONTES Swainson 1840

Brachidontes citrinus Röding 1798

Remarks.—This common West Indian mussel was collected sparingly at one station in North Sound, Grand Cayman. This is probably what Salisbury (1953, p. 51) recorded from Grand Cayman as *Modiolus demissus* Dillwyn.

Genus BOTULA Mörch 1853

Botula fusca Gmelin 1791

This species was not collected by the Ostheimers. Salisbury (1953, p. 51) reports one example from coral rock in 24 fathoms (?) and at South West Cay, Grand Cayman.

Genus MUSCULUS Röding 1798

Subgenus MUSCULUS Röding 1798

Musculus lateralis Say 1822

Remarks.—A live specimen was found at each of 3 stations in 6 feet of water over sandy silt in the lower half of North Sound, Grand Cayman. This is a much more common species elsewhere (North Carolina to Florida and the West Indies).

Genus LITHOPHAGA Röding 1798

Subgenus LITHOPHAGA Röding 1798

Lithophaga nigra Orbigny 1842

Remarks.—This common, coral-boring Black Date Mussel of the West Indian region was found only at Rum Point, Grand Cayman, although it probably occurs elsewhere on the island in reef areas.

Subgenus DIBERUS Dall 1898

Lithophaga bisulcata Orbigny 1842

Remarks.—This common West Indian species was obtained only on the reef in limestone rocks at Barkers Cay, although it probably occurs commonly elsewhere at Grand Cayman.

Superfamily *PTERIACEA*

Family **ISOGNOMONIDAE**

Genus ISOGNOMON Solander 1786

Isognomon radiata Anton 1839

1839 *Perna radiata* Anton, Verzeichniss der Conchylien, p. 17 (no locality; refers to Chemnitz, Conchyl.-Cab., vol. 7, fig. 579 which is from the West Indies).

1845 *Perna lamarckeana* Orbigny [in Sagra], Historia de La Isla de Cuba, Madrid, vol. 5, p. 360 (Martinica; refers to Lister, pl. 228, fig. 63 and Conchyl.-Cab., vol. 7, fig. 579).

1846 *Perna listeri* Hanley, Illus. Cat. Bivalve Shells, London, p. 259.

1954 *Isognomon radiata* Anton, Abbott, American Seashells, N. Y., p. 358, pl. 35a (in color).

Remarks.—This species is moderately common at Grand Cayman where it was taken in shallow water at 7 stations all around the island.

Isognomon alatus Gmelin 1791

Remarks.—The Ostheimers did not bring back this species which is evidently common on Grand Cayman. Salisbury (1953, p. 51) reports " several batches of specimens from the Mangrove roots in North Sound " This is a widely distributed mangrove species found in Bermuda, Florida, and the West Indies.

Family **PTERIIDAE**

Genus PINCTADA Röding 1798

Pinctada radiata Leach 1814

1814 *Avicula radiata* Leach, Zool. Miscell., vol. 1, p. 98, pl. 43 (in Indiae Occidentalis Mari?).

1954 *Pinctada radiata* Leach, Abbott, American Seashells, N. Y., p. 359, pl. 35c (in color).

Remarks.—This small West Indian pearl oyster was collected sparingly at 9 stations in shallow, inshore waters around Grand Cayman. Most of the specimens were under one inch in length, very fragile and quite oblique in shape. Larger and dark green specimens were found in shallow water in Red Bay, on the south shore.

Family **PINNIDAE**

Genus PINNA Linné 1758

Pinna carnea Gmelin 1791

Remarks.—This common West Indian *Pinna,* which ranges in color from light rose-amber to dark reddish, was found only at Breakers Point, and in sand in 5 feet of water in Frank Sound, Grand Cayman.

Superfamily *PECTINACEA*

Genus CHLAMYS Röding 1798

Chlamys ornata Lamarck 1819

Remarks.—This is a moderately uncommon species found from the Bahamas and southeast Florida to the Lesser Antilles. It was taken in goodly numbers at 23 stations at Grand Cayman, usually near or on coral reefs from low tide mark to 6 feet of water.

Chlamys imbricata Gmelin 1791

Remarks.—This is a moderately common Bermuda, southeast Florida, Bahama to Lesser Antilles species. It is rare at Grand Cayman, one live specimen being found on the reef off Old Isaacs, and a dead valve dredged in 18 feet off Georgetown.

Genus LYROPECTEN Conrad 1862

Lyropecten antillarum Recluz 1853 Map 3; Plate 4m and n.

1853 *Pecten antillarum* Recluz, Jour. de Conchyl., vol. 4, p. 153, pl. 5, fig. 1 (Pointe-a-Pitre, Guadeloupe).

1943 *Pecten (Lyropecten) eulyratus* F. M. Bayer, Nautilus, vol. 56, p. 110, pl. 14, fig. 28 (Biscayne Bay, Florida).

Description.—Shell about 15 to 25 mm. in length and width; valves rather fragile, both nearly flat. 11 to 15 moderately rounded, low ribs; minor radial cords sometimes present between the ribs. Concentric sculpture of exceedingly fine, crowded growth lines. Ears uneven. Color either pastel-yellow, whitish, tawny-orange or light-brown, commonly with chalk-white and brown mottlings, flecks or stripes.

Remarks.—There is considerable variation in the number of ribs and thinness of shell in this species. Our Guadeloupe specimens have 11 to 12 ribs; Cuban, 13; Floridian and Grand Cayman, 11 to 15. This species ranges from southeast Florida and the Bahamas to the Lesser Antilles. It was dredged in goodly numbers only in North Sound at 18 stations over sand and turtlegrass bottom at depths of 5 to 15 feet. This species probably does not belong in this genus.

Genus AEQUIPECTEN P. Fischer 1887

Subgenus PLAGIOCTENIUM Dall 1898

Aequipecten gibbus nucleus Born 1778

Remarks.—Four lots of *Aequipecten* were dredged in shallow water in North Sound. They seem referrable to *nucleus* Born, although a more thorough study of this group may show them to be *Aequipecten gibbus* Linné.

Family **SPONDYLIDAE**

Genus SPONDYLUS Linné 1758

Spondylus americanus Hermann 1781

Remarks.—A few dead valves were found on the beaches at the west end of Grand Cayman. It is probably not uncommon in waters just off the reefs.

Family **LIMIDAE**

Genus LIMA Bruguière 1797

Lima lima Linné 1758

Remarks.—This common and widely distributed species (southeast Florida and the West Indies; and worldwide in tropical waters) was found among rocks on the reef flats facing the ocean at 17 stations around Grand Cayman.

Subgenus CTENOIDES Mörch 1853

Lima scabra Born 1778

Remarks.—Three live specimens of the typical rough form were taken on the reef at low tide at Brinkleys and at Prospect, Grand Cayman. Nine large specimens of the smoother form (*tenera* Sowerby 1843) were taken at 4 reef stations on the south coast.

Subgenus MANTELLUM Röding 1798

Lima pellucida C. B. Adams 1846

Remarks.—Three specimens were obtained on the reef flats at South Sound; Brinkleys; and Gorling Bluff, Grand Cayman. If Mediterranean specimens prove to be the same as our West Indian ones, the name *tuberculata* Olivi 1792 or *imbricata* Risso 1826 will have to be used. This is *inflata* Lamarck 1819, *non* Gmelin 1791. It is not *hians* Gmelin 1791 which is from the Mediterranean.

Genus LIMEA Bronn 1831

Limea bronniana Dall 1886

Remarks.—Single examples were taken in 7 feet of water in Gun Bay and Bluff Bay, Grand Cayman.

Order EULAMELLIBRANCHIA

Suborder ***HETERODONTA*** Superfamily *ASTARTACEA*

Family **CRASSATELLIDAE**

Genus CRASSINELLA Guppy 1874

Crassinella guadalupensis Orbigny 1842

1842 *Crassinella guadalupensis* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 27, figs. 24-26; 1853, text, vol. 2, p. 289 (Cuba, Guadeloupe, Sto. Domingo, St. Thomas).
1845 *Thetis parva* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 9 (Jamaica); 1950, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 44, figs. 5 and 6 (paratype).
1956 *Crassinella martinicensis* Orbigny, Parker, Bull. Amer. Assoc. Petroleum Geologists, vol. 40, no. 2, p. 329, pl. 2, fig. 12. Not of Orbigny 1842.

Remarks.—This moderately common West Indian species was dredged alive within North Sound at 9 stations where the bottom was muddy and the water 6 feet deep. Dead valves were dredged at two stations in 18 feet of water at the outer reaches of North Sound. This is evidently the species which R. H. Parker (1956) obtained off the Mississippi Delta. *C. martinicensis* is much fatter and rarely exceeds a length of 2 or 3 mm. *C. lunulata* is more trigonal and with weaker concentric ridges.

Genus CARDITOPSIS E. A. Smith 1881

Carditopsis smithi Dall 1896

1896 *Carditella smithi* Dall, Bull. Laborator. Nat. Hist. State Univ. Iowa, vol. 4, no. 1, p. 16, fig. 4 (Bermuda); 1900 Verrill and Bush, Trans. Conn. Acad. Sci., vol. 10, p. 517, pl. 63, figs. 6-8.

Diagnosis.—Shell 1.3 to 2.0 mm. in length, resembling a miniature *Cardita dominguensis* Orbigny, but solid orange-brown, with an internal resilium pit, with a raised concentrid ridge on the umbone separating the prodissococonch from the adult shell, and with 10 to 11 fimbriated or beaded radial ribs.

Remarks.—Several dead valves were dredged off North Sound and in 12 feet of water in South Channel, Gun Bay and in Bluff Bay, Grand Cayman.

Superfamily *LUCINACEA*

Family **DIPLODONTIDAE**

Genus DIPLODONTA Bronn 1831

Subgenus DIPLODONTA Bronn 1831

Diplodonta punctata Say 1822 Plate 4d.

Remarks.—This moderately common West Indian species (off North Carolina to Brasil) was taken at 11 stations in 6 to 10 feet of water in sand silt throughout North Sound and in Frank Sound, Grand Cayman. Say's type cannot be found in the Academy's collection. Heilprin's *Mysia pellucida,* which is a synonym, is in ANSP no. 69644.

Subgenus PHLYCIDERMA Dall 1899

Diplodonta semiaspera Philippi 1836 Plate 4g and h.

Remarks.—Only three specimens were obtained at Grand Cayman, one

in the lagoon near Bluff Bay, the others at the north and south end of North Sound in 5 to 6 feet of water.

Family LUCINIDAE

Genus LUCINA Bruguière 1797

Our use of the genus *Lucina* is based upon Anton's designation of *pensylvanica* Linné as the genotype. This makes *Linga* Gregorio a synonym.

Subgenus LUCINA Bruguière 1797

Lucina pensylvanica Linné 1758

Remarks.—Large live specimens were dredged commonly at 15 stations in the north half of North Sound, in Frank Sound, West Bay, and the east end of Grand Cayman in 6 to 40 feet of water over clear sand and sparse algae. Small dead specimens were dredged at 9 other stations near reefs. Some specimens were stained with a rose blush. The fimbriations on the outside of the valves are calcareous in nature.

Genus ANODONTIA Link 1807

Subgenus ANODONTIA Link 1807

Anodontia alba Link 1807

1807 *Anodontia alba* Link, Beschr. Natur.-Samml., Rostok, p. 156 (no locality; refers to Conchyl.-Cab., vol. 7, figs. 410, 411 error).

1845 *Lucina chrysostoma* "Meusch" Philippi, Zeitschr. für Malak., vol. 2, p. 181; 1847, Abbild. Conch., vol. 2, p. 206, Lucina, pl. 1, fig. 3, 1920, Lamy, Journ. de Conchyl., vol. 65, pp. 86-89.

1954 *Anodontia alba* Link, Abbott, American Seashells, N. Y., p. 389, pl. 38f (in color).

Remarks.—In his original description, Link referred to Gmelin's *Venus edentula* (p. 3286, no. 80), but, in copying the figure reference, he evidently made the error of using the Conchyl.-Cab. figure 410 and 411 which Gmelin listed directly above in *Venus scripta*. The correct figure is pl. 40, figs. 427-429.

This species is uncommon at Grand Cayman, where it was taken sparingly, and not alive, in shallow, warm water 5 to 6 feet deep in the southern half of North Sound.

Genus CODAKIA Scopoli 1777

Subgenus CODAKIA Scopoli 1777

Codakia orbicularis Linné 1758

Remarks.—This widely distributed clam (Bermuda, Florida and the West Indies) is common and grows to a large size at Grand Cayman. It was taken at 33 stations around the island and in North Sound, large adults being found in sandy-mud near shore and young dredged in 5 to 20 feet of water.

Subgenus CTENA Mörch 1860

Codakia orbiculata Montagu 1808 Plate 4r.

1808 *Venus orbiculata* Montagu, Testac. Brit., suppl., p. 42, pl. 29, fig. 7 (Dunbar, England [error]).

1901 *Codakia (Jagonia) orbiculata* Montagu, Dall, Proc. U. S. Nat. Mus., vol. 23, no. 1237, p. 799.

1920 *Codakia (Jagonia) imbricatula* C. B. Adams, Lamy, Journ. de Conchyl., vol. 65, p. 249.

1954 *Codakia (Ctena) orbiculata* Montagu, Abbott, American Seashells, N. Y., p. 391, pl. 30-1.

Remarks.—There is a difference of opinion concerning the correct name of this species. If the Senegal, West Africa, species *C. eburnea* Gmelin proves to be distinct from our West Indian species, the name *orbiculata* may continue to be used. I am inclined, on the basis of published figures of West African specimens (Delessert, 1841, pl. 6, fig. 8 and Fischer, Germain and Pallary, 1942, pl. 14, fig. 11), to agree with Lamy (1920, p. 249) and Recluz (1869, p. 40) that the species are different. Dall, however, considered them the same, but overlooked Gmelin's *eburnea*. We agree with Dall that Montagu's specimens were from the West Indies.

Codakia orbiculata ranges from Bermuda to Brasil. It is common at Grand Cayman, where it was taken at 32 stations all around the island and throughout North Sound in quiet lagoon waters of 3 to 20 feet in depth.

Codakia pectinella C. B. Adams 1852

1852 *Lucina pectinella* C. B. Adams, Contrib. to Conch., no. 12, p. 246 (Kingston Harbor, Jamaica); 1952, Clench and Turner, Occ. Papers Moll., Harvard, vol. 1, no. 15, pl. 46, figs. 9, 10 (lectotype).

Remarks.—This species closely resembles *C. costata* Orbigny, but differs in being smaller (does not exceed 8 mm. in length), in having an elongate rather than a heart-shaped lunule, in having the concentric sculpture stronger than the radial ribs in the umbonal region, in having a much weaker (although not absent, as Dall stated) right anterior cardinal, and the entire shell, especially the young, being more tumid. The young of 3 to 4 mm. in length are fairly fragile, elongate and quite fat (resembling an Indo-Pacific *Fimbria fimbriata* L. in shape). It is possible that *C. portoricana* Dall 1901 is this species.

Codakia pectinella is rather rare, having been recorded from Jamaica, Puerto Rico and Argentina (by Dall, 1901, p. 800). It was dredged in 10 feet of water near the Main Channel and near the Duck Pond, North Sound, Grand Cayman.

Codakia costata Orbigny 1842 Plate 4s.

1842 *Lucina costata* Orbigny [in Sagra], Historia La Isla de Cuba, vol. 5, pl. 27, figs. 40, 41; 1845, ibid., p. 330 (Habana, Santo Tomas, etc.); 1846, Moll. Voy l'Amer. Merid., p. 586, no. 641.

1850 *Lucina antillarum* Reeve, Conch. Icon., vol. 6, pl. 10, fig. 37 (St. Croix).
1920 *Codakia costata* Orbigny, Lamy, Journ. de Conchyl., vol. 65, p. 262; 1954, Abbott, American Seashells, N. Y., p. 390.

Remarks.—This small common species was dredged at 32 stations in sand at depths of 5 to 20 feet in North Sound and the shallow lagoons around Grand Cayman. Its range is from off North Carolina to the West Indies.

Genus DIVARICELLA von Martens 1880

Subgenus DIVARICELLA von Martens 1880

Divaricella quadrisulcata Orbigny 1842

Remarks.—This is the commonest of the Lucinid clams at Grand Cayman, where it was dredged at 45 stations in sand at depths of 5 to 30 feet in clear ocean water in the north half of North Sound and offshore around the entire island. Nearly all of the Cayman specimens possess minute denticles on the inner edges of the valves. We believe a thorough study of this species and *D. dentata* Wood 1815 may show that the latter is merely an ecologic or senile form. Intergrades exist in some Bahama localities.

Superfamily *CHAMACEA*

Family **CHAMIDAE**

Genus CHAMA Linné 1758

Three small specimens of *Chama* were dredged in 20 feet of water off the west end of Grand Cayman. In all likelihood they are *C. congregata* Conrad.

Chama sarda Reeve 1847

1847 *Chama sarda* Reeve, Conchologica Iconica, vol. 4, Chama, pl. 7, fig. 40 (Honduras [Atlantic side]).

Diagnosis.—Shell about 1 inch in size, somewhat orbicular; attached valve deeper than the free one; surface bearing subconcentric rows of wavy scales; color whitish with strong, curving radial rays of bright coral-red or crimson; muscle scars rather long; border of valves faintly crenulated.

Remarks.—Dead, beach-worn specimens of this colorful Chama were found on the north shore beaches by Dr. H. G. Richards in 1952.

Superfamily *CARDIACEA*

Family **CARDIIDAE**

Subfamily **TRACHYCARDIINAE**

Genus TRACHYCARDIUM Mörch 1853

The scarcity of *Trachycardium* in the waters of Grand Cayman is most surprising. Only two dead valves of *T. magnum* Linné were collected. *T. muricatum* Linné which is very common throughout the West Indian region,

including nearby Cuba, was not obtained.

Trachycardium magnum Linné 1758

1758 *Cardium magnum* Linné, Systema Naturae, ed. 10, p. 680 (Jamaica).
1944 *Trachycardium* (*Acrosterigma*) *magnum* Linné, Clench and Smith, Johnsonia, vol. 1, no. 13, p. 5, pl. 4, figs. 1-2.

Description.—Shell from 55 to 70 mm. in height, moderately inflated, dorso-ventrally elongate, almost equilateral, and bearing 32 to 35 strong, slightly rounded radial ribs which are very weakly beaded on their sides. The anterior 10 ribs are closely, but weakly, beaded on their top surface. Color of shell white to cream with numerous purplish or orange-brown to buff mottlings. The posterior quarter of the valve is a solid orange-brown. Interior china-white, sometimes with a blush of yellow to light orange in the umbonal region. Periostracum thin, brownish, translucent, strongest on the posterior slope of the valve.

Remarks.—Rare on Grand Cayman. Clench and Smith (1944) have discussed in detail the synonymy of this species which includes *leucostomum* Born 1780, *marmoreum* Lamarck 1819, *elongatum* Sowerby 1831, and *subelongatum* Sowerby 1840. We doubt if this species properly belongs in the subgenus *Acrosterigma* Dall 1900, and believe it could be considered a *Trachycardium* s. s. This is a widespread species ranging from the Lower Florida Keys and the Bahamas to Brasil. Two dead but fresh valves were found on the beach near Low Point at the northwest end of Grand Cayman Island.

Genus PAPYRIDEA Swainson 1840

Only one of the two common and only known species of this genus in the Western Atlantic was found at Grand Cayman Island. Keen (in the Minutes of the Conchological Club of Southern California, no. 111, p. 7, 1951) includes *Papyridea* in the subfamily Trachycardiinae, but it is possible that it belongs in another subfamily on the basis of the shell and soft parts (see Pelseneer, 1911, p. 57).

Papyridea semisulcata Gray 1825

Remarks.—This is a rather uncommon shell found at depths from 1 to 300 fathoms (Dall, 1889, p. 54). *P. petitianum* Orbigny 1846 is merely the orange form. Its range is southern Florida, Bermuda, and south through the West Indies to Trinidad (Clench and Smith, 1944, p. 18). At Grand Cayman it was found off Low Point, near Georgetown in 8 fathoms in sand (1 fresh valve); lagoon at Old Man Bay in 9 feet (1 orange valve); lagoon off Conch Point in 6 feet (1 white valve).

Subfamily **FRAGINAE**

Genus TRIGONIOCARDIA Dall 1900

Ralph Steward (1930, p. 267) has given an excellent account of the gen-

eric differences between *Trigoniocardia* Dall, *Americardia* Stewart and *Fragum* Röding. The latter genus, found in Indo-Pacific waters, is considered a distinct genus by virtue of its having cardinals of equal size. In the American genera, especially *Trachycardium,* the cardinals are very unequal in size. The first two genera are separated as follows (by Steward, McLean 1939 and Clench and Smith 1944):

1. Hinge having the anterior laterals rather close to the cardinals and the posterior laterals more remote ..... *Trigoniocardia.*
2. Hinge having the anterior laterals almost as far removed from the cardinals as the posterior laterals ..... *Americardia.*

Unfortunately, *Americardia guppyi* Thiele is midway between in these hinge characters. In fact, Clench and Smith placed this species under *Trigoniocardia* s. s. We believe, however, that Dall's *Trigoniocardia* represents a rather homogenous group with the anterior laterals very close to the cardinals, and, perhaps more important, being small, solid, all-white shells with a few larger ribs on the disc and having much more prominent, neater, concentric riblets between the ribs. *Americardia,* on the other hand, are well-pigmented shells, with the anterior laterals moderately or well removed from the cardinals, with lower, more evenly rounded or square-topped ribs. The ribs in *Trigoniocardia* tend to be narrow at the top and bear numerous, crowded, smooth beads, while in *Americardia,* there are microscopic, concentric striae between the less frequent beads.

Trigoniocardia antillarum Orbigny 1842

1842 *Cardium antillarum* Orbigny, [in Sagra], Hist. L'Isle Cuba, Atlas, pl. 27, figs. 53-55; 1853, text, vol. 2, p. 309 (Cuba; Jamaica; Martinique and Guadeloupe).
1886 *Cardium ceramidum* Dall, Bull. Mus. Comp. Zoöl., vol. 12, "Blake Report", p. 269, pl. 4, fig. 6 (off Habana, Cuba).
1944 *Trigoniocardia ceramidum* Dall, Clench and Smith, Johnsonia, vol. 1, no. 13, p. 20, pl. 11, figs. 5-6.

We do not have this species from the Cayman Islands. There has been confusion concerning the true identity of *antillarum* Orbigny. We believe Dall (1901, Proc. U. S. Nat. Mus., vol. 23, no. 1214, p. 387) was correct in assigning his *ceramidum* to the synonymy of this species. Clench and Smith 1944, and McLean (1939, Mem. Soc. Cubana Hist. Nat. F. Poey, vol. 13, p. 166) misconstrued *antillarum* to mean the small, colored *Americardia* that we now call *guppyi* Thiele. Orbigny's description is poor and he unfortunately figured a specimen which approaches *guppyi* in outline. However, the number of ribs, the nature of the lunule and eschuteon, the frequency of beads on the ribs, its white color and inflated nature all point towards the *Trigoniocardia ceramidum* of Dall.

As Clench and Smith state, the species [our *antillarum*] is quite variable in shape, and is remarkable because some forms resemble fossil species de-

scribed from the West Indies by Dall. ANSP no. 157868 from Icacos Peninsula, Cuba, 3 fathoms contains forms resembling *T. aminense* Dall 1900 and *T. maturense* Dall 1900.

T. antillarum Orbigny is white in color, considerably inflated, with 16 to 18 ribs, of which the 5 or 6 middle ones are extra large, with bead, but without concentric threads, and with strong, concentric smooth bars or riblets between the ribs.

Genus AMERICARDIA Stewart 1930

There are three species in the West Indian region, the genotype *Cardium medium* Linné (by original designation by Stewart), *guppyi* Thiele, and one fossil species *A. burnsi* Dall 1900 from the Chipola of Florida. We are also including in this genus *A. speciosa* Adams and Reeve 1850 which is closely allied to *media* Linné, and *A. exigua* Gmelin 1791 of the Eastern Atlantic which is very closely allied to *A. guppyi*.

Americardia media Linné 1758

1798 *Cardium medium* Linné, Systema Naturae, ed. 10, p. 678 (Indian Ocean; refers to Lister pl. 316, fig. 153).

1954 *Trigoniocardia medium* Linné, Abbott, American Seashells, N. Y., p. 398, pl. 39m (in color).

Description.—Shell varying from 20 to 50 mm. in length, heavy, inflated, quadrate to obliquely quadrate and strongly ribbed. External color whitish or with numerous mottlings, and spots of orange-brown, purplish brown, orange or yellow. Interior whitish to cream, sometimes with a flush of yellowish. Posterior slope flattened and slightly concave. Ligament prominent, dark-brown. Lunule small, poorly defined, and generally bears 2 to 4 black-brown color streaks. Eschuteon not defined. 33 to 37 radial ribs are squarish on top, the interstices half the width of the ribs. Top of ribs, when specimen is fresh, bear numerous raised, concentric, arched, slightly fimbriated scales, but generally smooth in large or worn specimens. Interstices with much finer or obsolete, concentric, crowded striae. Margin strongly serrated.

Type locality.—Habana, Cuba (selected by McLean, 1939, p. 167).

Remarks.—Although this is a common West Indian species, it appears to be uncommon on Grand Cayman. Small, white live specimens were dredged from 8 to 18 feet in sand. Young specimens may be distinguished from *A. guppyi* by the strongly flattened posterior slope, white interior, higher umbones and the presence of the 33 to 37 weakly-beaded, instead of 26 to 28 strongly-beaded radial ribs. Its range is Bermuda, North Carolina and south through the West Indies to Brasil. The Grand Cayman records are: southwest of Water Point, North Sound, in 18 feet on grass and sand bottom, 3 live specimens; beach valves at South West Point; 8 feet, west of Rum Point, North Sound.

Americardia guppyi Thiele 1910 Plate 4o and q.

1910 *Cardium guppyi* Thiele, Zool. Jahrbücher, Suppl. 11, pt. 2, p. 129, pl. 9, figs. 25-26 (Barbados).

1939 *Trigoniocardia antillarum,* McLean, Mem. Soc. Cubana Hist. Nat., vol. 13, p. 166, pl. 25, figs. 7-8. Not Orbigny.

1944 *Trigoniocardia antillarum,* Clench and Smith, Johnsonia, vol. 1, no. 13, p. 19, pl. 11, figs. 3-4. Not Orbigny.

I am placing this Recent species, the Florida fossil *Cardium* (*Fragum*) *burnsi* Dall 1900 and the Mediterranean Recent *exigua* Gmelin 1791 in the genus *Americardia*. The hinge-teeth characters of *guppyi* are midway between those of the type of *Americardia* and *Trigoniocardia,* but the coloration and sculpture are more like *Americardia media* than that of *Trigoniocardia.*

Description.—Shell small, moderately heavy, varying from 6 to 15 mm. in length, subquadrate and strongly ribbed. External color cream or maculated with reddish brown or purplish. Interior cream or with a weak or strong patch of purple or purple-brown, and usually with two or three small red-brown dots on the hinge. Umbones prominent, subcentral and usually white. Ligament short, prominent and tan in color. Lunule narrowly ovate, larger on the right valve, and with a striated surface. Eschutcheon narrow, elongate, bordered in the right valve by a very broad, fimbriated rib. 26 to 28 radial ribs are sharply raised, rounded on top and bear, in addition to crowded, microscopic inverted-moon-shaped striae, rather prominent, swollen, rounded, sometimes fimbriated beads. The latter are more pointed or scaled at the posterior end of the shell. The channels between the ribs are as wide as the ribs, are squarish and sculptured with fine, distinct, concentric, raised cords (about 10 per mm. at the center of the disc). Margin of shell strongly serrated.

Remarks.—This species has been mistaken for *Trigoniocardia antillarum* Orbigny. See remarks under the latter. *Americardia exigua* Gmelin 1791 is the Mediterranean representative of *guppyi.* The type locality of the latter is Barbados. Its range is the lower Florida Keys, Bahamas through the Antilles to Barbados.

Records.—FLORIDA: Grassy Key (ANSP 89502). For BAHAMA, CUBA and VIRGIN ISLAND records see Johnsonia, vol. 1, no. 13, p. 20. JAMAICA: Port Royal (ANSP 95516). GRAND CAYMAN: abundant, alive, 5 fathoms, sand and broken coral bottom, with *Lucina pensylvanica* Linné, 75 yards off Mactaggart's, Georgetown (Ostheimer); 8 fathoms, alive, abundant, ⅓ mile off "The Stack", Georgetown (Ostheimer). Dredged, dead valves, common at 14 other stations around Grand Cayman, 1 to 2 fathoms (Ostheimer); 3 fathoms, entrance to South West Sound (Ostheimer, 1954). LESSER ANTILLES: Tobago (Wesley Heilman, 1957).

We have examined (through the kindness of Dr. N. T. Mattox of the Allan Hancock Foundation) the soft parts of the type species of *Trigoniocardia* (*granifera* Broderip and Sowerby) from Concepcion Bay, Lower California. They differ little from *Americardia,* except that the inner gills and the palpi are proportionately very much larger. The foot has no prominent byssal pore, nor any evidence of a byssus, and the median line bears a series of 4 to 6 distinct, although not very large, fleshy hooks or spurs. The

mantle edge and siphons are very similar. The soft parts of *Trigoniocardia obovalis* Sowerby from off San José Light, Guatemala (Allan Hancock Foundation) are hardly separable from those of *T. granifera*, except that the median line of the foot bears 10 to 11 fleshy spurs, instead of 4 to 6. The fan-shaped palpi of both species bear 11 to 14 thick, rounded ridges or lamellae.

On the basis of shell and soft part characters we are considering *Trigoniocardia* as a distinct genus and would include such Atlantic species as *antillarum* Orbigny 1846 (synonym: *ceramida* Dall 1886, (Recent)), *casta* Guppy 1866, (Tertiary), *haitensis* Sowerby 1849 (Tertiary), *galvestonensis* Harris 1895 (Tertiary), *callopleura* Gabb 1881 (Tertiary), *alicula* Dall 1900 (Tertiary), *simrothi* Dall 1900 (Tertiary), *aminensis* Dall 1900 (Tertiary), *maturensis* Dall 1900 (Tertiary), *apatetica* Dall 1900 (Tertiary) *willcoxi* Dall 1900 (Tertiary), and such Eastern Pacific species as *granifera* Broderip and Sowerby 1829 (Recent), *obovalis* Sowerby 1833 (Recent), *ovuloides* Reeve (Recent), *cabopasada* Pilsbry and Olsson 1941 (Tertiary), and *spiekeri* Hanna and Israelsky. There appears to be a gradation in shape among the fossil species between the ovate *granifera* and the oblique *obovalis*.

The soft parts of *Americardia guppyi* are of the general type found in the family, but are unique in a few characters. The inhalent siphon is merely a horseshoe-shaped thickening of the mantle edges, with its ventral end open. The inhalent siphon is complete, very slightly raised and surrounded by about 8 pairs of moderately long mantle digitations. The ventral mantle edge has two edges, an inner one with numerous, very small digitations, and an outer one which consists of about 17 to 20 large undulations behind each of which is a tuft of four-fingered digitations. The foot is large and bears on its dorsal and distal third a series of exceedingly fine papillae along the median line. In most adult specimens, a byssus was present, originating from the byssal pore and consisting of one to a dozen brownish, hair-like strands, sometimes equal in length to that of the shell (6 mm.). The two pairs of palpi are proportionately very small, in some cases being half the diameter of the posterior muscle scar. The palpi, however, increase in proportionate size with the age and size of the entire animal. The inner surface of each pulpus bears from 4 to 6 indistinct, obliquely slanting ridges or lamellae.

The soft parts of *Americardia media* bear close resemblance to those of *guppyi*. The mantle of *media* differs only in having two instead of four-fingered digitations behind the large undulations on the inner edge. The foot, in the few specimens we have examined, lacks a byssus, although the byssal hole is relatively large and is bordered by a strong spur of flesh. The palpi are proportionately much larger and bear about 12, instead of 4, raised ridges on the inner surface.

We have examined the soft parts of the type genus of the subfamily Fraginae, and find that they have an incomplete inhalent siphon. We were unable to obtain animals of *Fragum fragum* Linné, but that of *Fragum unedo* Linné from Palm Island, Queensland, Australia, while showing strong affinities to *Americardia*, differed in having an undulating mantle edge without the finger-like appendages along the ventral margins. The exhalent siphon is bordered with 6 to 8, moderately developed mantle digitations as in *Americardia*, but the inhalent siphon is bordered only by a thick, broad, papillose, horseshoe-shaped pad. There is a byssal pore and behind it a raised spur as in *Americardia media*. The gills and palpi are similar. The open inhalent siphon has been recorded by Pelseneer (1911, Siboga-Expeditie, vol. 53a, pp. 54-57) for *Corculum cardissa* Linné, *Fragum fragum* Linné, *Hemicardia* (*Hemicardia*) *hemicardia* Linné, *Ctenocardia* (*Ctenocardia*) *perornata* Iredale (the same as *imbricata* Sowerby and very close to the type of the genus, *hystrix* Reeve 1844, non Solander 1786 and non *symbolica* Iredale 1929), *Hemicardia* (*Lunulicardia*) *retusum* Linné, and *Americardia exigua* Gmelin. Pelseneer also points out that all of the Cardiidae with one complete siphon lack the highly developed pallial eyes. Although we are not in a position to offer a reclassification of the family, we believe that there may be anatomical justification for making a major division consisting of those now in the Fraginae and, on the other hand, those in Keen's other four subfamilies (Cardinae, Protocardiinae, Trachycardiinae, and Laevicardiinae).

In connection with this work, we found a great similarity in the two, raised, complete siphons of *Laevicardium laevigatum* Linné and *Laevicardium* (*Dinocardium*) *robustum* Solander. Soft parts of *Nemocardium* (*Microcardium*) *peramabilis* Dall showed two distinct and complete siphons which, however, do not have very greatly raised edges. The *Trachycardium* species have two complete but short siphons, while *Cerastoderma edule* Linné has two complete but very long siphons which are connected at their bases.

Subfamily **LAEVICARDIINAE**

Genus LAEVICARDIUM Swainson 1840

Laevicardium laevigatum Linné 1758

This is one of the dominant species in Grand Cayman wherever there are protected waters and grassy bottoms mixed either with mud or sand. Largest specimens and the heaviest populations were found in North Sound in 1 to 3 fathoms of water.

Because Olsson and Harbison (1953, p. 107) refer to this species as *L. vitellinum* Reeve, we made a careful study of all the specimens in the Academy in an attempt to ascertain how many species or subspecies are living today in the West Indian region. We agree with Olsson and Harbison that

the Reeve's type will have to be examined if the name *vitellinum* is to be used for the common Egg Cockle of Florida, the Bahamas and the Antilles. Reeve (Conch. Icon., vol. 2, fig. 1) calls this species *serratum* Linné, and we would judge that his figure 37 of *vitellinum* is the form that Olsson and Harbison call *laevigatum*. Hence, we doubt that wisdom of applying Reeve's name to our Grand Cayman Island form.

There are a number of interesting characters that can be used in this species. It would appear that the Pliocene and Pleistocene parent stock (*L. laevigatum wagnerianum* Olsson and Harbison 1953 and Pleistocene specimens of the *glabratum* Romer or *multilineatum* Dall and Simpson 1901) of our Egg Cockles are unique in having the following characters: numerous underlying patterns of fine radial riblets; absence of several fine, raised, radial threads on the escutcheon area of the left valve; a calcareous bar above the anterior half of the hinge which juts up abruptly and is closely oppressed to the umbo; the calcareous ligamental bar is less than one half the distance between the cardinals and the posterior lateral.

An extreme contrast to these characters is found in Grand Cayman, Florida, Bahama and Lesser Antilles specimens. The shells are more oblique, generally lack signs of the underlying radial riblets, possess one to four fine, raised threads on the escutcheon area of the left valve; the calcareous bar above the anterior half of the hinge rarely juts up at right angles and rarely is oppressed to the umbo; the ligamental support in tinted with purple and is more than one half the distance between the cardinals and the posterior lateral.

However, difficulties arise when examination is made of specimens from various localities in the West Indian-Florida region. It would appear that the fossil form which once had a wide distribution has contributed one or more of its distinctive characters to the Recent populations at random and without any particular geographical pattern. Specimens from northwestern Florida may have the anterior bar high and oppressed to the umbo like the fossil forms, but have a long, purple-tinted posterior bar as in the Grand Cayman specimens. The other characters also turn up sporadically in other widely scattered localities, so that it seems impossible to recognize distinct subspecies. It would be best to consider the various combinations in Recent material as forms.

Eschutcheon threads are usually present in Cayman shells, but in about ten percent of them they are absent. The range of this species is from Bermuda and North Carolina to Brasil.

Records.—GRAND CAYMAN: abundant at 12 stations in North Sound in 5 to 15 feet; moderately common at 9 stations in 1 to 9 fathoms; at the west end of the island; uncommon in Frank Sound and Bluff Bay (east end of island).

Specimens from muddy areas near mangroves are more darkly pig-

mented and thinned-shelled than those from sandy areas near the open ocean.

Superfamily *VENERACEA*

Family **VENERIDAE**

Subfamily **VENERINAE**

Genus ANTIGONA Schumacher 1817

Subgenus DOSINA Gray 1835

Antigona listeri Gray 1838

Remarks.—A single large adult was found on the mud and turtlegrass flats at Blakes, Gun Bay, Grand Cayman. This is a moderately common West Indian species.

Genus CHIONE Mühlfeld 1811

Subgenus CHIONE Mühlfeld 1811

Chione cancellata Linné 1758, form **mazycki** Dall 1902

Remarks.—We have treated the common Grand Cayman form which has rose beaks and a rose to rose-brown interior as an ecologic form which probably occurs wherever there is clear sand and water. *C. cancellata* exhibits various sculptural and color forms, some of which seem to have a limited geographical distribution. Shells with nearly all-white interiors and with exteriors with heavy mottlings and a brownish lunule are found in Puerto Rico, the Virgin Islands and Lesser Antilles. Specimens from inshore United States localities from North Carolina to Texas are usually heavily marked with purple on the inside. The *mazycki* form is very prevalent at Grand Cayman, and appears sporadically in collections from the Bahamas and southward to Brazil (Dall, 1902, p. 373). The Cayman specimens are a little more fluted in their concentric sculpture than that the specimen of *cancellata* illustrated in American Seashells, pl. 39h.

This species was taken in goodly numbers at 48 stations at depths from 5 to 30 feet over sand. Both white and rose colored umbones are present, although the latter was dominent only in Frank Sound and at the east end of the island.

Subgenus TIMOCLEA Brown 1827

Chione pygmaea Lamarck 1818

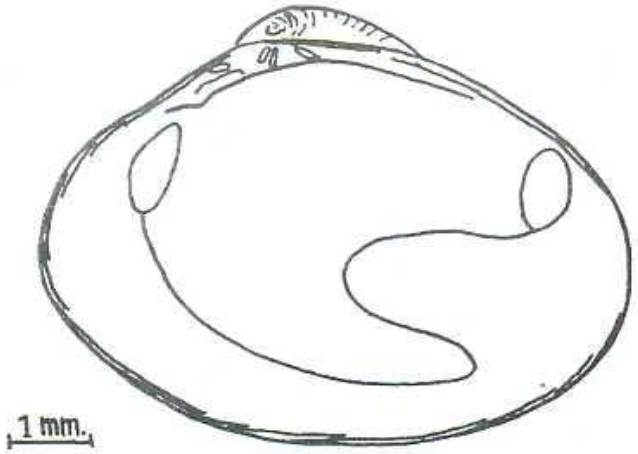
Remarks.—The range of this moderately common species is from southeast Florida to the Bahamas and throughout the Caribbean region. It was taken sparingly at 12 stations at depths of 9 to 48 feet off the west and north coast of Grand Cayman. It was not found in North Sound. *Cardita ovata* C. B. Adams 1845 and *Venus inaequivalvis* Orbigny 1842 are synonyms.

Subfamily MERETRICINAE

Genus TRANSENNELLA Dall 1883

Transennella gerrardi new species Text-fig. 7; Plate 4a-c.

Description.—Shell 8 to 10 mm. in length, solid, subtrigonal, with elevated beaks at the anterior third, moderately inflated, and equivalve. Prodissoconch not sharply delineated, moderately inflated, oval in shape, with microscopic, crowded concentric threads, and whitish or rarely tinted with orange or rose. Beaks in adults not touching each other. Lunule lanceolate, about ¼ to ⅕ the length of the shell, slightly elevated at the midline, bounded by a distinct, impressed line, with weak growth lines, glossy, whitish gray and with 2 to 4 weak or strong pairs of rosy-red streaks of color. Escutcheon ill-defined, its area flattish, glossy and the posterior dorsal edge of the valve crossed by 5 to 7 bright-rose, narrow, distantly spaced color streaks. Sculpture on exterior of valves of numerous concentric incised



Text fig. 7. *Transennella gerrardi* Abbott. Right valve of holotype, ANSP no. 199507 from Grand Cayman.

lines which are indistinct on the disc. Periostracum clear and varnish-like. Color of shell cream to white and with or without strong bright-rose maculations, cobweb-like streaks or zigzag lines and bars. Interior of valves glossy, yellowish white. Pallial sinus broad, rounded anteriorly. Grooves on the inner, lower edge of the valves usually 2 or 3, almost parallel to the edge and very weak.

Hinge with strong, well-defined teeth. Right valve with a small upper anterior lateral, below which is a very large, elongate, thick lower anterior lateral; with two, equal-sized anterior cardinals which are separated by a deep, narrow slit and with a larger posterior cardinal. Left valve with a single, strong anterior lateral, and with 3 blade-like cardinals, the middle one being the shortest and thickest.

Measurements

Length	Height	Width	
9.0 mm.	7.0 mm.	4.0 mm.	Holotype ANSP no. 199507

Type locality.—Georgetown Anchorage, Grand Cayman Island. 5 fathoms, sand and broken coral bottom. A. J. Ostheimer, 3rd, collector, Oct. 28, 1954.

Types and records.—Holotype, ANSP no. 199507 from the above locality. Paratypes from the above locality, ANSP no. 199508. Other paratypes all from the west end of Grand Cayman: 8 fms., ¾ mi. southwest of Low Point (ANSP no. 199509); 10 fms., off Boatswains Point; 10 fms., ½ mi. off Chapel (ANSP no. 199506 and U. S. Nat. Mus. 619551); 1 fm., 1 mi. southwest of Chapel (Mus. Comp. Zoöl.); 5 fms., off Georgetown Courthouse (U. S. Nat. Mus.); 8 fms., off the Stack, Georgetown Harbour, (ANSP no. 199510).

Remarks.—This very attractive and colorful *Transennella* is abundant at the west end of Grand Cayman. It differs in several characters from the other four known Western Atlantic members of this genus. Its anteriorly placed, inflated, separated umbones, weak internal marginal grooves, and bright coloration are distinctive. It differs from *T. cubaniana* Orbigny 1842 in being much more inequilateral. Its hinge teeth are much more strongly developed, its pallial sinus anteriorly more rounded, its beaks farther apart, and its posterior end more rounded than in *T. stimpsoni* Dall 1902. It resembles *T. culebrana* Dall and Simpson 1901, but the latter has prominent marginal grooving, is more trigonal in shape, and has a rather thick, yellowish brown periostracum. This species is named for Andrew M. Gerrard, former Commissioner and President of the Legislative Assembly of Grand Cayman Island. Commissioner Gerrard greatly facilitated the field work upon which this report is made.

Genus PITAR Römer 1857

Subgenus PITAR Römer 1857

Pitar fulminata Menke 1828 Map 3; Plate 4e and f.

Remarks.—Numerous small, live specimens of this common West Indian species were dredged at 23 stations in North Sound, Grand Cayman. It occurred in sand at water depths of 6 to 18 feet. Those nearer shore in warmer, muddier and shallower areas are more heavily pigmented.

Subfamily **CIRCINAE**

Genus GOULDIA C. B. Adams 1845

Gouldia cerina C. B. Adams 1845 Plate 4p.

1845 *Thetis cerina* C. B. Adams, Proc. Boston Soc. Nat. Hist., vol. 2, p. 9 (Jamaica).

Description.—Shell 8 to 12 mm. in length, solid, laterally flattened, subtrigonal in shape; beaks in the center, high and very small; lunule long, bounded by an impressed line; eschutcheon smooth. Sculpture finely reticu-

late in which the concentric lines predominate; radial ribblets stronger anteriorly. Color whitish, rarely with brownish zigzag markings or flecks.

Remarks.—This common and widely distributed species (off North Carolina to the south half of Florida, Bermuda and the West Indies) is uncommon at Grand Cayman where it was found singly at 8 stations in water 10 to 18 feet in North Sound.

Genus PARASTARTE Conrad 1862

Parastarte triquetra Conrad 1846

1954 *Parastarte triquetra* Conrad, Abbott, American Seashells, N. Y., p. 419, fig. 85.

Remarks.—Two rather fresh specimens, with their valves closed but with brown grit inside, were dredged in 8 feet of water at the east end of Frank Sound, Grand Cayman. This is a very common intertidal, sand flat species of west and east Florida, but has never been recorded from the West Indies. Wherever it is found, it usually occurs in great numbers. We believe that these specimens were brought to Grand Cayman by some water fowl, such as the Blue Wing Teal, which is known to migrate from Florida to Grand Cayman. We have also seen dead valves from a land-locked, salt lake in Santo Domingo which we believe have also been dropped by visiting water fowl.

Superfamily *TELLINACEA*

Family **TELLINIDAE**

Genus TELLINA Linné 1758

Subgenus TELLINA Linné 1758

Tellina radiata Linné 1758

Remarks.—This common and widely distributed West Indian species is moderately common at Grand Cayman where it was obtained at 27 stations in water from 6 to 48 feet in depths over clear sand. It lives where there is fairly clear ocean water, but was not found in the shallower, warmer reaches of North Sound. It was particularly abundant in the lagoon off Little Bluff on the north shore.

Tellina laevigata Linné 1758

Remarks.—A single, freshly-killed specimen of this fairly common West Indian species was found on the reef flats off Old Isaacs, Grand Cayman.

Subgenus TELLINELLA Mörch 1853

Tellina listeri Röding 1798

1798 *Tellina listeri* Röding, Museum Boltenianum, p. 185 (refers to Conchyl.-Cab., vol. 6, pl. 8, fig. 73 which is from the West Indies).

1815 *Tellina interrupta* Wood, General Conchology, London, p. 146, pl. 36, fig. 3 (Indian and American Seas; refers also to Lister, pl. 399, fig. 238; Conchyl.-Cab., vol. 6, pl. 8, fig. 73 and Encyclop. Method., pl. 288, fig. 7).

1841 *Tellina mexicana* **Petit,** Revue de Zoologique, p. 183; **1953, Olsson and Harbison,** Monograph 8, Acad. Nat. Sci. Phila., p. 122, pl. 14, fig. 6.

1954 *Tellina interrupta* **Wood,** Abbott, American Seashells, N. Y., p. 422, pl. 401 (in color).

Remarks.—Unless some provision is made by the International Commission for Zoological Nomenclature for suppressing obscure names not in use during the last 50 years, Röding's name will have to be employed for the well-known name *interrupta* Wood. There is no question but what they are the same species. We consider *mexicana* Petit as merely young with well-developed radial ribs. Both forms exist and intergrade in Cayman lots. It is a moderately common species which was found with *Tellina radiata* at 30 stations at depths of 6 to 48 feet in clear ocean water. Purple, yellow, white and brown-flecked specimens were present.

Subgenus SCISSULA Dall 1900

Tellina similis Sowerby 1806 Plate 5h and i.

1806 *Tellina similis* Sowerby, Brit. Miscell., vol. 2, pt. 12, p. 29, pl. 75 (Brighton, England [error]); 1954, Abbott, American Seashells, N. Y., p. 426, fig. 86e, pl. 40m (in color).

1826 *Tellina decora* Say, Jour. Acad. Nat. Sci. Phila., vol. 5, p. 219 (southern coast of East Florida); type in ANSP 52427.

1842 *Tellina caribaea* Orbigny, [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 25, figs. 47-49; 1853, text, vol. 2, p. 251 (Guadeloupe and Cuba).

Description.—Shell 15 to 25 mm. in length, moderately elongate, moderately compressed, thin but fairly strong. Color opaque-white with a yellowish or buff blush, and may be with numerous, broad radial rays of pink. Sometimes pure watermelon red. Cayman specimens without pink color. Sculpture of concentric growth lines and numerous fine concentric threads on the anterior ⅗ of the shell which cross the growth lines at an oblique angle. Concentric threads raised and strong on the posterior end of the right valve; weaker on the left valve.

Remarks.—This common Florida, Bahamas and western Caribbean species is very common at Grand Cayman where it was dredged at 34 stations in large numbers at depths from 6 to 25 feet over sand wherever there was clear ocean water. It was not found in the southern half of North Sound. Found with *T. candeana* Orbigny.

Tellina candeana Orbigny 1842 Plate 5e and f.

1842 *Tellina candeana* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 25, figs. 50-52; 1853, text, vol. 2, p. 254 (Martinique).

Description.—Shell 8 to 10 mm. in length, similar to *similis*, but less compressed, more truncate posteriorly, with a stronger, shinier shell, with much weaker sculpturing on the posterior slopes, and colored either pure milk-white, all yellowish or all watermelon red. Rarely, if ever, with radial rays of pink.

Remarks.—This species is almost as common as *similis* having been

dredged at 26 stations at Grand Cayman where it occurs at depths from 6 to 25 feet, generally in company with *similis*.

Subgenus MOERELLA Fischer 1887

Tellina cuneata Orbigny 1842 Map 8; Plate 5j and k.

1842 *Tellina cuneata* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 26, figs. 21-23; 1853, text, vol. 2, p. 256 (Cuba and Florida).

1846 *Tellina gouldii* Hanley, in Sowerby's Thesaurus Conchyl., vol. 1, p. 272, pl. 56, fig. 26 (West Indies).

Description.—Shell 6 to 11 mm. in length, almost equilateral, solid, strong, moderately inflated, milk-white, glossy, with very weak concentric threads which are generally evident only on the very blunt, truncated posterior end. Pallial sinus reaches to the anterior muscle scar.

Remarks.—This is a moderately common species at Grand Cayman where it was dredged at 25 stations at depths from 6 to 25 feet in lagoons facing the open ocean. It was not taken in as large numbers as *Scissula*.

Tellina sybaritica Dall 1881

1881 *Tellina sybaritica* Dall, Bull. Mus. Comp. Zoöl., vol. 9, p. 134; 1886, pt. 1, pl. 6, fig. 11 (Yucatan Straits, 640 fms); 1954, Abbott, American Seashells, N. Y., p. 424, fig. 86d.

1940 *Tellina rubricata* L. M. Perry, Bull. Amer. Paleontology, vol. 26, no. 95, p. 79, pl. 42, fig. 301 (Sanibel Island, Fla.).

Remarks.—This very small, colorful *Tellina* ranges from North Carolina and the Gulf of Mexico to Puerto Rico. It is uncommon at Grand Cayman where three specimens were dredged in 6 feet of water in Frank Sound, one valve in Gun Bay, two valves in South West Sound, and two live specimens in 6 feet of water in coral sand, 2 miles N. E. of Conch Point, off North Sound.

Subgenus ANGULUS Mühlfeld 1811

Tellina guadeloupensis Orbigny 1842 Map 8; Plate 5a and b.

1842 *Tellina guadeloupensis* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 26, figs. 1-3; 1853, text, vol. 2, p. 252 *guadalupiensis* (Guadeloupe).

1901 *Tellina* (*Angulus*) *promera* Dall, Proc. U. S. Nat. Mus., vol. 23, no. 1210, p. 312, pl. 2, fig. 11 (Bermuda).

Description.—Shell 12 to 20 mm. in length, solid, white, rounded; anterior end a little longer, rounded in front, the posterior shorter, slightly flexuous. Outer surface of numerous, rather distinct, finely elevated concentric lamellae which may be easily worn off in some specimens. *T. martinicensis* Orbigny is small, heavier, with stronger concentric sculpturing and with a longer and straighter posterior upper edge.

Remarks.—This species was dredged sparingly at 11 stations in the lower half of North Sound Grand Cayman. Some specimens were almost devoid of concentric sculpture. It is a shallow- and warm-water species

ranging from Bermuda and Florida to the Lesser Antilles.

Genus ARCOPAGIA Brown 1827

Subgenus CYCLOTELLINA Cossmann 1886

Arcopagia fausta Pulteney 1799

1799 *Tellina fausta* Pulteney, Catalogue Birds, etc. Dorsetshire, p. 29; 1804, Donovan, Nat. Hist. British Shells, p. 10, pl. 25, figs. 13, 14.

1815 *Tellina laevis* Wood, General Conchology, London, p. 181, pl. 37, fig. 1 (West Indies; refers to Lister pl. 266, fig. 102; Born, pl. 2, fig. 11; Conchyl.-Cab., vol. 6, pl. 12, fig. 112).

1954 *Arcopagia fausta* Pulteney, Abbott, American Seashells, N. Y., p. 428, pl. 40j (in color).

Remarks.—Several large, live specimens of this moderately common West Indian species were obtained at 7 stations at Grand Cayman in water 4 to 6 feet deep over clear sand near the open ocean.

Genus QUADRANS Bertin 1878

Quadrans lintea Conrad 1837 Plate 4k and l.

1837 *Tellina lintea* Conrad, Jour. Acad. Nat. Sci., Phila., vol. 7, p. 259 (Mobile Point, Alabama).

1954 *Quadrans lintea* Conrad, Abbott, American Seashells, N. Y., p. 430, fig. 86g.

Remarks.—A single, small live specimen of this moderately common tellin was dredged in 48 feet off Georgetown, Grand Cayman. This species ranges from North Carolina to both sides of Florida and the West Indies.

Genus STRIGILLA Turton 1822

Strigilla mirabilis Philippi 1841 Plate 4i and j.

1822 *Tellina flexuosa* Say, Jour. Acad. Nat. Sci. Phila., vol. 2, p. 303 (southern coast, United States). *Non* Montagu 1803.

1841 *Tellina mirabilis* Philippi, Archiv. für Naturg., vol. 7, p. 260; 1846, Philippi, Abbild. Beschr. Conchyl., vol. 2, *Tellina* plate 4, p. 93, pl. 4, fig. 8 (*Sinus Mexicanus*).

Description.—Shell 10 to 15 mm. in length, oval, inflated, solid, shiny, milk-white, and with numerous, fine, distinct incised lines cutting across the shell at a 45 degree angle. Rarely with a yellowish blush inside, but never with pink.

Remarks.—This moderately common species was taken in goodly numbers at 21 stations at Grand Cayman in water from 6 to 48 feet over coral sand, and was more common at depths over 18 feet off the west end of the island. It was found dead in the lagoons facing the open ocean, but not inside North Sound.

Family SEMELIDAE

Genus SEMELE Schumacher 1817

Semele bellastriata Conrad 1837 Plate 5c and d.

1837 *Amphidesma bellastriata* Conrad, Jour. Acad. Nat. Sci. Phila., vol. 7, p. 239, pl. 20, fig. 4.

1842 *Amphidesma cancellata* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 25, figs. 42-44; 1853, text, vol. 2, p. 241. (Not Sowerby 1833).

1954 *Semele bellastriata* Conrad, Abbott, American Seashells, N. Y., p. 435, pl. 30j.

Remarks.—Dead valves were dredged at 6 stations in 6 to 16 feet along the north shore of Grand Cayman. All specimens were under 12 mm. in length.

Genus CUMINGIA Sowerby 1833

Cumingia coarctata Sowerby 1833 Plate 51 and m.

1833 *Cumingia coarctata* Sowerby, Proc. Zool. Soc. London for 1833, p. 34 (Bay of Caraccas, 7 fms.).

1842 *Lavignon antillarum* Orbigny [in Sagra], Hist. L'Ile Cuba, Atlas, pl. 25, fig. 36-38; 1853, text, vol. 2, p. 236 (Sto. Domingo).

Description.—Shell 5 to 10 mm. in length, moderately fragile, milk-white in color. Tellin-like in shape, but usually irregular, somewhat inflated, gaping a little behind; outer surface with distantly-spaced irregular, raised lamellae and with numerous, microscopic radial scratches. Under the beaks in each valve there is a spoon-shaped resilium pit; in front of it in the left valve is a compressed cardinal and two faint laterals. Right valve with a double cardinal behind the pit and with two strong laterals.

Remarks.—This moderately common species is found in the Lower Florida Keys and the West Indies. It is uncommon at Grand Cayman, where one to three live specimens were obtained at 7 stations in North Sound and dead valves outside of North Sound and in the lagoons inside the reefs along the north shore of the island. One live specimen was taken in 8 feet of water in South Sound.

Family **SANGUINOLARIIDAE**

This family appears to be absent at Grand Cayman Island. Salisbury (1953) does not record nor did the Ostheimers collect alive two common West Indian species, *Asaphis deflorata* Linné and *Heterodonax bimaculata* Linné. One dead pair of valves of the former is credited from Grand Cayman, but they may have come from the Bahamas.

Suborder *ADAPEDONTA*

Superfamily *MACTRACEA* Family **MESODESMATIDAE**

Genus ERVILIA Turton 1822

Ervilia concentrica Gould 1862

1862 *Ervilia concentrica* Gould, Proc. Boston Soc. Nat. Hist., vol. 8, p. 280 (off North Carolina).

Description.—Shell 3 to 5 mm. in length, solid, elliptical in outline, moderately inflated. Each end is rounded to the same degree and the beaks are

almost central. There is a pin-point depression just behind the glossy, inrolled beaks. Sculpture of fine, numerous, concentric ridges. Radial scratches or threads at posterior third may form tiny beads. Color white, yellow or sometimes pinkish.

Remarks.—This common little bivalve has a range from off North Carolina to the West Indies. It was dredged in fair numbers at 11 stations in water 6 to 30 feet in depth over sand in lagoons facing the open ocean and in the outer reaches of North Sound, Grand Cayman.

Superfamily *MYACEA*

Family **CORBULIDAE**

Genus VARICORBULA Grant and Gale 1931

Varicorbula operculata Philippi 1848

1848 *Corbula operculata* Philippi, Zeitschr. für Malakozool., p. 13 (St. Thomas).
1954 *Varicorbula operculata* Philippi, Abbott, American Seashells, N. Y., p. 456.

Description.—Shell 5 to 7 mm. in length, very inequivalve, oval-quadrate, moderately thin-shelled and glossy, except the left valve is covered with a moderately thin, brownish periostracum. Beaks high, curled under and pointing anteriorly. Right valve subtrigonal in shape, very obese and with strong, concentric ridges. Left valve much smaller, less obese, elongate and with numerous but weaker ridges. Color white, rarely with rose near the margins.

Remarks.—A single, live adult was dredged in 8 fathoms one third mile off Georgetown, Grand Cayman.

Genus BASTEROTIA Hoernes 1854

Basterotia quadrata Hinds 1843

1843 *Corbula quadrata* Hinds; Proc. Zool. Soc. London for 1843, p. 47 (locality unknown); 1844, Reeve, Conch. Iconica, vol. 2, Corbula, pl. 5, fig. 40 (locality unknown).
1881 *Poromya granatina* Dall, Bull. Mus. Comp. Zoöl., vol. 9, p. 109 (Yucatan Strait, 640 fms.).

Description.—Shell 6 to 14 mm. in length, solid, inflated, and strongly carinate from the beaks to the posterior third of the shell. Color milk white; outer surface irregular and with small granules over the anterior two thirds of the shell. Each valve bears a strong, conical sub-umbonal tooth which is separated from a prominent nymph by a narrow gap.

Remarks.—A single left valve of this rare species was dredged in 30 feet of water near the Main Channel, North Sound, Grand Cayman. The Academy collection contains specimens from Long Bay, St. Thomas Island, Virgin Islands, collected by Robert Swift.

Subgenus BASTEROTELLA Olsson and Harbison 1953

Basterotia newtoniana C. B. Adams 1852

1852 *Corbula newtoniana* C. B. Adams, Contributions to Conchology, no. 12, p. 240 (St. Thomas); 1950, Clench and Turner, Occ. Papers on Moll., Harvard, vol. 1, no. 15, p. 314, pl. 47, figs. 9-10 (lectotype).

Diagnosis.—Shell 5 to 9 mm. in length resembling *B. quadrata,* but without the carina, more elongate, less inflated, and without granulations.

Remarks.—Three dead valves of this rare species were dredged off Palmetto Point in 6 feet of water at Grand Cayman.

Class CEPHALOPODA

Order DECAPODA

Genus SPIRULA Lamarck 1799

Spirula spirula Linné 1758

Diagnosis.—Shell fragile, coiled in a flat, open spiral, multi-chambered, usually less than 1 inch in diameter, and translucent white in color. There is a small siphonal tube running back into the shell and piercing the concave, nacreous septa.

Remarks.—A widely dispersed, benthic species of warm waters. Shells were found on beaches at Grand Cayman.

Order OCTOPODA

The following three species have been recorded from Grand Cayman: *Octopus vulgaris* Lamarck (Pickford, 1950), *Octopus hummerlincki* Adam 1936 (Pickford, 1950) and *Tremoctopus violaceus* della Chiaje 1830 (Salisbury, 1953). The Ostheimers did not collect any.

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PLATES 1-5

PLATE 1

Figs. a and b.—*Hemitoma octoradiata* Gmelin — p. 19
Length 16.0 mm. Grand Cayman, ANSP 197870.

Fig. c.—*Emarginula ostheimerae* new species — p. 18
Length 24.0 mm. Grand Cayman, holotype, ANSP 195983.

Fig. d.—*Emarginula pumila* A. Adams — p. 19
Length 10.0 mm. Grand Cayman, ANSP 198589.

Fig. e.—*Coralliophila abbreviata* Lamarck — p. 65
Length 26.0 mm. Grand Cayman, ANSP 198723.

Fig. f.—*Coralliophila aberrans* C. B. Adams — p. 67
Length 22.5 mm. Grand Cayman, ANSP 224663.

Fig. g.—*Coralliophila caribaea* new species — p. 66
Length 18.5 mm. Vera Cruz, Mexico, holotype, ANSP 197054.

Fig. h.—*Coralliophila caribaea* new species — p. 66
Length 11.0 mm. Grand Cayman, paratype, ANSP 197056.

Fig. i.—*Bursa corrugata* Perry — p. 60
Length 40.0 mm. Grand Cayman, ANSP 197842.

Fig. j.—*Bursa thomae* Orbigny — p. 56
Length 26.5 mm. Off Palm Beach, Florida, ANSP 193855.

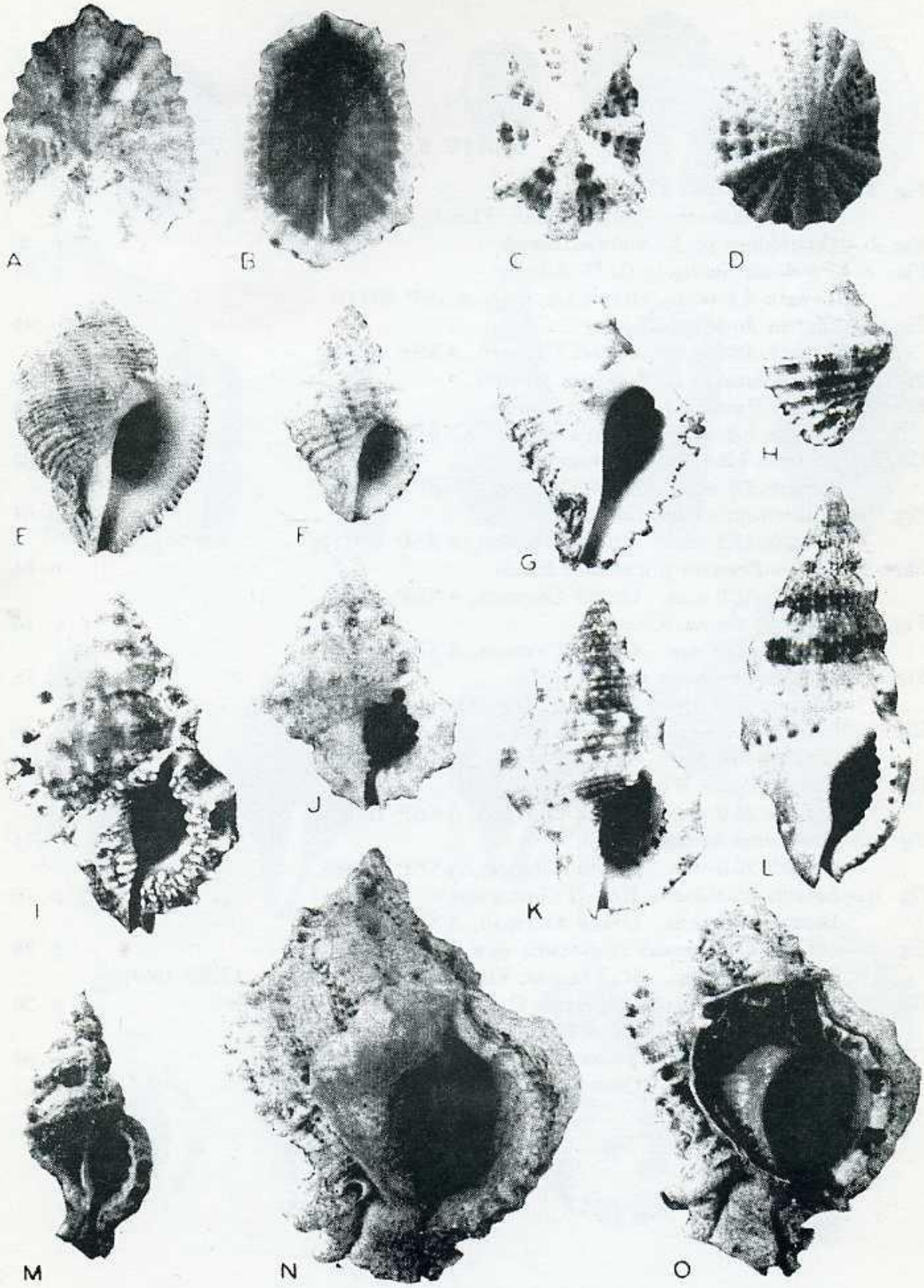
Fig. k.—*Bursa cubaniana* Orbigny — p. 57
Length 36.5 mm. Grand Cayman, ANSP 197843.

Fig. l.—*Colubraria obscura* Reeve — p. 73
Length 42.0 mm. Grand Cayman, ANSP 190554.

Fig. m.—*Aspella paupercula* C. B. Adams — p. 62
Length 13.5 mm. Grand Cayman, ANSP 198627.

Fig. n.—*Murex* (*Phyllonotus*) *margaritensis* new name — p. 61
Length 100 mm. Isla Margarita, ANSP 35993.

Fig. o.—*Murex* (*Phyllonotus*) *margaritensis* new name — p. 61
Length 90 mm. Isla Margarita, ANSP 36079.



ABBOTT: CAYMAN MOLLUSKS

PLATE 2

Fig. a.—*Natica canrena* Linné — p. 50
Length 23.0 mm. Lake Worth, Florida, ANSP 205811.

Fig. b.—Operculum of *N. canrena* Linné — p. 50

Fig. c.—*Persicula fluctuata* C. B. Adams — p. 87
Length 4.1 mm. Grand Cayman, ANSP 200000.

Fig. d.—*Natica floridana* Rehder — p. 49
Length 18.0 mm. Grand Cayman, ANSP 205808.

Fig. e.—Operculum of *N. floridana* Rehder — p. 49

Figs. f and g.—*Hyalina tenuilabra* Tomlin — p. 86
Length 8.0 mm. Grand Cayman, ANSP 199059.

Fig. h.—*Hyalina albolineata* Orbigny — p. 85
Length 7.0 mm. Grand Cayman, ANSP 199049.

Fig. i.—*Epitonium novangliae* Couthouy — p. 44
Length 15.2 mm. Grand Cayman, ANSP 198717.

Figs. j and k.—*Prunum pruniosum* Hinds — p. 84
Length 10.0 mm. Grand Cayman, ANSP 199046.

Fig. l.—*Hyalina avena* Kiener — p. 85
Length 11.0 mm. Grand Cayman, ANSP 199050.

Fig. m.—*Leucozonia nassa nassa* Gmelin — p. 78
Length 36.0 mm. Missouri Key, Florida, ANSP 193583.

Fig. n.—*Leucozonia nassa leucozonalis* Lamarck — p. 79
Length 30.0 mm. Grand Cayman, ANSP 197875.

Fig. o.—*Turbo filosus* Wood — p. 28
Length 25.0 mm. Grand Cayman, ANSP 197889.

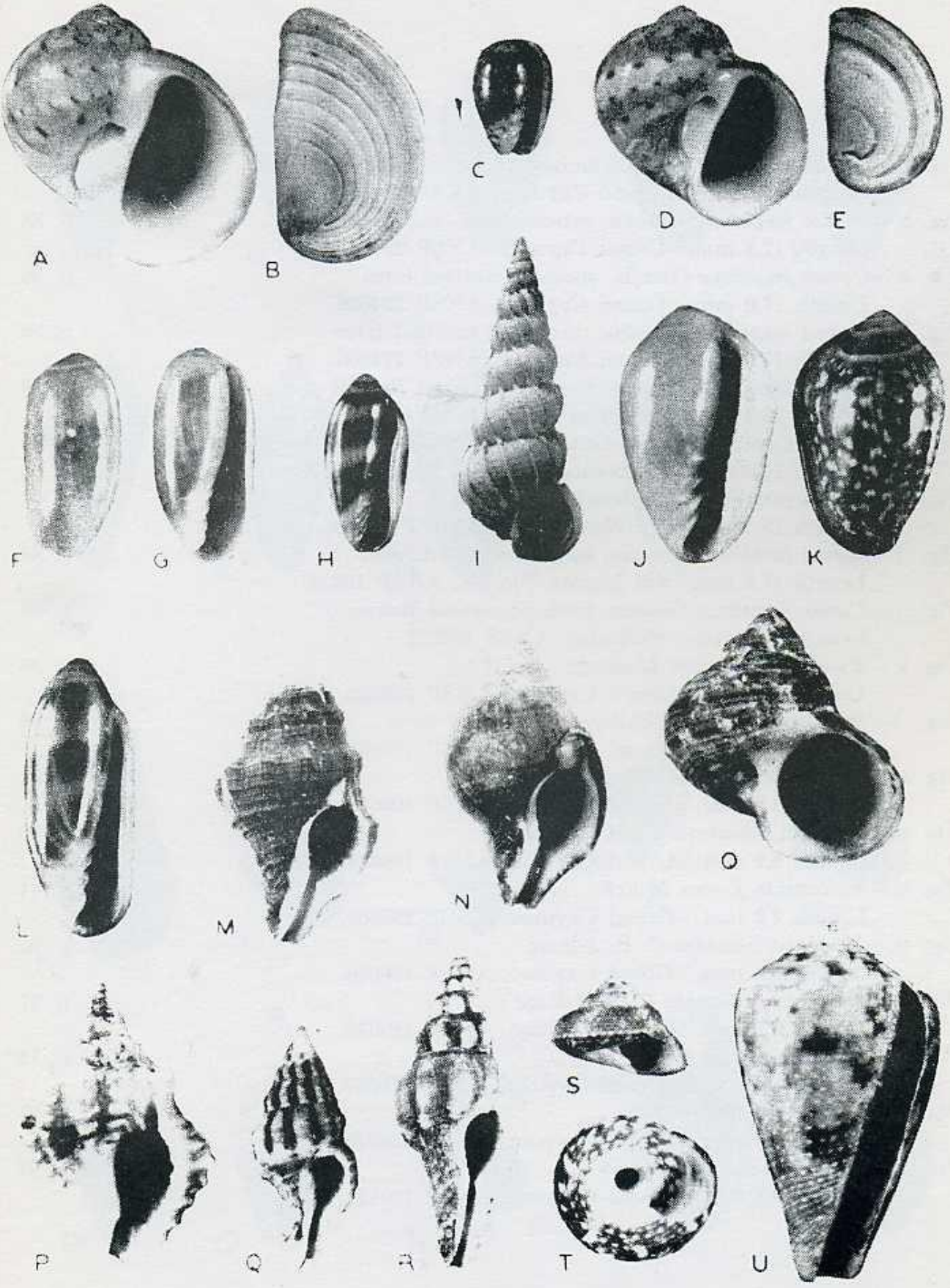
Fig. p.—*Cantharus auritulus* Link — p. 74
Length 25.0 mm. Grand Cayman, ANSP 197889.

Fig. q.—*Latirus trochlearis* Kobelt (immature) — p. 76
Length 25.0 mm. Grand Cayman, ANSP 196414.

Fig. r.—*Latirus* (*Polygona*) *virginensis* new species — p. 76
Length 33.0 mm. St. Thomas, Virgin Islands, holotype, ANSP 196459.

Figs. s and t.—*Tegula lividomaculata* C. B. Adams — p. 26
Length 5.0 mm. Grand Cayman, ANSP 197902.

Fig. u.—*Conus ranunculus* Hwass — p. 94
Length 42.5 mm. Grand Cayman, ANSP 199820.



ABBOTT: CAYMAN MOLLUSKS

PLATE 3

Fig. a.—*Canus jaspideus* Gmelin, smooth, light form — p. 88
Length 17.5 mm. Grand Cayman, ANSP 224664.

Fig. b.—*Conus jaspideus* Gmelin, intermediate, mottled form — p. 88
Length 17.5 mm. Grand Cayman, ANSP 224667.

Fig. c.—*Conus jaspideus* Gmelin, smooth, mottled form — p. 88
Length 17.0 mm. Grand Cayman, ANSP 224666.

Fig. d.—*Conus jaspideus* Gmelin, verrucose, mottled form — p. 88
Length 17.0 mm. Grand Cayman, ANSP 224666.

Fig. e.—*Conus jaspideus* Gmelin, form *vanhyningi* Rehder — p. 88
Length 18.0 mm. Off Palm Beach, Florida, ANSP 175190.

Figs. f and g.—*Conus jaspideus* Gmelin, subspecies *stearnsi* Conrad — p. 90
Length 16.5 mm. Clearwater, Florida, ANSP 158176.

Fig. h.—*Conus jaspideus jaspideus* × *j. stearnsi* — p. 91
Length 18 mm. Key West, Florida, ANSP 100163.

Fig. i.—*Conus jaspideus* Gmelin, spirally grooved form — p. 88
Length 17.5 mm. Off Naples, Florida, ANSP 193567.

Fig. j.—*Conus jaspideus* Gmelin, form *pygmaeus* Reeve — p. 88
Length 20.0 mm. Barbados, ANSP 180622.

Fig. k.—*Rissoina decussata* Montagu — p. 36
Length 7.8 mm. Grand Cayman, ANSP 198953.

Fig. l.—*Rissoina cancellata* Philippi — p. 36
Length 7.1 mm. Grand Cayman, ANSP 198955.

Fig. m.—*Triptychus niveus* Mörch — p. 103
Length 7.2 mm. Grand Cayman, ANSP 198610.

Fig. n.—*Mitrella fenestrata* C. B. Adams — p. 70
Length 6.0 mm. Grand Cayman, ANSP 198634.

Fig. o.—*Epitonium krebsi* Mörch — p. 44
Length 7.2 mm. Grand Cayman, ANSP 198689.

Fig. p.—*Mangelia biconica* C. B. Adams — p. 98
Length 5.8 mm. Grand Cayman, ANSP 199040.

Fig. q.—*Mangelia trilineata* C. B. Adams — p. 97
Length 6.1 mm. Grand Cayman, ANSP 199038.

Fig. r.—*Nassarius albus* Say — p. 75
Length 16.0 mm. Grand Cayman, ANSP 198677.

Fig. s.—*Mangelia bartletti* Dall — p. 97
Length 7.0 mm. Grand Cayman, ANSP 198970.

Fig. t.—*Pyrgocythara coxi* Fargo — p. 97
Length 6.1 mm. Grand Cayman, ANSP 199842.

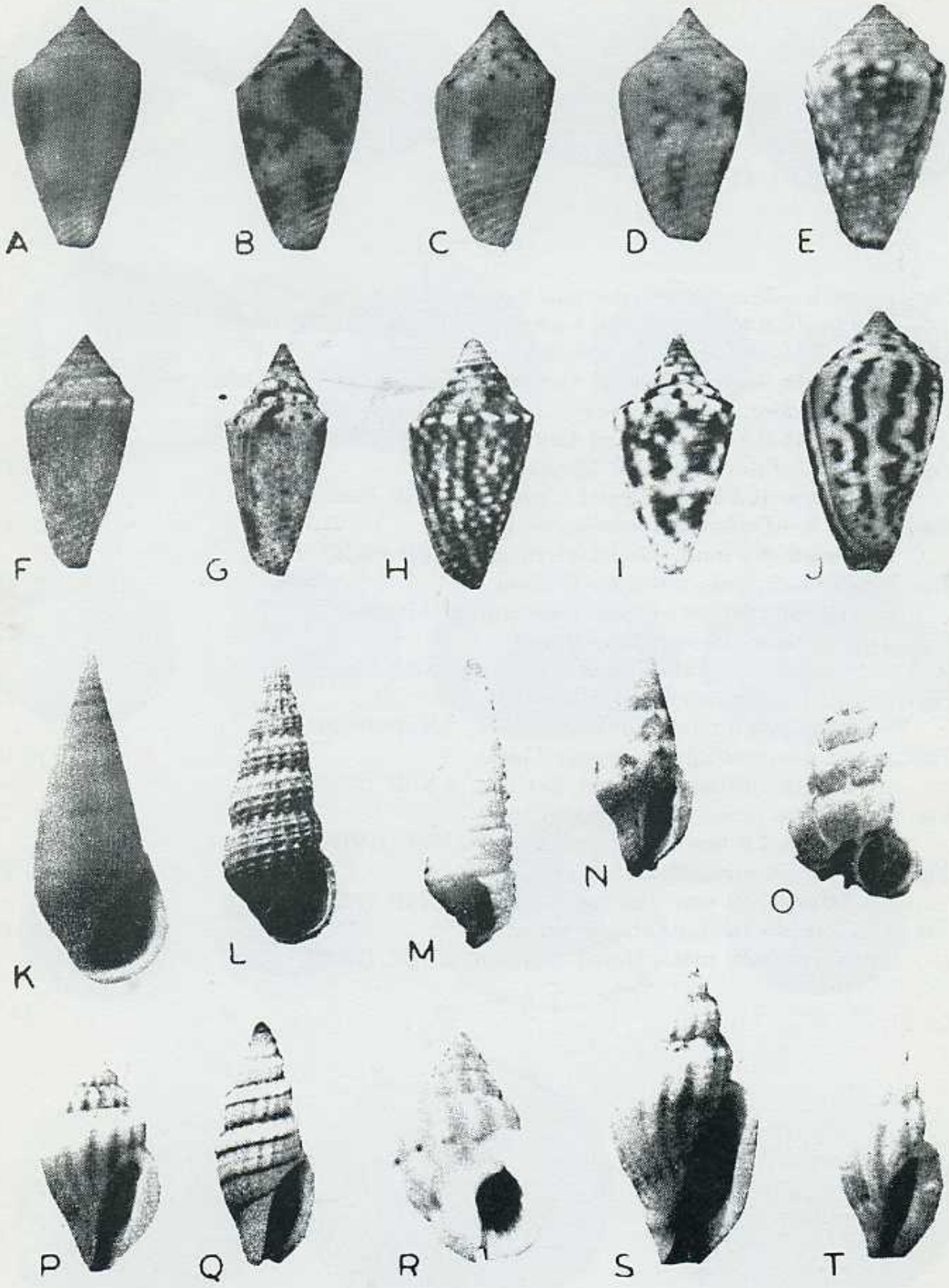


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PLATE 4

Figs. a and b.—*Transennella gerrardi* new species — p. 130
Length 9.2 mm. Grand Cayman, holotype, ANSP 199507.

Fig. c.—*Transennella gerrardi* new species — p. 130
Length 9.0 mm. Grand Cayman, paratype, ANSP 199509.

Fig. d.—*Diplodonta punctata* Say — p. 118
Length 9.2 mm. Grand Cayman, ANSP 199532.

Figs. e and f.—*Pitar fulminata* Menke — p. 131
Length 10.5 mm. Grand Cayman, ANSP 199514.

Figs. g and h.—*Diplodonta semiaspera* Philippi — p. 118
Length 6.5 mm. Grand Cayman, ANSP 199533.

Figs. i and j.—*Strigilla mirabilis* Philippi — p. 135
Length 8.0 mm. Grand Cayman, ANSP 199653.

Figs. k and l.—*Quadrans lintea* Conrad — p. 135
Length 10.0 mm. Grand Cayman, ANSP 199655.

Figs. m and n.—*Lyropecten antillarum* Recluz — p. 116
Length 14.0 mm. Grand Cayman, ANSP 199489.

Figs. o and q.—*Americardia guppyi* Thiele — p. 124
Length 10.5 mm. Grand Cayman, ANSP 197841.

Fig. p.—*Gouldia cerina* C. B. Adams — p. 131
Length 7.0 mm. Grand Cayman, ANSP 199511.

Fig. r.—*Codakia orbiculata* Montagu — p. 120
Length 13.0 mm. Grand Cayman, ANSP 199522.

Fig. s.—*Codakia costata* Orbigny — p. 120
Length 12.0 mm. Grand Cayman, ANSP 199525.

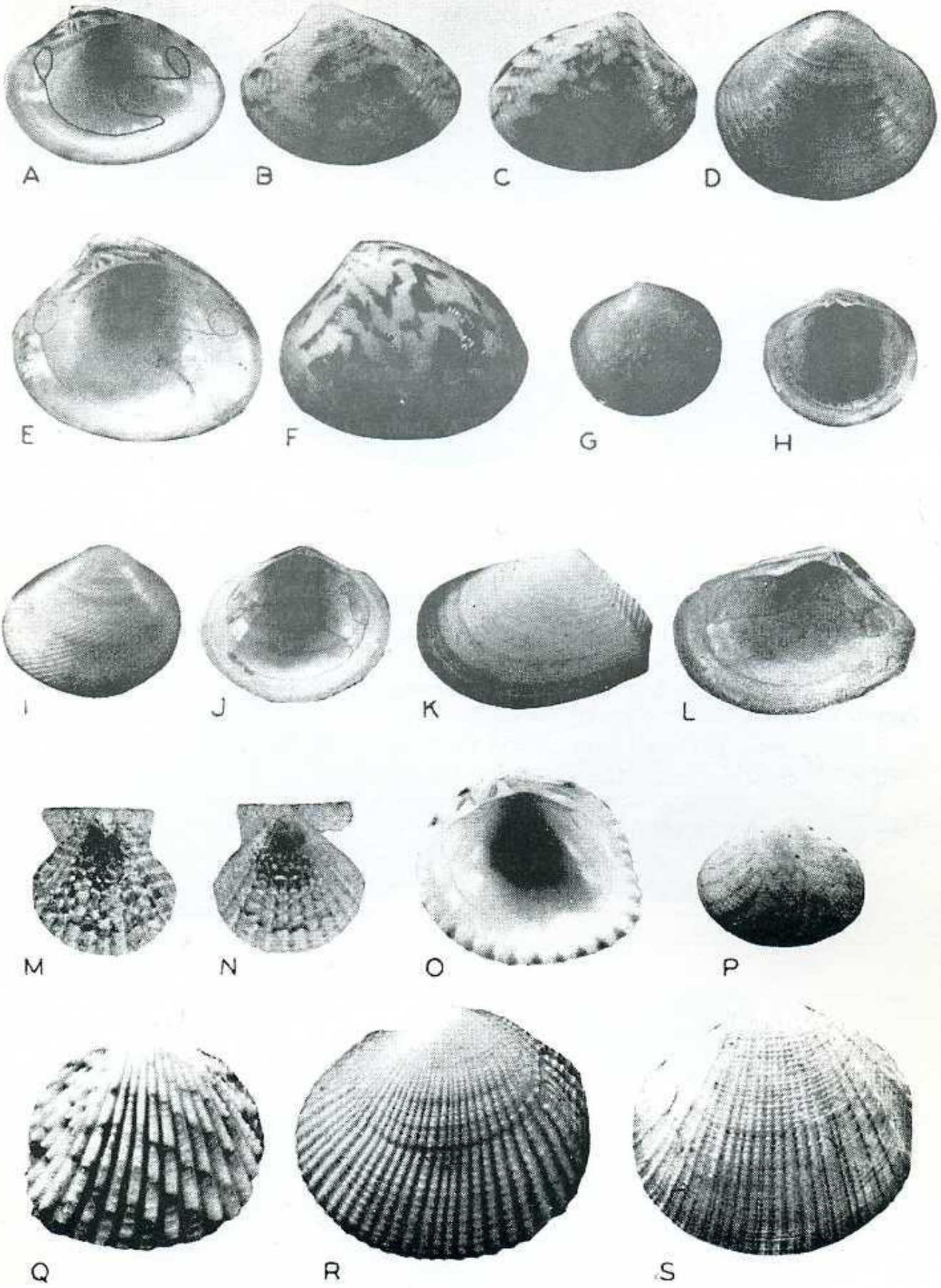

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PLATE 5

Figs. a and b.—*Tellina guadeloupensis* Orbigny p. 134
Length 12.5 mm. Grand Cayman. ANSP 199674.

Figs. c and d.—*Semele bellastriata* Conrad p. 135
Length 7.0 mm. Grand Cayman, ANSP 199673.

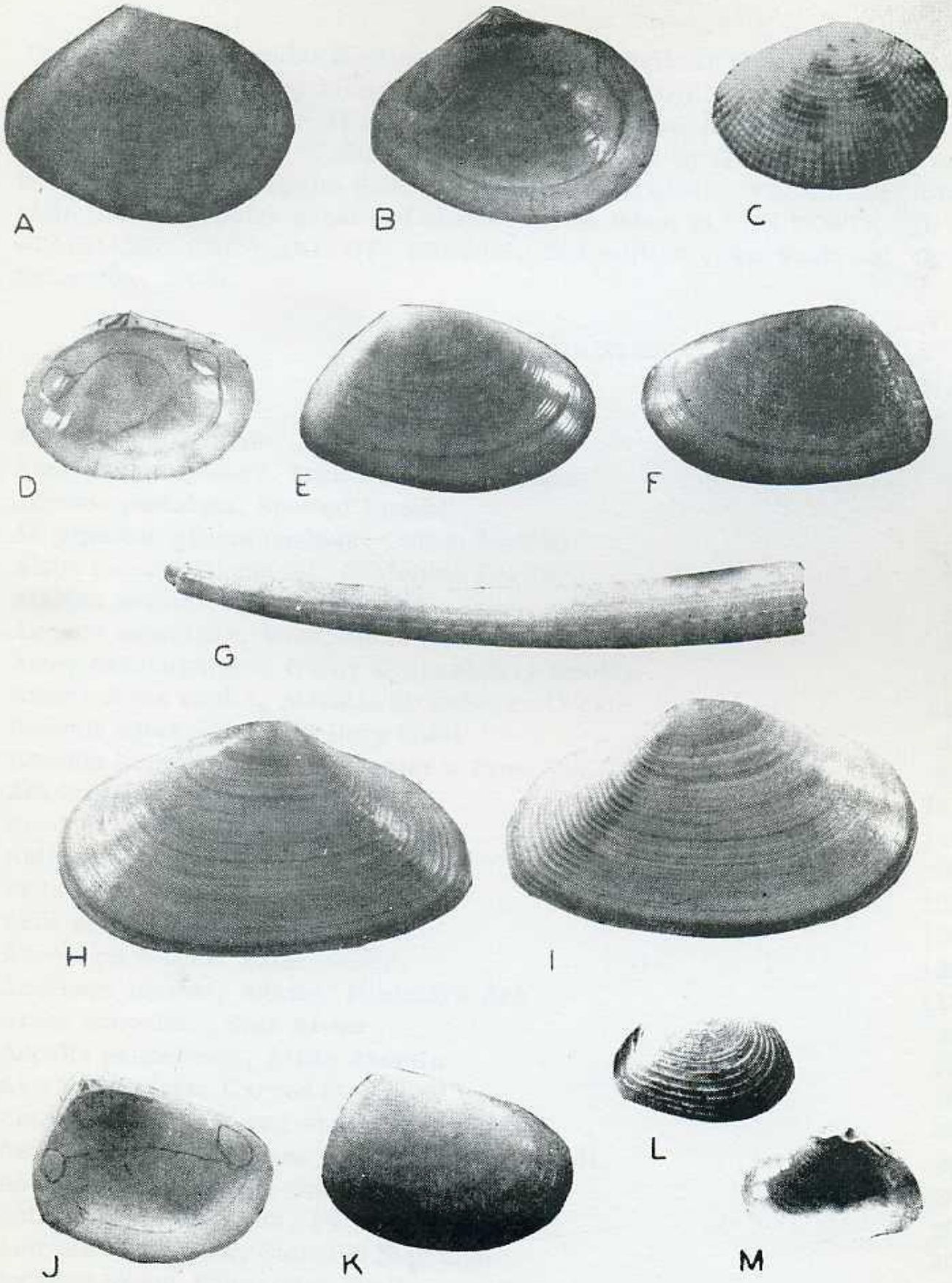
Figs. e and f.—*Tellina* (*Scissula*) *candeana* Orbigny p. 133
Length 10.2 mm. Grand Cayman. ANSP 199669.

Fig. g.—*Dentalium antillarum* Orbigny p. 108
Length 23.0 mm. Grand Cayman. ANSP 199828.

Figs. h and i.—*Tellina* (*Scissula*) *similis* Sowerby p. 133
Length 18.0 mm. Grand Cayman. ANSP 199660.

Figs. j and k.—*Tellina* (*Moerella*) *cuneata* Orbigny p. 134
Length 8.7 mm. Grand Cayman. ANSP 199671.

Figs. l and m.—*Cumingia coarctata* Sowerby p. 136
Length 4.1 mm. Grand Cayman, ANSP 199865.



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COMMON NAMES

The common or popular English names of the shells in this book are listed below. Page numbers follow the names. Shells not illustrated here may be found in AMERICAN SEASHELLS by R. T. Abbott (D. Van Nostrand Co., Princeton. 1955) and CARIBBEAN SEASHELLS by G. L. Warmke and R. T. Abbott (Livingston Publ., Narberth, Pa. 1961). Values and complete lists of popular genera of shells may be found in VAN NOSTRAND'S STANDARD CATALOG OF SHELLS, 2nd edition (Van Nostrand Co., Princeton. 1967).

Alphabetical by Latin Name

-A-

-D-

-N-

-O-

-P-

-V-

-X-

-Z-

Alphabetical by Common Name

-A-

-B-

-C-

-D-

-E-

-F-

-G-

-H-

-I-

-U-

-V-

-W-

-Y-Z-