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TEXAS CONCHOLOGIST, Vol. XXI, No. 1, October, 1984

SEARCH AND SEIZURE

By Constance E. Boone

MORE ON THAIS HAEMASTOMA

A field trip to the Mississippi delta during the annual meeting of the American Malacological Union at New Orleans, Louisiana, in July, 1982, has prompted another discussion of the common rock shell in our area.

We returned to the hotel with buckets of beach material, including several sticks covered with egg cases of our common Thais.

Dr. Emily Vokes of Tulane University, the well-known muricid authority, remarked to me that she had never seen Thais egg cases on wood. She thought this would be interesting to report.

I happened to mention this to Dr. Harold Harry, who referred me to a Master's Thesis done for Louisiana State University by Lyle Stanhope St. Amant in 1938. Titled "Studies on the Biology of the Louisiana Oyster Drill--Thais floridana haysae Clench," this thesis, unpublished, discussed egg capsules on sticks in the oyster beds in Louisiana. Dr. Vokes helped me get a copy of pertinent parts of this thesis for my report here.

To review for my readers the status of this Thais in systematics, I note to you that the species in our Gulf has gone under several specific and subspecific names in recent literature. Dr. W. J. Clench monographed the Genera Purpura and Thais in the Western Atlantic in Johnsonia, Vol. 2, No. 23, 1947, pp. 61-91. He recognized Thais haemastoma, Linne, 1767 as originating and living in the Mediterranean and as spread to Brazil and Uruguay. He recognized Thais haemastoma floridana (Conrad, 1837) and Thais haemastoma haysae (Clench, 1947) as two subspecies in the Western Atlantic, with both listed to occur in Texas. Dr. Tucker Abbott's 1974 edition of American Seashells listed Thais haemastoma floridana and Thais haemastoma canaliculata (Gray, 1839) and made T. haemastoma haysae a synonym of canaliculata.

We puzzled about the change to T. haemastoma canaliculata and the fact that collectors here felt that we could see both of the subspecies in populations we found, for instance, at the Galveston jetties.

In response to queries of the change and our puzzle, Dr. Abbott reviewed in Texas Conchologist, Vol. XII, No. 2, pp. 30-31, the nomenclature of our common rock shell. We learned then that he had decided to make only one subspecies, Thais haemastoma floridana, for all of the Western Atlantic. Both haysae and canaliculata were discussed as forms only, the former the rugged, deep-sutured, two-rowed tuberculed specimens found in Louisiana and the upper Texas coast. The specific name canaliculata had been given a shell by Gray and originally thought to be from China. This was corrected by scientists who recognized it as the one from the Western Atlantic. However, now Dr. Abbott relegated this to synonomy under Thais haemastoma floridana, and this viewpoint has been repeated in the more recent publications by Abbott and Dance, Compendium of Seashells, 1982, and a new booklet by Abbott, Collectible

Shells of Southeastern U.S., Bahamas & Caribbean, 1984.

At the Houston Museum of Natural Science, we are cataloging our Thais as Thais haemastoma at present. The kinship to the Mediterranean parent is not settled, perhaps.

St. Amant's thesis discussed the trick used by the Louisiana oystermen which entailed planting sticks in the oyster beds for the female Thais to climb and deposit eggs on during the breeding season. The oystermen then removed the stakes from the water and placed them on land to dry and die. This would destroy both eggs and adults. This is why we found so many of the sticks covered with egg cases on the beaches during the AMU field trip. Dr. Harry tells me that he knows that the oystermen also collected the sticks and took them to deserted mangrove islands where discarded Thais shells piled up in mounds several feet thick.

St. Amant discussed the breeding habits, noting that the months of April through May were the height of copulation and egg laying and noting the tendency for the Thais to congregate during this season. Many females join to lay egg masses.

It is known that this species has a tendency to climb, and studies reveal that this species does not deposit eggs on the substrate but always seeks to find something higher.

We have observed that the Thais egg cases are found on driftwood, pieces of lumber, other Thais, stones, and jetty rocks. Once we saw egg cases on fresh Busycon egg cases hauled in by seiners on the Gulf beach. Thais kept in aquariums will climb the glass sides to deposit egg cases.

Information from St. Amant's thesis concerning the eggs follows: "The eggs of Thais are contained in a tough membranous capsule, measuring from 6-10 mm. in length and from 0.8-1.0 mm. in width. The cases are attached vertically to the substratum by a very short stem which is firmly glued by some gelatinous material similar in appearance to the egg cases. The eggs, evidently fertilized within the female, are not deposited until the capsule is formed around them. Longitudinally the capsules are somewhat club-shaped, tapering slightly toward the base, which in a transverse plane two surfaces may be distinguished: A slightly flattened concave one forms the back of the case while a large convex front gives the effect of a semicircle with a closed back. The flattened posterior surface allows the cases to fit more closely together in an orderly arrangement."

"The snails are dioecious..... Each female lays between 59 and 150 cases, each containing from 500 to 1,000 eggs or more. The total incubation period requires from ten to twelve days depending somewhat on the environmental conditions. The development of the eggs is not typically molluscan, but presents the general atypical condition common to prosobranchiates. This is indicated by a large yolk mass which does not divide with the developing germ layers; instead cleavage takes place at the animal pole and an epibolic over-growth of cells forms the ectoderm....."

".....The trochophore and veliger stages are represented, but the

former is atrochal and the latter does not possess a true velum. The larvae are hatched in a free-swimming condition; the mechanics of hatching evidently must be stimulated by some outside force, most likely wave action..."

The snail hatches as a veliger with embryonic shell. According to St. Amant, it takes 245-290 hours to get to hatching.

We have observed fresh egg cases in a mass on some solid object, with part of the capsules lavender or purple. The egg capsules are waxy cream when first laid. Apparently the eggs begin to hatch into veligers about the time the egg cases turn purplish, but I am not sure of this or if light has turned some of the cases purple. At any rate, I do know that I have brought some of the egg cases home and put them under the microscope. Inside the lavender ones I have seen swimming objects, the larvae.

The veligers are released through a hole in the capsule to begin a time of swimming in the currents. These peculiar embryonic shells once were given a new name because it was not known they were young Thais. These shells finally settle into niches to grow to adulthood. We can find many of these embryonic shells in the drift near the jetty at Port Aransas, in particular, but they can be found in any drift in our coast. However, they probably would show up in most abundance during the summer months. That would be the height of development to this stage. Dr. Harry has mentioned that he began to find juvenile Thais on the jetties in late August.

I do not know if the purple in/on the egg cases has anything at all to do with the fluid this snail exudes when it is disturbed. This fluid turns purple with light. The secretion is known to have been used in the Mediterranean to make the famous "Tyrian purple" dye for royal robes. We know that the Indians in Mexico used the dye from Thais on cloth. On the Pacific Coast I once encountered a large population of Thais and had a demonstration from a local inhabitant on how the snails were milked for the fluid to dye cloth. This Thais population on the rocks outside the village was left intact for that purpose. I, too, left it intact.

In Taxonomy and Distribution of Teleplanic Prosobranch Larvae in the North Atlantic by Dan Laursen ("Dana Report No. 89, 1981"), Dr. Laursen discusses the travels on ocean currents of the swimming larvae and pictures embryonic shells of Thais. He made no attempt to solve the taxonomic problem, but he used Thais haemastoma floridana and said the larvae of the species in the Genus Thais are very similar. The term teleplanic means pelagic larvae with a long free-swimming stage.

Dr. Laursen stated that larvae of Thais were captured in samples from the Caribbean, Gulf Stream, the Sargasso Sea, the North Atlantic Drift and the North Equatorial Current, mostly at a depth of 50-100 mw. Adults, he noted, are found on both sides of the Atlantic--North Carolina to Brazil, the Caribbean, the Gulf of Mexico, the Luisitanian region, including the Mediterranean; the West African region, and the South African region. He stated that authors dealing with teleplanic larvae emphasize the great importance the currents have in spreading the

species from one coast of the oceans to the opposite one. Studies of duration of drift indicate the time for an Atlantic crossing from West to East to vary from four months to 13 months, and from East to West from four months to six months.

I once reported finding Thais embryonic shells in Sargassum. These juveniles, with their peculiarly notched lip, have operculums quite different from adult Thais.

It seems probable that migration takes place continually. It has been printed that Thais adults have hitched rides on driftwood across the Atlantic, and it has been reported Thais came to our shores on the bottom of vessels. There is reason to think man might have transported Thais to establish colonies to provide dye. Certainly the larvae can survive in currents for some time. The swirl of the currents would bring larvae from Europe and Africa to the Western Atlantic. The life-style of our common rock shell aids in expanding the range.

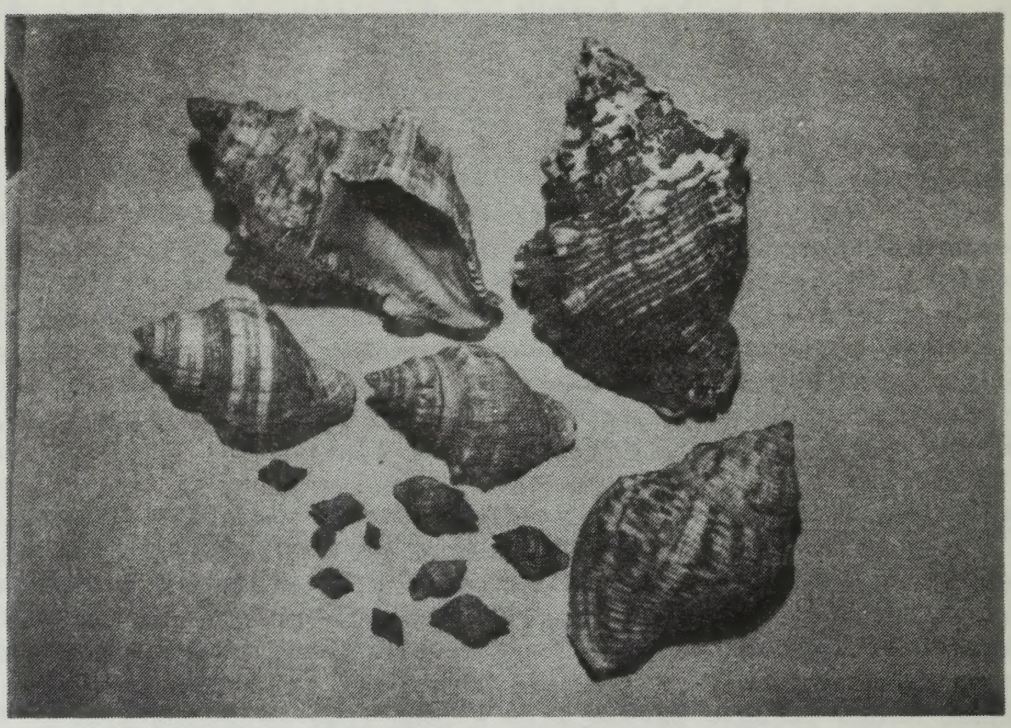


Fig. 1 Thais haemastoma, part of lot #15,951 at the Houston Museum of Natural Science, collected by Sam and Fannie Miron March 17, 1973, at the south jetties, East Beach, Galveston, Texas. The lot consists of all sizes and variations from smooth to tuberculed and deeply sutured.

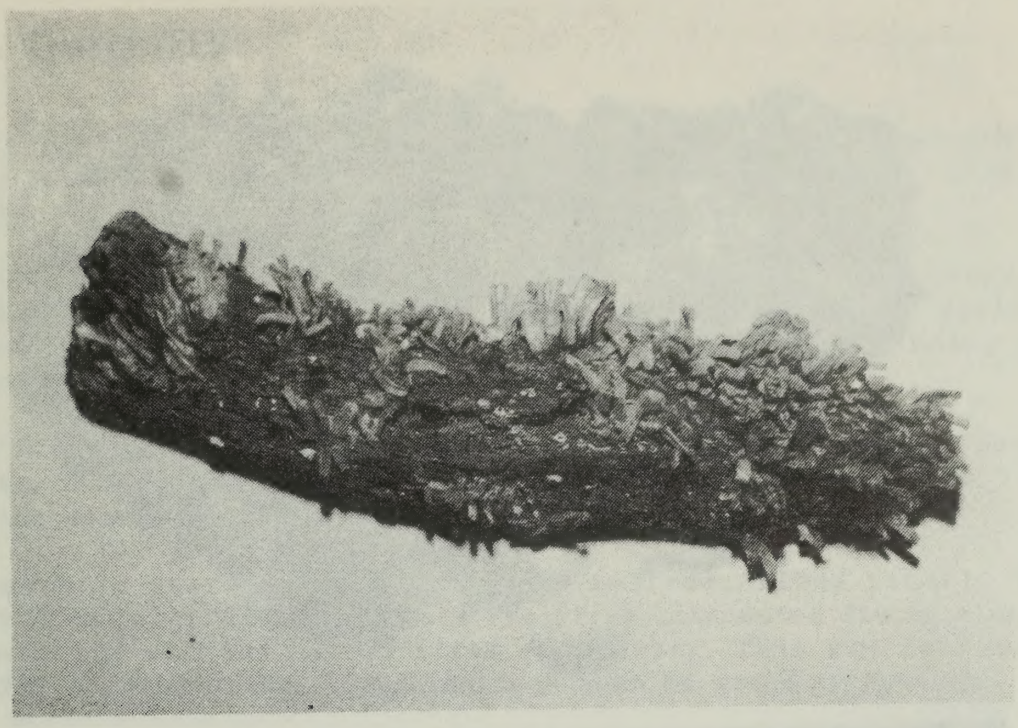


Fig. 2 Egg capsules of Thais haemastoma found on driftwood by Sam and Fannie Miron on March 17, 1973, at East Beach, Galveston, Texas. Note that some of the capsules are light colored. The capsules are creamy or waxy white when fresh laid.

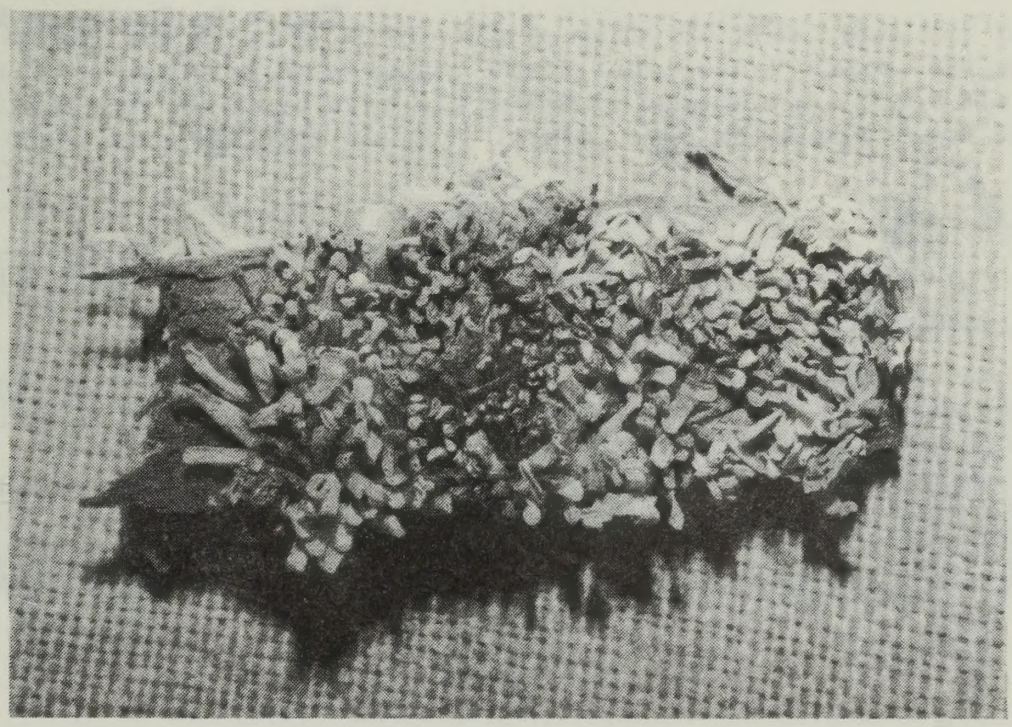


Fig. 3 Egg capsules of Thais haemastoma found on a shingle of wood at Matagorda Beach, Texas, by Constance E. Boone in April, 1976. This is only part of the twelve-inch piece of wood that was completely covered by the egg capsules. On this date C. Boone and other HCS members collected many large tuberculed specimens on the sand bar at the mouth of the Colorado River. It was probably egg-laying time for this Thais.

Fig. 4 The egg mass of Thais haemastoma on sandstone, lot #12,959 at HMNS, collected by Merle Kleb at Sargent Beach, Texas, in 1970. This probably was a "community lay-in." Notice that most of the egg capsules are darkened--they are actually purplish.

Photos by Constance E. Boone

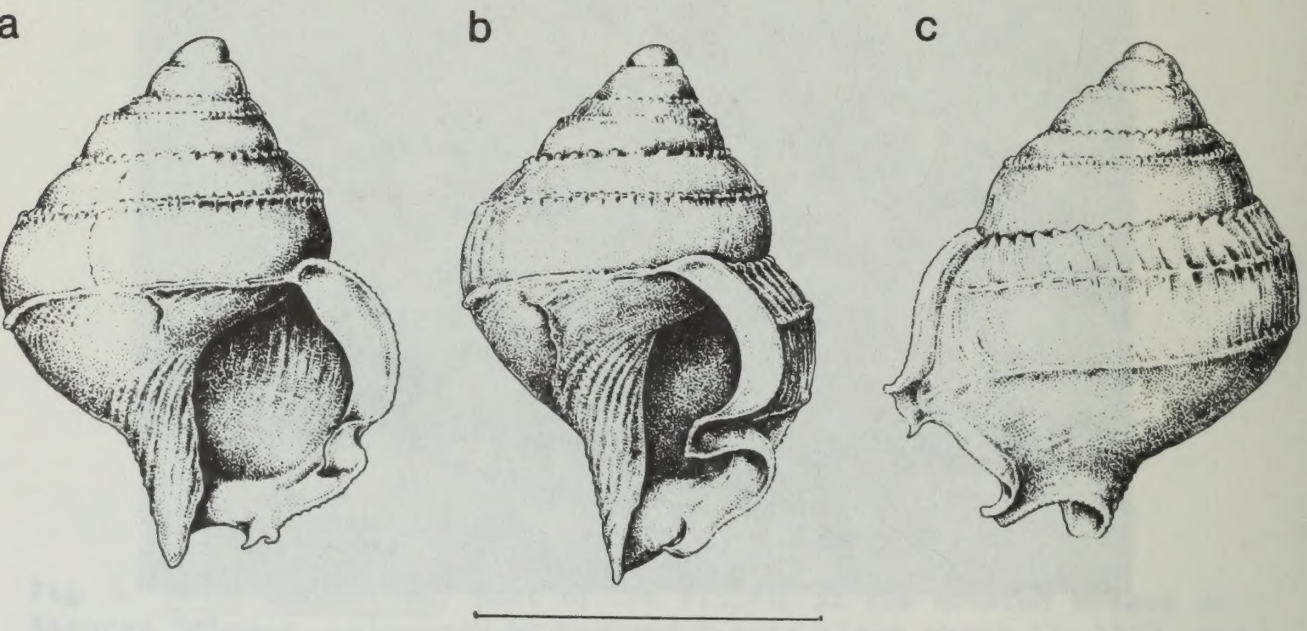


Fig. 5 These illustrations of the larval shell of Thais haemastoma floridana (according to Laursen) are taken from the "Dana Report No. 89, 1981;" a, b, c represent the old stage specimen, according to the publication.

OUI, CHARLEYEEE!

Our long-time member, Charley Doh, was lauded and "captured" in an article titled "Pioneer Beneath the Surface" in the May-June, 1984, edition of Schlumberger's Sounde Off publication.

Charley retired from that company in 1976 but continues today with a company which supplies oil field equipment. Though his oil field adventures in South America and the U.S. were pioneering, his hobby is what we are concerned about. I quote:

"The first time I put a mask on my face, it was like a whole new world for me. I went crazy. It was a beauty you could not describe. Imagine finding yourself in front of a fish that weighed 200 pounds."

The article states Charley became a self-described fanatic for the underwater pastime, helping form the first underwater diving club in New Orleans and serving as its first president. This was followed with working with underwater organizations when he moved to Houston.

"In 1967, on a two-month vacation off the coast of Tahiti, an American biologist taught Doh the intricate art of finding seashells, and his zeal went from spear fishing to shell collecting. In the late 1970s he built a small museum behind his contemporary home in Houston's Memorial area to house a collection of shell specimens from all the world's oceans, except the Arctic."

Charley has shared many of his shells with the club, been our favorite speaker, encouraged many to get their faces under water, helped with displays, and enthused over his hobby to others who caught his fever. So---where have you been Charley, lately, that we haven't heard about?

C. B.

SHELLY SCOOPS

Busycon is trawled off North Carolina for a new industry of canning the meat under the title "scungilli" for sale especially in the New York area. At the 1984 annual summer meeting of the American Malacological Union slides of workers extracting the meat of boiled Busycon with screw drivers left some of us less than interested in this product! We were told that all four species of Busycon were harvested although most of the specimens were Busycon carica and Busycon canaliculatum.

The third state to name a state shell is South Carolina where Oliva sayana has been chosen because the shell was named from that state by Ravenel in 1834 for an early conchologist, Say. Texas shellers once considered a state shell but never could agree on a species nor could they even agree this state needed a state shell. Florida has named Pleuroploca gigantea, the horse conch; and North Carolina chose Phalium granulatum, the scotch bonnet.

C. B.

RARE JANTHINID FOUND BY HCS MEMBER

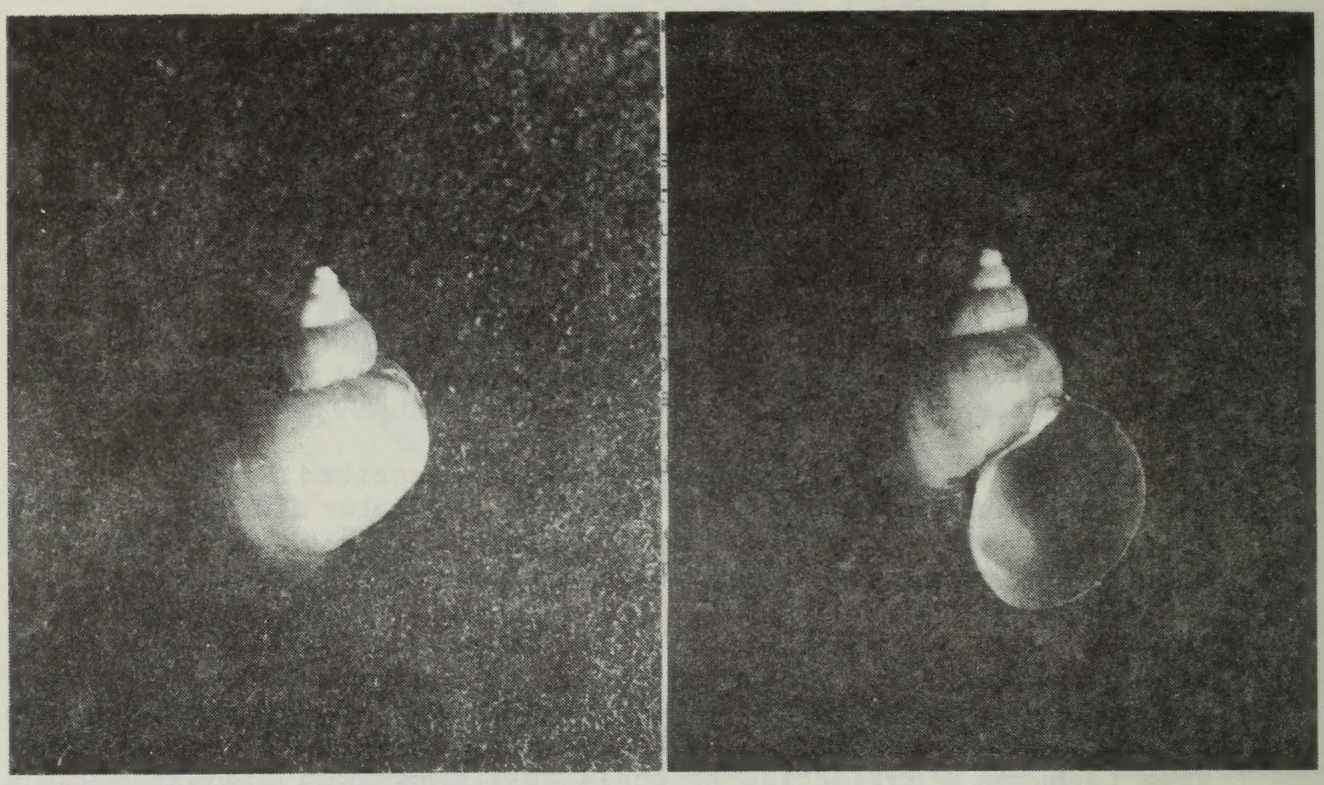


Fig. 1 Recluzia lutea Bennett, 1840, from Port Aransas, Texas

Photos by C. Boone

Donald Oates collected one specimen of the rare janthinid Recluzia lutea (Bennett, 1840) on May 1, 1984, in beach drift near the ferry, Port Aransas, Texas. Along with his wife and other HCS members, he was looking for epitoniids at this area because they had found some there before. The party had not found other janthinids on the Gulf beach during their stay. This single specimen was identified first by HCS member Emily Oakes and has been confirmed by Dr. T. E. Pulley.

The inch specimen of the brown janthinid looks very much like a land snail. Dr. Tucker Abbott reported on the Genus Recluzia in Nautilus, Vol. 76(4), April, 1963, p. 151, stating that Dr. Martin D. Burkenroad collected several dozen live specimens of Recluzia on Mustang Island, near Port Aransas, Texas, in March, 1953. He wrote Dr. Abbott that the

specimens washed ashore with the brown, floating anemone, Minyas. (See Seashells of North America, Golden Field Guide by Abbott, 1968.) Recluzia was not known in the United States until 1953, according to Abbott. Dr. Burkenroad told Dr. Abbott that the Recluzia body was sulphur-yellow and that the long, twisted float, made of brown bubbles, was occupied by brown egg capsules. The living snail was observed eating Minyas, and its feces were stuffed with the anemone's nematocysts. From Nautilus: "...seems wisest to identify this snail as Recluzia rollandiana Petit, 1853. If this species is worldwide in distribution it would have to take the name of R. lutea Bennett, 1840." Abbott reported that the Academy of Natural Sciences of Philadelphia had one specimen of R. rollandiana from Sao Paulo, Brazil, collected many years before by H. von Ihering.

We now report to you that in Compendium of Seashells, 1982, Abbott and Dance list this species as R. lutea with worldwide distribution. Both R. rollandiana and R. palmeri (Dall's name for Recluzia in the Panamic Province) become synonyms. The holotype is illustrated in Compendium.

Other specimens from Texas were reported in Texas Conchologist, Vol. II(7) by Odé and Spears in "Notes Concerning Texas Shells." They stated that a number of Recluzia had been collected off Padre Island--Port Isabel area by several collectors.

The Houston Museum of Natural Sciences does not have a specimen in its mollusk collections.

Notes from ANSP

I am grateful to Dr. Robert Robertson, Academy of Natural Sciences of Philadelphia, for the following records of Recluzia at ANSP, three lots from Texas, as follows:

#300801 Specimens collected at Mustang Island, Texas, by M. D. Burkenroad April 3-4, 1953.

#300806 Specimens collected by M. D. Burkenroad, Mustang Island, Texas, 1953.

#303761 Specimens collected by Mrs. T. W. Moore at the Gulf beach in front of Sea Island Motel, South Padre Island, Texas, March 22, 1965.

Lots also from South Africa, Brazil (as noted already) and from Queensland, Australia.

Dr. Robertson said he knew that some of the early lots had been originally cataloged as Lymnaea, a fresh water snail. He remarked that Recluzia seems still to be very scarce, and he wonders how it manages to be distributed worldwide since it is so scarce.

C. Boone

Note From H. W. Harry on the Pelagic Anemone, *Minyas olivacea* (LeSueur, 1817)

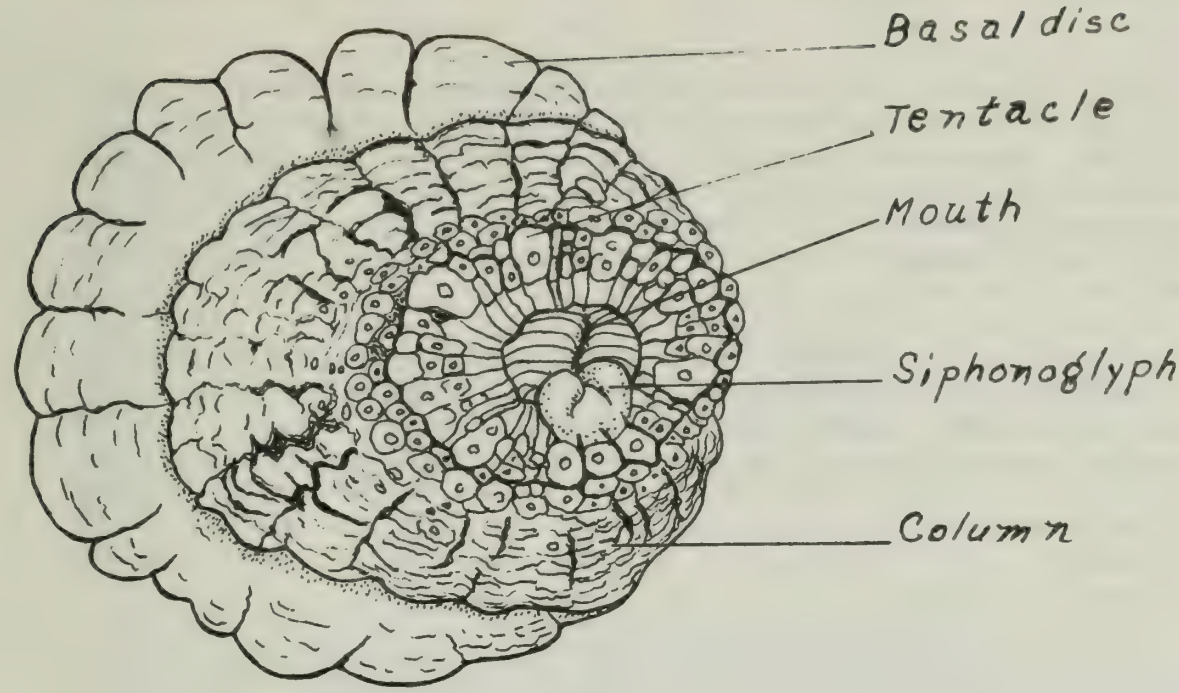
Minyas olivacea (LeSueur, 1817) is a pelagic anemone which occurs chiefly in the tropics but occasionally washes on to the beaches of Louisiana and Texas, presumably also in Florida. It is not hard to see when present on the beaches, and, indeed, its presence may indicate the presence of the pelagic snail, *Recluzia*. One might look for the snail when they see the anemone. Since the anemone itself is sufficiently rare and poorly known, it will continue to be worthwhile to publish a note of its occurrence, to save the specimens, to study them alive, if possible, or at least to put a few in alcohol with a label and pass them to a museum or some worker who may be interested.

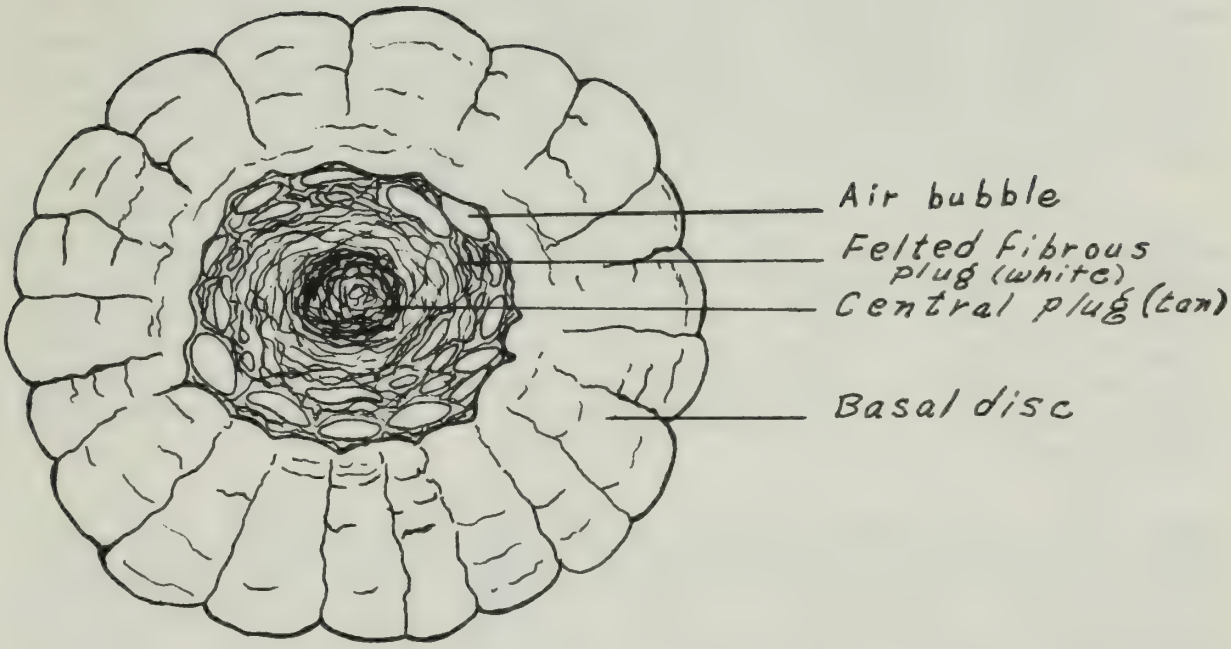
Drawings of a specimen which H. W. Harry found on the beach at the south end of Padre Island on 27 March, 1970, are shown in Figs. 2 and 3. It was about 20 mm. diameter at the base, and light greenish brown (olive colored). The base of the anemone is expanded and flattened; instead of attaching to some solid substrate, it secretes a fibrous material, forming a disk-like pad, in which are entangled some air-bubbles. This allows the anemone to float upside down at the surface of the water. The short, cylindrical column or body is faintly ridged, and toward the oral end the ridges become pustulose. A prominent series of these around the edge of the oral end are evidently all that remain of tentacles. The mouth has a single groove on one side, which is the beginning of a single siphonoglyph, a groove which carries material to the interior of the body. The only account of this species which I have found, outside the brief notes in conchological literature, is a brief one by Hedgpeth (1954:287):

"A pelagic antillean species which occasionally drifts ashore on the coasts of Texas and Louisiana, sometimes in considerable numbers. The animal is an olive brown color, with the tentacles apparently reduced to knoblike processes. The animal remains at the surface by means of a float in the pedal disc. According to observations of M. D. Burkenroad, *Minyas* will shed its float in an aquarium, but does not produce a new one under these conditions. It may be that the mature *Minyas* (as yet unknown) is a sessile form."

Hedgpeth, Joel W.
1954 Anthozoa: the anemones. (pages 285-290) *in* Galtsoff, P. S., (Ed.) Gulf of Mexico; its origin, waters and marine life. U.S. Fish and Wildlife Service, Bull. 89, 604 pages.

(Additional note from the Editor---Dr. T. E. Pulley recalls having seen *Minyas* only twice on our beaches. The Editor once saw many at Galveston West Beach. Neither collector found *Recluzia*, however. Dr. Harry has not collected *Recluzia*.)





Figs. 2 and 3 Drawings by Harry of the pelagic anemone, Minyas olivacea (LeSueur, 1817), collected by H. W. Harry March 27, 1970, at South Padre Island, Texas.

ANOTHER WEEK AT HARBOUR ISLAND

By H. Cornellisson

The third trip to Harbour Island, Bahamas for Mary Ann Curtis, Luana Huggins, and me, and the first trip for Peg Wright, was made June 23 - July 1, 1984. We were eager to get there. The trip over was routine--changed planes in Fort Lauderdale, Florida, from Continental to a small seven passenger plane to North Eleuthera, a short boat ride to Harbour Island. Edward (taxi driver) met us at the dock. Our cottage on the hill was ready for us.

The first morning the weather wasn't very cooperative but we went to Girl's Bay. The first thing we noticed was the absence of small sea urchins. On previous visits there were hundreds of urchins left exposed as the water receded at low tide. (I understand now some species of sea urchins in the Caribbean have had a disease and are dying.) Shelling wasn't the greatest that day, but we all found a few shells--milk conchs, tulips, pink conchs, etc. We saw many larger urchins as we waded through the water.

The second day we visited the Narrows. There were nerites, turbo, periwinkles and chitons on the rocks. Mary Ann and Luana each found a helmet; both helmets were very clean and the colors were beautiful.

Prior to making this trip, I was reading past issues of the Texas Conchologist, Volume XIV, December 1977, page 35, which had a very interesting notation in Search and Seizure. I quote "This summer I was told of a successful method of cleaning helmet shells. It seems that one pours a small amount of oil (like baby oil, mineral oil or cooking oil) in the aperture and sloshes it around with the animal. Then the shell is turned down from a perch. The animal is not able to maintain its attachment because of the oil and finally slips completely out. Hope it works!" I carried baby oil with me, cord, and several mesh fruit sacks, thinking we would try this. On previous trips our helmets came home with bodies intact.

We tied each helmet with the aperture on the side, hung them from a small tree, slipped a bag over the shell to prevent loss of the operculum. The body began to slip but never slipped completely out. We left them to hang all night. The next morning Mary Ann and Luana pulled the critters from their shells. There were seven helmets found; they all came home clean. However, not one body slipped completely out by itself. Perhaps if we had tied the shell with aperture down we would have had better luck.

Peg tried the oil treatment on a milk conch with the same results. I tied a string behind the operculum of a milk conch and hung the shell down. The poor critter pulled that heavy shell up and down like a yo yo but never let go of his home. Next morning I found the shell on the ground, the critter pulled apart, operculum with half the animal still on the string. I boiled the shell and finished cleaning it.

Rocky, a native of the island who has helped many club members shell for several years, came to visit us. He is quite tall, a nice-looking young man, working on construction, no time for shelling now.

We made two successful trips in a boat with Herman Higgs, another native who has a boat, who has a sharp eye for anything in the water. Herman told us as we left the dock not to pick up starfish until we were ready to quit shelling; on the return trip we would stop and gather all we wanted. I saw many starfish as we made our way around the bay and left them after checking each to see if a triton was having lunch, because Sunny Sappington once found one under a large starfish. As the afternoon passed we began to place starfish in the boat. Herman became really irked with us. I didn't understand until he put one of the starfish back into the water and it floated. Starfish expell water and shrink. Herman wanted us to have nice full specimens to carry home. We did gather several on the way to the dock, rushed them up to Angela's restaurant to be placed in the vat of formaldehyde. The starfish lesson will not be forgotten. We have all learned to take our live starfish to Angela to have them properly treated and dried. We do not remove the animal by cutting into the arms. The whole preserved starfish is more interesting.

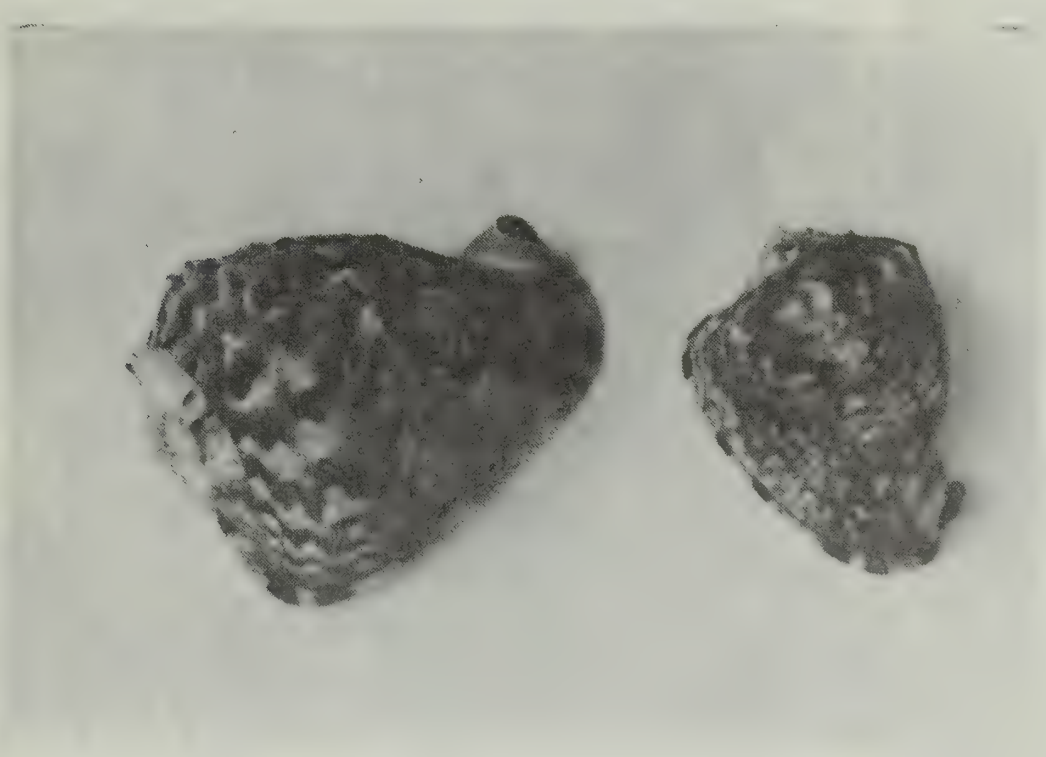


Fig. 1 Two of the very clean Cassis tuberosa (Linne, 1758) collected at Harbour Island in June, 1984, are shown in this photograph by Helen Cornellisson.

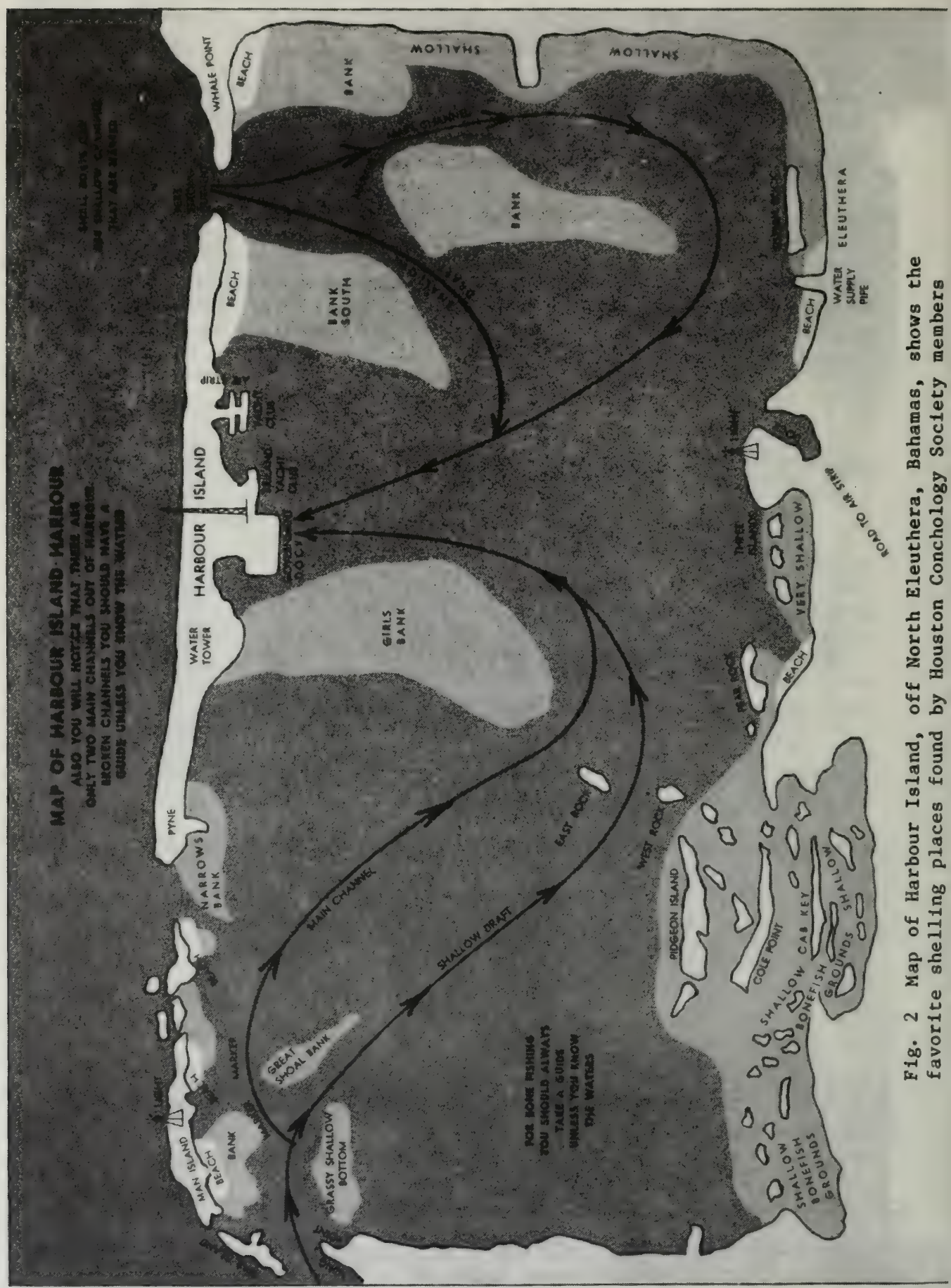


Fig. 2 Map of Harbour Island, off North Eleuthera, Bahamas, shows the favorite shelling places found by Houston Conchology Society members

HOUSTON MUSEUM OF NATURAL SCIENCE

By T. E. Pulley

(Reprinted in part from The American Malacological Union Newsletter, Vol. 15, No. 1, Spring, 1984)

The Houston Museum of Natural Science is rapidly developing into an important center for malacological studies. The collection of mollusks from the western Gulf of Mexico is already the largest in the world. The library includes almost all of the major works of the 19th and 20th centuries.

The current catalogue of the collection was begun in 1975, and the number of catalogued lots...[is now over 16,000]. Most of this material is from the Western Atlantic, with emphasis on species which live in the Gulf of Mexico and the Caribbean, but shells from other areas are also included. Coverage of shells from the Western Gulf is intended to be as complete as possible, but the world-wide collection will consist primarily of the larger and more attractive shells to be used in the public displays.

Much of the Western Gulf collection is from the "Northwest Gulf Survey" instituted by Mr. Harold Geis in 1965. The collections were made by scuba divers and from dredgings by State and Federal research vessels operating the area. The massive job of washing and sorting was done by volunteers working under the direction of Mr. Geis, and almost every specimen, no matter how small or fragmentary, was preserved. In addition to those species which are small as adults, the collection is rich in larval or juvenile shells of large species. These were found to be very useful by Dr. Dan Laursen in his review of the prosobranch larvae in the North Atlantic.

Detailed studies of the "survey" collection have been made by Dr. Helmer Ode, and his review of the bivalves has been completed. Identification of all the bivalves, at least to Genus, and details of their occurrence have been the subject of numerous articles by Dr. Ode in Texas Conchologist, a quarterly publication of the Houston Conchology Society. Dr. Ode is now working on the gastropods, and he has begun the formidable task of bringing order to the Pyramidellidae. He has developed a list of more than 2,400 names that have been applied to the group, and this catalogue, which will be indispensable to other students of the pyramidellids, will be published by the Academy of Natural Sciences of Philadelphia.

The total size of the "survey" collection is estimated at 25,000 lots. More than 8,000 lots (mostly bivalves) have already been catalogued. Many of the remaining lots have been satisfactorily identified and are ready for cataloguing. A high percentage of the small gastropods cannot be identified to species, and it is likely that many of them are undescribed. There is mounting evidence of endemism in the Western Gulf, or the area is at least the center of abundance for many species that are rare elsewhere.

The core of the library was assembled by Mr. R. W. Barker and was sold (most reasonably) to HMNS. Mr. Barker grew up in England, and he knew most of the English malacologists of the early and middle 20th century, including G. B. Sowerby III and Hugh Fulton, the famed bookseller. Many of the important reference works in the library were obtained through Sowerby and Fulton, including Sowerby's set of Conchologica Iconica which still has marginal notes in Sowerby handwriting.

Also in the library are the tenth (reprint), twelfth and thirteenth editions of Systema Naturae and the pre-Linnean books of Bounanni, Rhumphius, Gualtieri, Klein and d'Argenville. There are more than 500 indexed volumes, including the most important works of Reeve, Philippi, Pfeiffer, Bruguiere, Deshayes, Semper, Kiener, Lamarck, Tryon, Pilsbry, Kobelt, Martini and Chemnitz (both editions), Rossmassler, Chenu (a mint set of Illustrations Conchyliologiques), Ferussac, Schroeter, Knorr, Martyn, 4 generations of Sowerbys, Montfort, Perry, Swainson, Adams (3), Mawe, Quoy and Gaimard, d'Orbigny, Valenciennes, Hanley, Born, Dautzenburg, and many others.

All of the 19th and 20th century journals from England, France, Germany, United States and Japan are complete or nearly so. There are also more than 1,000 separates and smaller publications that have been bound in a series of volumes and indexed by author.

In addition to the publications on recent Mollusca, there are 500 volumes on geological subjects, most of which are paleontological, including a large number which deal with fossil mollusks. This section of the library includes complete series of all the important invertebrate paleontological journals of England, France and the United States.

Interested scientists wishing to borrow material from the collections of HMNS should write to Dr. T. E. Pulley or Mrs. Constance Boone at the Museum, 1 Hermann Circle Drive, Houston, Texas 77030. Please do not ask for all of the material from a particular genus or species because only selected lots will be sent at any one time. It has been learned through sad experience that both the post office and a few malacologists are notoriously unreliable.

Expanded facilities for the mollusk collection at HMNS have recently been made available, and the collection is now in a rapid growth phase. Gifts of material will be welcome. Particular interest at this time is centered on Western Atlantic species living in the area from Cape Hatteras to Brazil and on world-wide species that are suitable for public display. It should not be necessary to mention that there are tax advantages in donating shells to a museum, but you may inquire about this matter if you want further details.

The library is freely available to qualified persons who wish to come to HMNS, but books cannot be loaned. Limited numbers of photocopies can be sent free on request, but please do not ask for more than 10-15 pages at a time.

The Houston Museum of Natural Science would like to develop a major malacological collection, and we seek the cooperation of other institutions and individuals that will help us achieve this goal.

EXPLANATION OF FIGURES

Fig. 1 The engraved portrait of G. E. Rumphius from the "Amboinische Rariteitkammer," from the 1739 reissue of Thesaurus Imaginum Piscium Testaceorum ut et Conchearum in the HMNS library shows this early naturalist with some of the objects in his collection. Rumphius was blind at the time of the original drawing. This copy clearly shows this condition.

George Eberhard Rumpf (1627-1707) was employed by the Dutch East India Company and spent the greater part of his life on the island of Amboina, East Indies, where he conducted innumerable observations on plants and animals. He was essentially a field man who amassed a wealth of information on living animals in their natural surroundings. Finally, he was able to put all this down on paper and is said to have had a remarkable gift for description. His work was pre-Linnean, but Linnaeus used many of Rumphius' names and referred to his illustrations. Thus, today we have such a designation as Cypraea argus Linne, which Rumphius described as Porcellana argus. His Cassis cornuta became Linne's Buccinum cornutum, but today we know it by Rumphius' name.

Fig. 2 A fanciful arrangement of shells, as favored in the early cabinets of naturalists, is shown on this plate from the Latin edition, 1684, of P. Buonanni's "Recreatio mentis, et oculi in Observatione Animalium Testaceorum Romae, et Veneunt Parisiis," a volume in the HMNS library.

Philippo Buonanni (1638-1725), an Italian Jesuit, wrote the first book of any size restricted to mollusks. It was first published in Rome in 1681 and contained many illustrations of shells, reversed in printing but reasonably accurate. The majority were referred to subsequently by Linnaeus. Buonanni had no scientific background and no field knowledge. The book was probably intended to be a picture book to delight the curious. Several plates were included showing similar arrangements of shells as the one plate we depict.

Information on the two authors was taken from Shell Collecting, An Illustrated History by S. Peter Dance, 1966. We have this volume in our HCS library.

EFFIGIES
GEORGII EVERHARDI RUMPHII, HANOVIENSIS ÆTAT: LXVIII.

Fig. 1

Cæcus habens oculos tam gnavæ mentis acutos,
Ut nemo melius detegat aut videat:
RUMPHIUS hic vultu, Germanus origine, totus
Belga fide et ca[illegible] c: cætera dicet opus.
ex tempore posuit.

N: S. Gub: Amb:


PARS
QVARTA
Icones Testaceorum
quae in Parte Secunda describuntur

Fig. 2

TEXAS CONCHOLOGIST, Vol. XXI, No. 1, October, 1984

ON THE OCCURRENCE OF REDEPOSITED PLEISTOCENE FOSSIL SNAILS IN SEDIMENTS ASSOCIATED WITH AN ARCHEOLOGICAL SITE IN CENTRAL TEXAS (41KM16)

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Terrestrial and freshwater gastropods have been widely utilized to interpret present and past environments in relation to archeological sites. Generally, the recovered snails are assumed (or possibly verified through studies of local stratigraphy) to have originated at the point of recovery or to have been transported by floodwaters from upstream habitats. Sequential interpretation is possible only if each layer can be assumed to be a homogeneous unit. Below is discussed a site in which environmental reconstruction is complicated by the existence of a layer dominated by modern flood debris which includes materials from an upstream Pleistocene terrace.

SITE DESCRIPTION

Site 41KM16 is located in the eastern part of the Edwards Plateau on the banks of Copperas Creek just upstream from its confluence with the North Llano River in Kimble County just west of the county seat, Junction. Various Lower Cretaceous limestones form a rather flat topography which is occasionally interrupted by watercourses which have eroded various-sized canyons (see Alexander and Patman 1969). Climax vegetational associations include mixed-grass prairie or savannah on level to gently rolling sites with variable amount of plateau live oak (*Quercus fusiformis*). Breaks and steep rocky slopes support arborescent vegetation, particularly Ashe juniper (*Juniperus ashei*), Texas oak (*Quercus texana*) and Texas persimmon (*Diospyros texana*). Extensive overgrazing has altered composition of the grass cover and caused an increase in woody plant coverage (Cory 1959). Climate is semi-arid (18.33 inches average annual precipitation) with hot summers and mild winters (R.B. Orton in Wiedenfield and McAndrew 1968).

METHODS AND RESULTS

Snails retrieved from on-site flotation sampling operations have been examined in a column from the surface to a depth of five feet (Table 1). No sample was available for one level (2.0-2.5 feet). Initial inspec-

tion of the snail species present in the various levels reveals a distinct difference between the upper and lower levels of the column with the major breaking point appear to be at the missing layer with an additional change at the 0.5-1.0 foot level. Layers below this major break-point are dominated by Rabdotus mooreanus and Helicodiscus singleyanus. The former species, known as the prairie snail, indicates the occurrence of extensive grasslands with varied amount of arborescent vegetation. The latter species indicates some occurrence of cover which could be supplied by dense grass. Layers above the break-point indicate greater amounts of arborescent vegetation.

DISCUSSION

Level 0.5-1.0 reveals a further increase in species number and a substantial increase in specimen number. Of greatest significance is the occurrence of Vallonia perspectiva Stecke. The closest known occurrence of natural living populations of V. perspectiva are several scattered mesic relictual areas in the Trans-Pecos area of Texas (Fullington and Pratt 1974). Undoubtedly the occurrence of V. perspectiva in the column at 41KM16 is the result of erosion of an upstream Pleistocene terrace. Although erosion of the terrace may be almost continuous (note occurrence of V. perspectiva in level 4.5-5.0), the extremely large percentage of specimens which are found in one layer could be due to a major flood. This event was probably the flood of 16 September 1936, the maximum flood in this area since at least 1875 (Patterson 1963). Extensive flooding occurred during this period, so much so that a large whirlpool was created at the confluence of Copperas Creek with the North Llano River.

Consequently, many snails in these uppermost layers may have come from the drainage basin of the upper North Llano rather than that of Copperas Creek. Four species (Gastrocopta cristata, Deroceras laeve, Hawaiia minuscula and Mesodon roemeri) were found only in one level (either 0.5-1.0 or 1.0-1.5). Two other species (Pupoides albilabris and Polygyra mooreana) occur only above the 2.0 mark. These six species indicate greater arborescent cover and moisture levels; restriction to these layers probably reflects the greater arborescent coverage on the upper North Llano River than on Copperas Creek.

Normally, a sharp contrast between grassland and woodland snail faunas would indicate transition from pristine prairie conditions to overgrazed, scrub-invaded conditions. However, the one-foot level is dated at about 1400-1600 A. D. level. The major change (if real) occurs in earlier levels before widespread human impact occurred. Possibly increasing aridity caused these changes. An increase in seasonality of rainfall (less rain in summer and fall) would cause increased runoff with less ground cover. The result would be increased erosion and woody plant invasion. Larger samples would be required to make definite conclusions, especially in light of the effects of floods upon the origin of the snails in these sediments.

Although all snails in these samples are flood debris deposits, only eight specimens of a single species of aquatic snail were found; all

were below the 3.0 foot level. Aquatic snails are likely to be uncommon as most of the drainage of the North Llano is intermittent; springs are uncommon and quite minor in discharge rates (Alexander and Patman 1969; Muller and Pool 1972). Restriction of aquatic snails to these lower levels could be a further indication of more mesic periods in the past (4.0-4.5 layer is dated 2500-2700 B.P.).

I thank Joe Denton for supplying snails, culturally-derived dates, and additional information concerning 41KM16.

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TABLE 1

Gastropods Recovered from Soil Column at 41KM16

Snails	Column Stratum										
	1	2	3	4	5	6	7	8	9	10	Total
Helicina orbiculata	4	14	2	-	*	-	-	-	1	-	21
Vallonia perspectiva	1	12	1	-	*	-	-	-	-	1	15
Pupoides albilabris	3	2	-	-	*	-	-	-	-	-	5
Gastrocopta cristata	-	1	-	-	*	-	-	-	-	-	1
Gastrocopta pellucida	-	1	-	1	*	-	1	-	-	-	3
Gastrocopta procera	2	2	2	1	*	-	-	-	1	-	8
Gastrocopta contracta	12	19	3	2	*	-	1	-	-	1	38
Helicodiscus singleyanus	2	3	1	4	*	-	6	3	3	-	22
Deroceras laeve	-	1	-	-	*	-	-	-	-	-	1
Glyphyalinia umbilicata	-	1	1	1	*	-	-	1	-	-	4
Hawaiia minuscula	-	-	1	-	*	-	-	-	-	-	1
Rabdotus mooreanus	-	6	5	10	*	7	8	6	5	10	57
Polygyra mooreana	-	3	-	2	*	-	-	-	-	-	5
Polygyra texasiana	-	1	2	2	*	1	-	-	-	-	6
Mesodon roemeri	-	-	1	-	*	-	-	-	-	-	1
Planorbella trivolvis	-	-	-	-	*	-	2	1	5	-	8
SPECIES TOTALS - 16	6	13	10	8	*	2	5	4	5	3	196

A LESSON ON SHELLING IN TEXAS

Fig. 1 HCS members last March dug Cyrtopleura costata (Angel Wing) in the mud near the jetties on Bolivar Peninsula. It was cool and cloudy, and access to the mud bar required going through water. As we reported in Texas Conchologist, Vol. XX(3), many of the 13 HCS members arrived with inadequate shelling equipment. You need waist or hip waders to shell in winter or spring months. Lace-up, high-top tennis shoes are a must in mud and also helpful over stocking-foot waders (which are lighter weight for women). Plain boots filled with water. Helen Cornellisson, extreme left, holds her boots after emptying them of water. Our front row visitor, Lori Jacob, borrowed knee boots but lost them in the mud, and you see her with wet trousers. Luana Huggins, front center, held the visitor's camera and didn't try to come out to the sand bar as she only had boots. Other members, back row, left to right, are Connie Boone, in full regalia of waders, high-top tennies, gloves, stocking cap and head lens; Sunny Sappington who got wet but dug angel wings anyway; trip leader Don Hart in boot waders; Judy Endsley (with bucket) holding her first angel wing (that muddy blob in her hand); and Elizabeth Smith. New members need to note that shelling in Texas when tides are lowest in the winter requires preparation. We were on the bar that day with no tool like a sharp-shooter spade to dig the angel wings. Garden trowels bend easily in the mud. We played mud pies, using our hands getting the animals out.

Photo by Bob Sappington

TEXAS CONCHOLOGIST, Vol. XXI, No. 1, October, 1984

MONOGRAPH

By H. Odé

DISTRIBUTION AND RECORDS OF THE MARINE MOLLUSCA IN THE NORTHWEST GULF OF MEXICO

(A Continuing Monograph)

Family COLUMBELLIDAE Swainson, 1840 (Continued)

Genus Anachis H. and A. Adams, 1853

The genus Anachis is well represented in the Western Atlantic. Only a single species of Anachis sensu stricto occurs in the tropical part of the Western Atlantic (Cuba to Brazil), but this species has not been found in our coastal or offshore waters. A number of interesting species of the subgenera Costoanachis and Parvanachis is widely distributed along the eastern seaboard of the U.S.A. For more information the reader is referred to Abbott's American Seashells (1974, pages 195-197) and three papers by G. E. Radwin in the Veliger (1977-78): Vol. 19 (4) 403-416; Vol. 20 (2) 119-133 and Vol. 20 (4) 328-344.

Subgenus Parvanachis Radwin, 1968

This subgenus was proposed by Radwin to include a number of rather small columbellids with heavily thickened apertural lips and body whorls somewhat shorter than other anachids. In my opinion it is somewhat doubtful that this subgenus is truly different from Costoanachis.

In Texas bays and close offshore waters there live two species, one of which is in all probability merely a form of the other.

66. Parvanachis obesa (C. B. Adams, 1845)

This is a widespread and common shell along the Texas coast, often common in beach drift. Its main habitat appears to be in the offshore waters and not in the bays where it is replaced by the next species (ostreicola). However, I have considerable doubt about the distinctness of these two so-called species. Our extensive Texas material contains at least three seemingly distinct forms, all belonging to this variable complex. We may here enumerate a number of differences.

1) Obesa is the more straight conical form, and ostreicola is the more spindle shaped.

2) The costae of ostreicola are often slightly nodulose in consequence of the fact that the spiral sculpture is more heavily developed than in obesa.

3) The color pattern of obesa is mostly considerably lighter than that of ostreicola.

4) Obesa often has a heavily developed subsutural thickened

ridge which occasionally is nodulose. This ridge is always lighter in color than the main body of the shell. The ridge is almost never present in ostreicola.

5) A third form is not often found on the beach. It has the typical shape of ostreicola but a much lighter color than the dark brown ostreicola from the bays. It lacks the subsutural ridge and the heavy development of the labrum of obesa. Most characteristic, however, is the presence of a clear dark purple band on a light colored background around the siphonal canal.

6) The sculpture of the first windings after the shiny smooth initial ones appear to be quite different in ostreicola and obesa. In the latter they show hardly any spiral sculpture between the costae whereas in ostreicola there is clear evidence of spirals between costae much less in number than in obesa.

It is often quite difficult, especially in worn beach material, to decide which "species" one has under the microscope. Radwin mentions the presence in ostreicola of a "baldspot" (that is, an area on the subapertural side where the sculpture fades away). A similar baldspot occurs in many examples of obesa and even in specimens of lafresnayi d'Orbigny.

In view of the large number of specimens in the survey collection of H.M.N.S. it is surprising how little variation there is in fresh material. In contract to beachworn material, this can always be assigned to one form or the other. We must mention that in obesa there occurs rarely a form in which the costae are far more numerous than in the "regular" form.

Records HMNS Survey Collection: 65 lots of which 16 contain live collected material.
Depth range: 0-28 fms; alive 0-25 fms.
Geographical range: From Virginia to Florida and Texas. South America to Uruguay (Abbott, 1974).
Maximum size: 5.0 mm. It is to be noted that Andrews apparently quoted a size for Texas specimens without measuring it. In the thousands of shells in our collection, not a single one exceeded 5.0 mm.

67. Parvanachis ostreicola Sowerby, 1882

According to Radwin, Melvill's original designation of 1881 is invalid (nomen nudum).

In the previous discussion we have enumerated a number of differences with P. obesa. The species is widespread along the Texas coast and lives in the bays on the oyster reefs. We may remark here about a rather remarkable fact. Sometimes lots of shells collected alive on the oyster reefs contain amid a hundred or so specimens a single specimen of obesa, which except for shape looks in habitus exactly like ostrei-

cola. The shape is that of obesa with the straight conical outline of the shell and the enormously thickened labrum. Finally, we mention here that Andrews (1971, Sea Shells of the Texas Coast) figures on page 112 a typical ostreicola labelled Anachis (Costoanachis) c.f.a. obesa.

It must be mentioned that live populations of ostreicola have also been found offshore Louisiana (Ship Shoal) and outside Freeport (mouth of Colorado River), indicating that this form prefers muddy substrata in waters of varying salinity.

In conclusion, I state here that I consider P. ostreicola as an ecological variant of obesa adapted to life in muddy coastal bays or shallow offshore waters with reduced salinity occurring from Florida over Louisiana to Texas and northern Mexico.

Records HMNS Survey Collection: 57 lots of which 28 contain live collected material.
Depth range: 0-15 ft.
Geographical range: Gulf Coast of western Florida over Louisiana to Texas and Mexico.
Maximum size: 4.3 mm.

Subgenus Costoanachis Sacco, 1890

This name was invented by Sacco for an Italian tertiary fossil and the name is now applied to several Western Atlantic species. In total there are five species of Costoanachis in our area, but on the basis of shell characters, I would place only two in a separate subgenus (floridana and semiplicata), and I would place three others (hotessieriana, lafresnayi and an unidentified one) with obesa and ostreicola. In the discussion of the latter three enumerated species we have been hampered by the remarkable disparity between the figures shown in Radwin's papers and material at hand in our collection. Of two species we have large numbers of freshly collected shells. They hardly can be stated to look like the figures given by Radwin on his plates (opposite page 120, figs. 4, 8 and 9 for C. hotessieriana and figs. 5 and 6 for C. lafresnayi. For the latter we have to rely on the fact that our identification originally was made by Dr. Radwin himself (see Texas Conchologist, Vol. 7, p. 47). Finally, we state that in our material has come to light a species which we cannot identify. It is the largest Anachis of our coast, living in fairly deep water and in shape--but not in size and color pattern--very close to C. hotessieriana. However, it is twice as large.

68. Costoanachis floridana (Rehder, 1939)

This easily recognized species, which was first described from near Cape Canaveral, Florida, apparently has a quite disjunct occurrence in the U.S.A. It also occurs in the recent fauna of southern Texas. But from Galveston, where the species is rarely found, to west Florida, it has to my knowledge not been collected. According to Radwin, it is closer related to the South American C. sertularium d'Orbigny more than to our well

known C. semiplicata Stearns, from which it differs distinctly. It has a rather smooth shell with costae only on the body whorl and is covered with fine irregular spiral striae. It is known from the immediate coastal waters but has been taken alive offshore Freeport in water between 38-45 feet.

Records HMNS Survey Collection: 13 lots of which five contain live collected material.
Depth range: 0-7 1/2 fms.
Geographical range: North Carolina to Florida, Southwest Texas (Abbott, 1974).
Maximum size: 12.2 mm.

69. Costoanachis semiplicata (Stearns, 1873)

This quite common columbellid lives along the entire northern shore of the Gulf of Mexico. It is quite rare in offshore dredge material, but if present the specimens are always old and worn and probably represent Pleistocene fossils. In offshore waters the species is replaced by C. lafresnayi (Fischer and Bernardi, 1856). Texas specimens have a uniform color pattern of clearly bounded brown splotches.

Records HMNS Survey Collection: 40 lots of which 21 contain live collected material.
Depth range: 0-25 fms; alive 0-10 ft.
Geographical range: West Florida to Yucatan, Mexico (Abbott, 1974).
Maximum size: 14.2 mm.

70. Costoanachis lafresnayi (Fischer and Bernardi, 1856)

Specimens of this species are occasionally found in worn condition in beach drift along the Texas coast. It is one of the few species which is more common on East Texas beaches than on beaches further west and south. Very rarely alive in beach drift (one alive on a piece of driftwood near High Island). In the past it has been reported a few times as Anachis avara similis Ravenel, but according to Radwin, it is unclear what shell this name applies to.

In offshore waters the species is fairly abundant and is often dredged alive. It differs from hotessieriana by its color pattern—no zig-zag pattern on its base—and lacks the excavated suture of hotessieriana. Live collected shells have an obvious, strong and finely wrinkled epidermis. Lafresnayi is an earlier name for translirata Ravenel.

Records HMNS Survey Collection: 46 lots of which 25 contain live collected material.
Depth range: 0-45 fms; alive 0-35 fms.
Geographical range: Maine to East Florida, Yucatan (Abbott, 1974).
Maximum size: 10.8 mm. Radwin cites a maximum size of up to 16 mm, but our Texas material never gets as large as that.

71. Costoanachis hotessieriana (Orbigny, 1842)

In the past we have reported several lots of this species incorrectly under such names as A. translirata Ravenel and A. iontha Ravenel (see Texas Conchologist, Vol. 9, p. 66). According to Radwin translirata is a synonym of lafresnayi (Fischer and Bernardi) and iontha Ravenel of hotessieriana d'Orbigny. C. hotessieriana can be recognized immediately by its color markings which consist of narrow parallel red brownish lines more or less parallel to the spirals and zig-zag patterns of lines on the base of the shell. Its shape is quite characteristic. Texas material is extremely straight-sided in outline. Fig. 4 of Radwin appears somewhat close, but does not give the impression our material gives. The costae of our material are perfectly straight, not knobby. Also the somewhat keeled body whorl which is quite different in outline from that of C. lafresnayi is a good identification guide. But perhaps the most characteristic feature of the shell is the deeply excavated suture whose depth is accentuated by the ending of the costae. In some specimens solid brown bands may occur. The figure #2055 given by Abbott comes closest to our Texas material.

The species is quite common offshore where it may live mixed with lafresnayi. It is hardly ever found on the beach. Once a juvenile fresh shell was collected by me from beach drift at Port Isabel, and it has also been taken from the jetty at Freeport.

Records HMNS Survey Collection: 46 lots of which 14 contain live collected material.
Depth range: 0-40 fms; alive 3 ft - 25 fms.
Geographical range: South Florida and the West Indies (Abbott, 1974).
Maximum size: 7.7 mm.

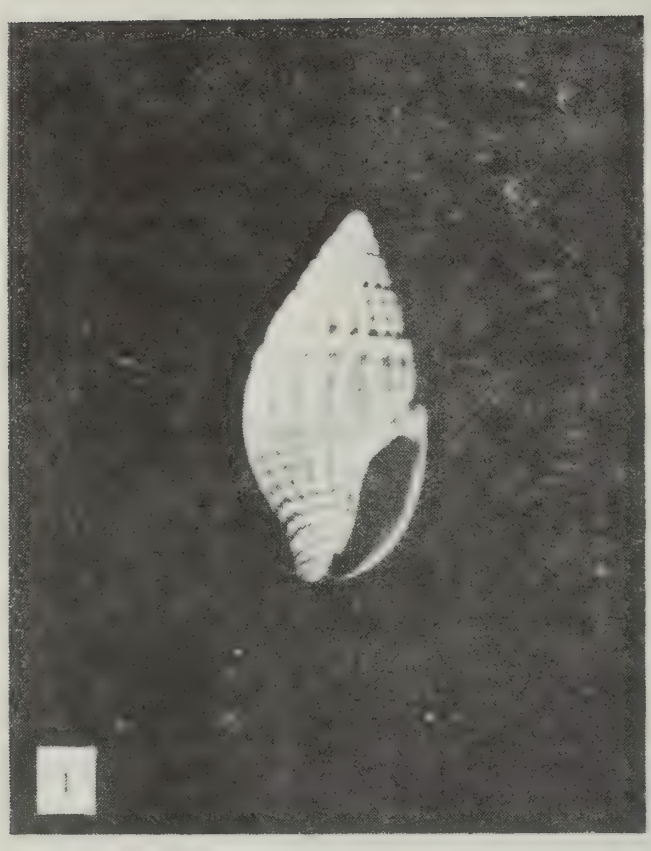
72. Costoanachis spec. indet. A.

Among our material is one species that I am unable to identify. Radwin does not present a figure that resembles it and also Abbott does not throw light on this matter. It appears to be fairly closely related to C. hotessieriana but differs in several important aspects:
1) Its size is considerable--up to 14.7 mm--which is about twice the size of hotessieriana.
2) Its color pattern is different. There are no zig-zag lines on the base or spiral lines on the body whorl. Instead there is a somewhat whitish band at the slightly keeled body whorl, while the main part of the body whorl has an irregular brownish coloration.
3) There is no excavated suture. Instead there are two spiral incisions below the suture which make it appear as if there is a subsutural ridge which in some examples is even slightly nodulose.
4) The shell shape is clearly that of hotessieriana. It is

possible that this is somehow a local giant race of hotessieriana d'Orbigny living in deeper waters of the northern Gulf of Mexico. I doubt this, and I believe that this probably is one of the localized species which are common in the genus Anachis and of which Radwin had no material.

Records HMNS Survey Collection: 12 lots of which one contains live collected material.
Depth range: 22 fms - 40 fms; alive 25 fms.
Maximum size: 14.7 mm.

(To be continued)



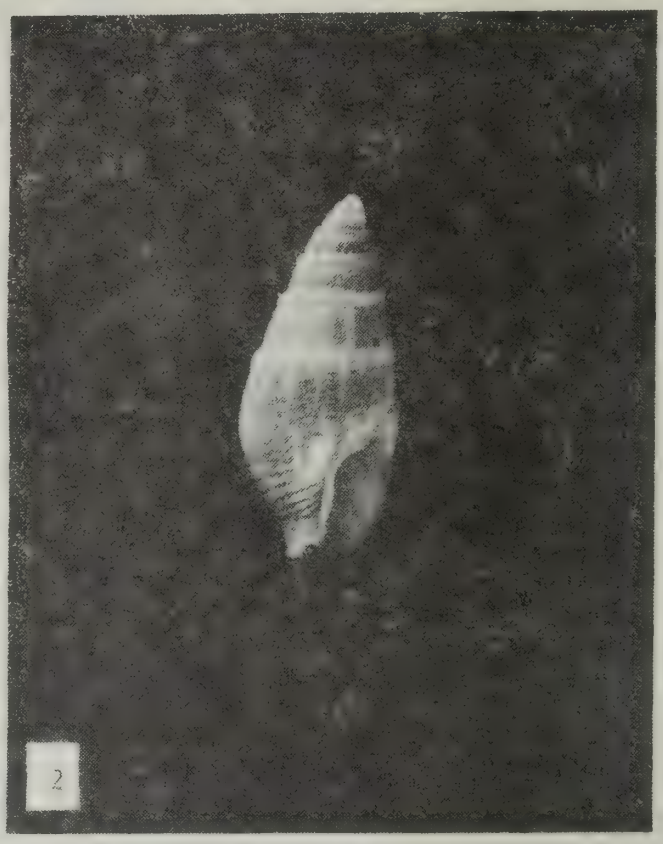


Fig. 1 Anachis ostreicola, 4.6 mm., collected by diver H. Geis 35 miles North of Port Isabel, Texas, in 25-50 feet from a limestone lump off Padre Island, Sept. 25, 1966.

Fig. 2 Anachis obesa, 4.05 mm., trawled 3 1/2 miles SSE of Port Aransas, Texas, by the Bureau of Commercial Fisheries, 1965.

Fig. 3 Anachis hotesseriana, 6.3 mm., collected by diver H. Geis at Heald Bank, 31 miles ESE of Galveston, Texas, August 27, 1965.

Fig. 4 Anachis spec. indet., 12.7 mm., trawled by Capt. A. Kight 58 miles South of Freeport, Texas, Nov. 1, 1967.

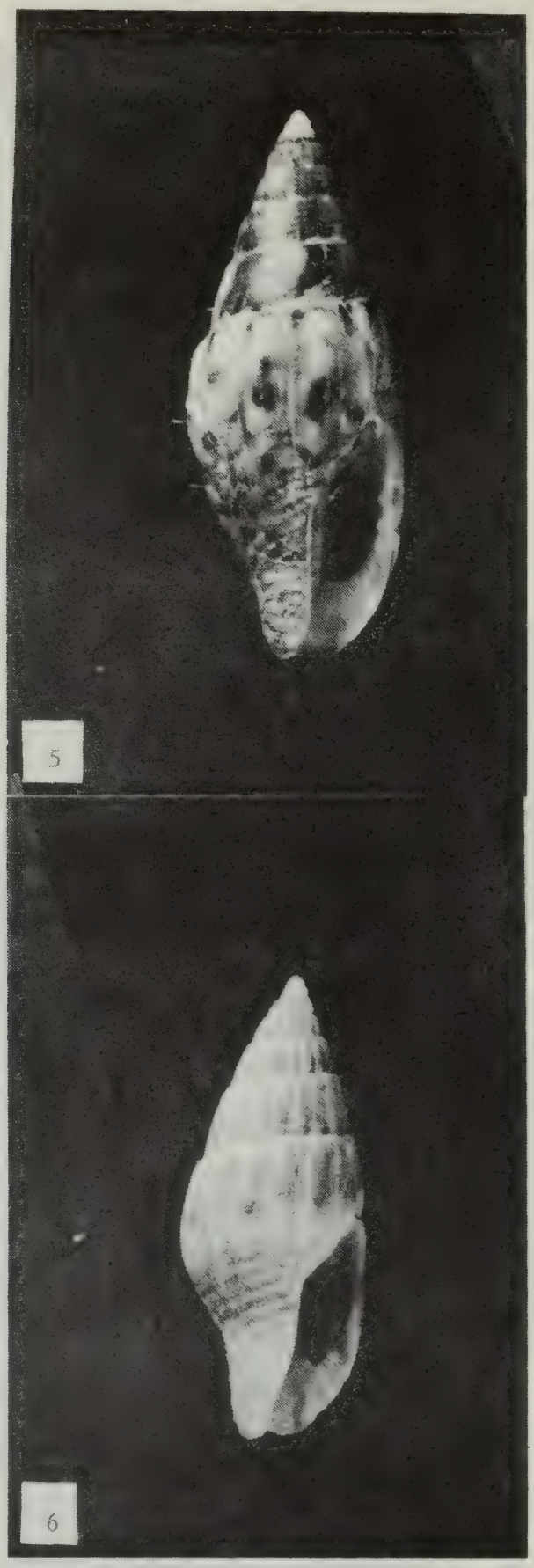


Fig. 5 Anachis semiplicata, 9.3 mm., collected by hand from marsh flats, at Hoecker's Point, Galveston West Bay, Texas, by H. Geis, Feb. 27, 1968.

Fig. 6 Anachis lafresnayi, 8 mm., collected by divers H. Geis and W. Pierce in 11 fms. from the 30 mile rigs South of Galveston, Texas, Nov. 1, 1964.

Photos by H. Geis

TEXAS CONCHOLOGIST, Vol. XXI, No. 1, October, 1984

NOTES ON THE LIVE SNAIL, COLUBRARIA LANCEOLATA (MENKE, 1828) FROM HEALD BANK, OFF GALVESTON, TEXAS

HAROLD W. HARRY

The few species of the marine prosobranch snails of the family Columbrariidae live in tropical and warm temperate waters, chiefly below low tide. From all accounts, specimens are rare where they occur, and they are infrequently collected.

A single live specimen (Fig. 1) of Colubraria lanceolata (Menke, 1828) was in the dredged material of 30 June 1965 from Heald Bank, off Galveston, Texas, but no additional specimens were in the sample dredged there in the fall of that year (see a previous note in Texas Conchologist, Harry, 1984). The specimen was kept alive in a small aquarium for four months, during which time I made a few notes and sketches of the animal (Figs. 2-4). Unlike some other snails of its home area, it never attempted to burrow, although sand and shell fragments from its native habitat formed the substrate of the five gallon, aerated tank in which it was kept. It frequently crawled up the side of the aquarium to the water line, where it often stayed for long periods. Whether it fed during this long captivity, or what its food might have been, is not known. Fasting for marine snails for many days is not unusual in captivity.

This specimen had no operculum. The sole of the foot was narrow for its length, and bluntly rounded behind. The front end was truncate, with a minute auricular tip at each end of the almost straight margin. The front end had the usual marginal groove of the more advanced prosobranchs. When the snail rested quietly, which was most of the time, the foot contracted to about the shape and size of the shell's aperture. When I picked up the snail from its attached position, it usually adhered tenaciously to the substrate, rather than retracting immediately into its shell.

The mantle margin was thin, extending just to the edge of the lip of the shell, and there were no papillae on it. The mantle siphon did not extend beyond the edge of the shell's siphonal canal, but the labial (outer) margin continued as a slight fold inward, across the mantle roof, perhaps forming an incurrent channel to direct water to the gill. There was no evidence of a posterior siphon, which, when it is present, is directly below the suture of the body whorl.

The body stalk was rather narrow, and the head projected from it at a sharp angle; the head was of considerable length. It was narrow and considerably flattened dorso-ventrally, with the two sides having each a keeled margin which extended to the eyes. The tentacles were circular, moderately thick and tapering gradually to bluntly rounded ends. The eyes were large black spheres, at the outer sides of the tentacles, a very short distance upward from their bases. The tentacle bases were not precisely adjacent (as they are in many advanced prosobranchs) but separated by a space which contains the base of a short, cylindrical

snout, always everted, with the mouth being in a central depression at its tip.

The color of all exposed flesh was bright orange. Under the microscope, this seemed to be due to large circular orange spots near the surface, and a diffuse reddish orange color deeper in the tissues. There were also large, opaque white punctations on the mantle and foot, which were more abundant on the top of the head, forming a broad, white area.

The anatomies of two New Zealand species of this family were described by Ponder (1968), from two specimens of one species and one of the other. All these were preserved in formalin when he got them, but the two specimens of one species had been kept alive for ten months before they were preserved. The specimen I studied was very similar externally to those he described and drew. He noted a small operculum, and figured it, in both species, saying it would be too small to close the aperture of the shell effectively.

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Harry, H. W.
1984 Notes on the chiton, Chaetopleura apiculata Say, from Heald Bank, off Galveston, Texas. Texas Conchologist 20(2):55-60.

Ponder, W. F.
1968 Anatomical notes on two species of the Columbrariidae. Royal Society of New Zealand, Transactions 10(24):217-223.

Ode, H.
1983 Distribution and records of the marine mollusca in the Northwest Gulf of Mexico. The Texas Conchologist 19(3):58-59.

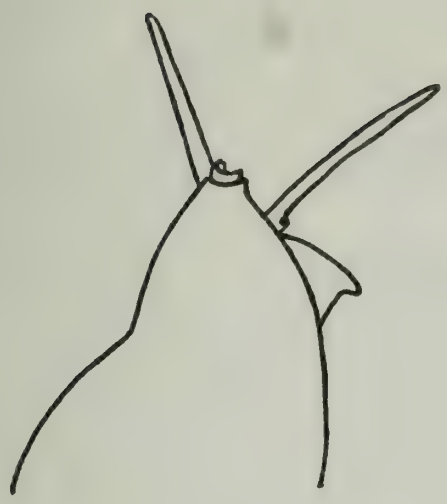
Explanation of the figures

Fig. 1. Shell of Colubraria lanceolata collected at Heald Bank, 21 mm. high, 7.5 mm. diameter. Drawn by Selma F. Snyder.

Fig. 2. Animal, seen from above.

Fig. 3. Oblique side view of live animal.

Fig. 4. Another sketch, to show flattening of head and groove along front margin of foot.



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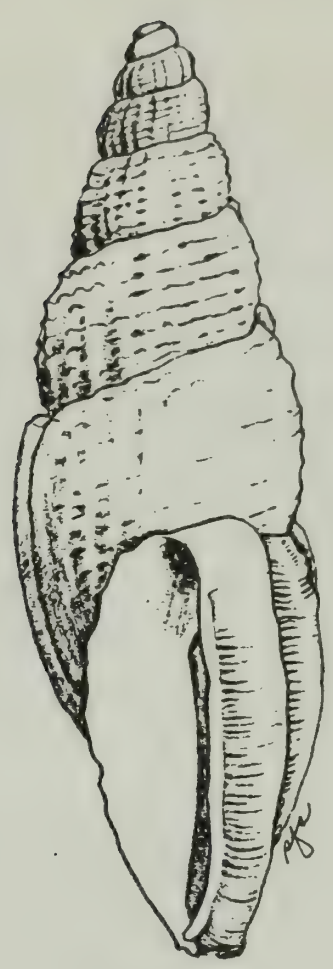

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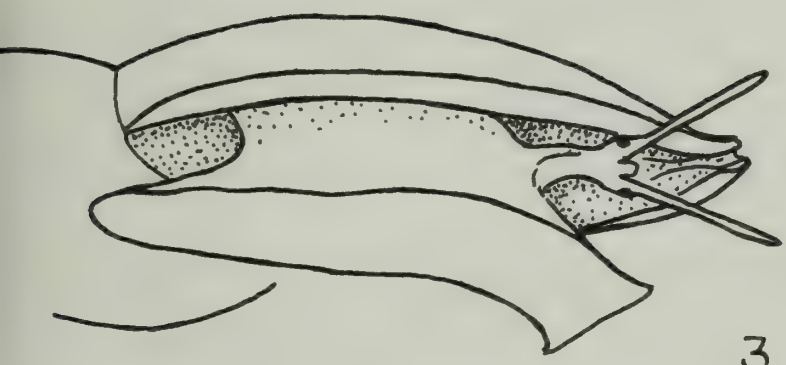

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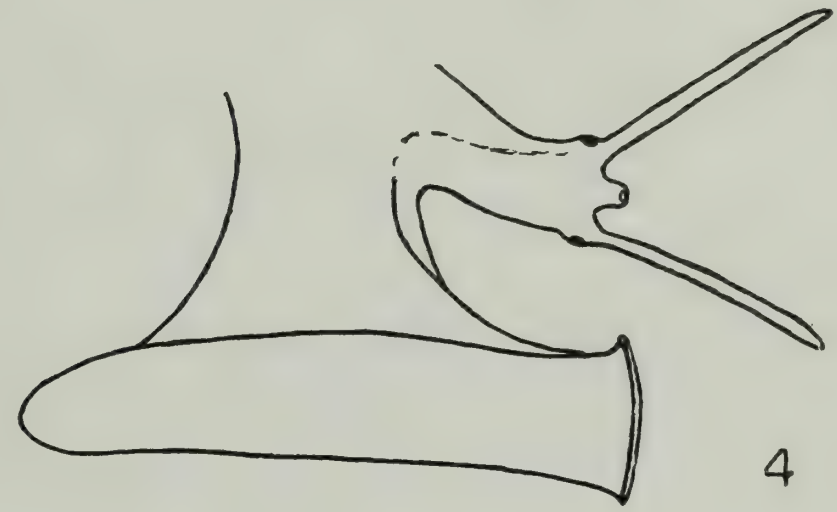

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BOOK NOTES

Living With the Texas Shore by Robert A. Morton, Orrin H. Pilkey, Jr., Orrin H. Pilkey, Sr., William J. Neal; Duke University Press, 1983, $9.75 at the HMNS gift shop; 184 pp., black and white drawings, photos and maps. Description and history of the Texas coast; how barrier islands are formed and operate; beach dynamics including erosion, beach sand sources, bay shorelines, storm effects; shoreline conservation; how to select a site for building; the law and land use in Texas; field trip tips and maps. This is a part of a series of 20 books planned on coastal living and management.

Collectible Shells of Southeastern U.S., Bahamas & Caribbean by R. Tucker Abbott; all color booklet that is a guide to most common shells found by collectors in the areas covered. 1984, 64 pp., published by American Malacologists, Inc. Some nice photos of living animals; hints on collecting, etc. Clearly slanted to the Florida area, but we have many of the shells also. "Crown Conchs" (Melongena corona) said to be found from all of Florida to Texas, but don't ask me how to find them in Texas as there aren't any here except in shops and collections. But the booklet can be purchased for a modest $4.95 at the HMNS gift shop, and you are probably going to want one. A waterproof booklet, priced at $8.95, can be purchased from American Malacologists, Inc.

Spirals From The Sea, An Anthropological Look At Shells by Jane Fearer Safer and Frances McLaughlin Gill; Clarkson N. Potter, Inc., Publishers, in association with the American Museum of Natural History; 192 pp., over 60 full color photographs of shell artifacts. Was $35.00 on publication in 1982; now $12.98 at some discount book stores. I had it on my Christmas list along with other books in 1982 but took it off after seeing the book and the price, because I had other books I needed more. Now I recommend it as full of interesting notes on shells and at a better price.

It is based on research done for AMNH's Hall of Mollusks and Mankind. It explores ways mankind has used shells and what they meant to various cultures. Most interesting to me was a chapter on molluscan purple dye where we learn of the colorless secretion ejected by some mollusks when disturbed (Thais, Murex, Purpura). This fluid turns "from yellow to green to blue and finally to a purplish red" when exposed to sunlight. You learn how the dye was processed by the Phoenicians and how many shells were needed to make small amounts of dye to use on cloth that could be worn only by individuals of the highest rank. "The Old Testament distinguishes two colors of molluscan dye: 'red' and 'blue.'" The blue was considered very rare and thought only collectible every 70 years and was used to dye just one thread at each corner of the prayer shawl worn by devout Jews. This blue is now known to come from Janthina janthina, the pelagic purple snails that wash up also on our shores and do so worldwide.

The book discusses shell money, of course; and it has chapters on many other uses of shells throughout history and today. The type is large and easy to read; the photos are beautiful, a coffee table book.

Constance E. Boone

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Texas CONCHOLOGIST

VOLUME XXI NO. 2

HOUSTON CONCHOLOGY SOCIETY

Epitonium angulatum

JANUARY, 1985

The TEXAS CONCHOLOGIST is the official publication of the Houston Conchology Society, Inc., and is published quarterly at Houston, Texas. It is distributed as part of the dues to all members.

The Society holds regular meetings the fourth Wednesdays of the following months: August, September, October, January, February, March, April, and May. The meeting is held the third Wednesday in November. Meetings are held at the Houston Museum of Natural Science, Caroline Street in Hermann Park, beginning at 7:30 p.m.

The TEXAS CONCHOLOGIST is published October, January, April and July. It is mailed postpaid to regular members in U.S. postal zones. Overseas members will be charged additional postage. Only one copy will be mailed a family membership.

Dues extend from the beginning of the fiscal year of June 1 through May 31. However, the July issue of the TEXAS CONCHOLOGIST each year is the fourth quarterly due on the regular dues year beginning June 1 of the previous year. Memberships will be accepted throughout the year but will receive quarterlies of that fiscal year. Members receive meeting Newsletters and have all other privileges provided by the Society's by-laws.

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The TEXAS CONCHOLOGIST accepts contributions for publication from amateurs, students, and professionals, subject to approval by the Editor. Manuscripts should be typed, double spaced and should be in the hands of the Editor the first day of the month preceding publication dates. Photos accompanying such material are welcomed.

BOLIVAR IN SEPTEMBER

By Jan Hobbs

My favorite part of the September HCS field trip? The Homo sapiens species! On September 29, 1984, approximately 20 members began their outing at the Bolivar jetty and worked their way up past High Island. About half this number were new members of the club, and we even had with us members from as far away as San Antonio and Austin. The group had a fine day, despite the chilly wind. We all had an opportunity to get better acquainted and help each other learn a little more about our favorite hobby--what else? Shelling!

At the jetty some brave members followed our trip leader, Dr. T. E. Pulley, into the cold water of the grassy area to hand dredge for whatever lay in the mud. This produced mussels and a "sole" of oyster shells (tennis shoe sole). Dr. Pulley used this shoe as an example to explain that oysters need something on the bottom to settle on. He also opened up a mussel and gave a lesson on its anatomy. He pointed out the safe path, away from the mud and deep water, to reach a sand bar east of the jetty for future hunting. (Follow the grassy shoreline for some yards east before turning out toward the bar. Avoid attempting an approach to the sand bar from or near the jetty because of the deep, soft mud.)

At the "garbage dump" road beach, everyone had the adventure of digging for angel wings. Those who had dug them before caught the excitement of those digging that precious first. We all learned to recognize the siphons peeping out of holes, and they were plentiful on the near-dry flats. Do you remember Richard Yuill's story (Texas Conchologist, Vol. XIX, No. 2, p. 28) about the strange animals a marine biologist once found and couldn't identify? One member brought an "animal" for us to identify that she had dug on the sand bar. Richard laughed and said, "You have cut off the siphon of an angel wing." Mary Edna Ragland went with that member to dig that angel wing.

Some of us learned to see the trails and lumps that produced small moon snails. A few members were pleased to find medium-sized baby's ears shells. Well, dead ones are certainly better than none!

At Rollover Pass, we learned not only its history from our trip leader but also picked our share of the Texas zebra periwinkles and juvenile Thais from the bulkhead there.

A short stop was made at a shell shop in Gilchrist, where we saw, to quote one member, "at last, some really beautiful shells." (Now, I ask you, what is more beautiful than your first and very own muddy angel wing?)

On we drove down Highway 87 past the barricades. There our able leader gave us a short geological lesson of the area and pointed out to us the fossil Rangia. We were also shown how to tell the difference between Campeche angel wings and the ones we dug up, Cyrtopleura (the difference being the comb-like projections near the hinge, found only on the Campeche species).

We all enjoyed each other's company, and we all extend a great big "thank you" to Dr. Pulley for pointing our noses (? eyes?) in the right direction to find our treasures and teach us some things in the bargain. It was a great day!

For those new members, a little help with the scientific names of the majority of shells we mostly called by common names:

Angel Wing - Cyrtopleura costata
Zebra Periwinkle - Littorina lineolata
Baby's Ear - Sinum perspectivum
Disk Dosinia - Dosinia discus
Moon Snail - Polinices duplicatus
Rock Shell - Thais haemastoma
Campeche Angel Wing - Pholas campechiensis
Marsh Periwinkle - Littorina irrorata
Ark Shell - Anadara ovalis and Anadara brasiliana
Mussel - Geukensia demissa granosissima

FROM OUR MEMBERS

The article on our local Thais in the October Conchologist certainly attracted my attention. On December 31, 1983, I collected two Thais on the Galveston jetty, and they now reside in my aquarium. I don't know what sex they are, and I haven't seen any eggs, but observing their behavior is interesting.

One has a knobby shell, and for the first few weeks it kept climbing the sides of the aquarium as though it wanted to get out of the water. Now it spends most of its time inside the large Busycon shell in the aquarium. The other has a smooth shell. It spends most of its time buried in the aquarium gravel. Is it normal for members of the same species to exhibit such different behavior?

Lucy Clampit

On a Fall fishing trip to Deepwater Cay off Grand Bahama Island, I was able to collect 6-holed sand dollars for the first time. I discovered, however, that this area has a law that only edible shells may be collected, and one must be a resident for 30 days to do this. The lodge there is run by a couple of professional divers. Dive packages are $1,190. Seven day fishing packages for 2 are $3,030. The lodge accommodates 16 people. There are no autos, no telephones, no TV. Air conditioning is provided, but we did not need it. The meals were good. I enjoyed eating Cittarium pica cooked in garlic butter. We flew direct from West Palm Beach. If you are interested in more information on this isolated resort, call me.

Mrs. C. W. Hanks

Our members Harold and Freida White from Angleton won an appreciation award for a non-competitive display in the Brazoria County Fair last October. The Whites presented an interesting and educational five-case display of the various oyster families: True oysters, hammer, thorny, winged, pearl, tree, and window-pane oysters. They were on hand to discuss their display with any interested visitors. All members who live in Brazoria County are encouraged to enter next year's competition at the fair.

HCS - COZUMEL '84

THE YUILL LOG

For those of you who missed the October trip to Cozumel -- you missed beautiful beaches, friendly natives, good food, good shelling, and great company. The HCS had 33 members attend the 4 day trip to Cozumel via Aero Mexico.

The trip started and ended without a hitch -- the rest of the time we were in Mexico. To me the change of tempo and the unpredictability of Mexico is a great part of its charm; to others these traits are a source of great frustration. Either way, you might as well accept it, because you can't change it.

Most of the chores of making things happen fell to Connie Boone. Somehow she arranged to persuade, cajole, or intimidate our hosts into producing what we had been promised. We got our promised number of rooms at the El Presidente (most with working A/C). We got seven working jeeps, most in mint condition. In Mexico as in Houston, when Connie Boone speaks, people listen.

On Saturday, our first full day in paradise, we arose to a leisurely buffet breakfast and a chance to feed bread to the fish off the small pier in front of the hotel. Tropical fish swarmed to the pier for their morning treat of stale bread. The "Fish Man", another Anglo tourist, told us we were watching Sargent majors, angelfish, pompano, chub, damsel fish, and an occasional majestic queen triggerfish.

As the morning progressed, with the usual amount of confusion surrounding renting seven jeeps and mobilizing 33 people, we mounted up and headed south for the beaches. Our first stop was on the southwest side of Cozumel at an unmarked beach just north of Playa Maya. The only landmark at this beach was a crude, weathered sign at the shore proclaiming that collecting live coral was prohibited. This beach had a narrow rocky tidal zone (known as on other islands as iron shore -- a mixture of ancient eroded limestone and coral). This rocky shore was flanked seaward by broad, shallow sand flats. The shore was collected equally well by land-lubbers and amphibious collectors, but the shallows were best collected by snorkeling.

The finds along this beach ranged from the common nerites, neritinas, periwinkles, keyhole limpets, and rock shells to scarcer specimens such as live tulip shells, including the deep red-orange color form, wide-mouthed *Purpura* and live emerald nerites. Collectors working the high drift line found good beach specimens of hawk-wing conchs. Also present were the ubiquitous Chestnut Latirus (*Leucozonia nassa*) usually covered with reddish purple coralline algae. This common gastropod would not easily be identified from the illustrations in either *American Seashells* or *Caribbean Seashells*. Connie Boone pointed out that the form we were finding fits the smooth shouldered form of the subspecies *leucozonalis*.

The find of the day at this first collection spot was a large, perfect tulip shell, collected by Katherine Sheldon. She found this beauty while she was preparing to snorkel, right up at the shoreline almost

before she got her feet wet.

The second collection spot of the day was just a few hundred yards further south, but still north of Playa Maya. There was no beach access road at this location. We merely parked our caravan along the shoulder of the road and trekked the 10 to 20 feet to the shoreline. This section of beach had a bit more marine grasses and more live seafans. It was the site of a first for many of us — our first look at a live Flamingo Tongue (Cyphoma gibbosum). It is no wonder that Abbott cautions against over-collecting this beautiful little shell, as it is both irresistible and highly visible with its orange coloration against the purple seafan. This second location finished out the morning collections.

We continued southward on the main road and around the south end of the island, then headed north up the windward east coast of the island to Punta Morena. There is a small hotel, and a rustic open air restaurant at this beach. Most of the sampling at this location was of the culinary type, but a few of us did trudge down the beach for a search of the drift. The sand along this open ocean, high energy beach is very coarse and unpacked, making walking difficult. Nice large Purpura patula were found on the wave-dashed rocks.

After lunch, the group headed back south the way we came towards the south lighthouse. The majority of the group drove on to the lighthouse via a "secondary road" (i.e. goat path). The less adventurous (and in my opinion, more intelligent) portion of the group headed back to the hotel for an early shower and/or a dip in the pool.

The evening found us all showered, shining, and chowing down at two different restaurants of the same name. If you want to keep 33 people together in Mexico, you have to be explicit with the cab drivers. Most of us topped off the evening with a little light shopping.

Day two, Sunday, found us better organized in the morning. The group split into the SCUBA DO'ers and the SCUBA DON'Ts for most of the day. The DO'ers will have to give their own report. The DON'Ts (also known as chickens-of-the-sea) set sail south again for yet a third section of the beach just north of Playa Maya. This location provided similar shelling to the first day but offered less rocky shore and more submerged cobble sized rocks and grass. The exciting finds this day were live West Indian Chanks and Caribbean Vase shells. Flamingo Tongues were fairly common on the seafans. Other little gems were a dead Atlantic Partridge Tun, marginellas, and dead, but paired bivalves, primarily Pennsylvania Lucina and Faust Tellins. At least one live red-brown Ark was collected. Everyone was having such a good time snorkeling at this location, that we spent the whole morning until lunchtime working the flats and turning over rocks. Live Black Atlantic Planaxis were found high above the mean waterline in the moist drift and rocks. Beach drift included a variety of arks, immature Queen Conchs, spirulas, olivellas, Stocky Ceriths, and keyhole limpets.

Lunch was spent at San Francisco Beach just south of Playa Maya. This outdoor restaurant boasted a live band and a gift shop selling black

coral and jewelry and Queen Conch (all konked). After lunch and a rather circuitous route through San Miguel, we took the cross island road to the east coast and then headed towards the north lighthouse. After about an hour of snaking through the thick undergrowth, we had covered perhaps only half the distance to the lighthouse. We stopped to collect the rocky shore at a clearing with an abandoned building. The rocks and tide pools produced the three common nerites -- Bleeding Tooth, Four-Toothed, and Tessellate Nerites — the usual periwinkles and false prickly-winkle, the pretty little zebra nerite, several Thais species, and wide-mouthed Purpura. Meanwhile, John Arrington and Chris Boone were checking further down the road to see if the road was passable and if the gate to the northern beach was locked or open. After 1-1/2 hours they returned saying that the gate was open, and the road was passable but that another jeep had gotten stuck on the lower of the possible routes. Although it was disappointing, we decided that at 5:50 it was too late to go further and risk driving out in the dark. We returned to the hotel and bar for R and R. Advice to future shellers trying to reach the north lighthouse is to start early in the day and make that your primary objective of the day, but we understand the gate through the ranch is not always open. It was our Sunday there.

Sunday evening was spent at the Aquarium Club, sampling crustaceans, pisces and assorted fermented beverages.

Monday, our final day in paradise was spent without the aid of the jeeps. The group split off into various directions — some heavy shopping in town, some light snorkeling at the El Presidente beach or casual shelling the shoreline near the hotel. My observation in town was that most shellers look for some way to jettison some weight on return trips. Most of our group chose to part with as much loose change as possible. My primary observation at the El Presidente Hotel was that one should not neglect snorkeling in your own front beach. The beach at the hotel had beautiful coral and associated tropical fishes within 100 feet of the swimming area. It also produced a few surprise shelling bonuses. The Arringtons found live olives right at the bathing beach, and I found some live West Indian Top-shells just outside the bathing beach.

At least one rare shell was found. Merle Kleb collected a good, but dead, specimen of Pterotypis (Tripterotyphis) triangularis.

Connie Boone reports a count of 65 species, and this does not include species from drift samples. Barbara Hudson and Connie brought drift home to work. Barbara has already found a wee, perfect Typhis!

We had to load up and leave Cozumel Monday afternoon and fly back to "civilization". But if Houston is civilized, I'd rather go native in Cozumel.

Fig. 1 Thirty HCS members pose in front of El Presidente Hotel at Cozumel just before their departure after a grand field trip weekend.

Photo by Richard Yuill

Fig. 2 Nancy McPhaul and Bill Oakes (daughter and father) grin as they show off their large Turbinella laevigata collected on their first open salt water Scuba excursion at Cozumel during the HCS trip in October.

Photo by Emily Oakes

PORT ARANSAS IN FAIR WEATHER OR FOUL

By Emily Oakes

On a cold and windy Friday morning, November 21, 1984, HCS members and visitors began to gather at 10 a.m. at the south jetty at Port Aransas, Texas, for another great field trip, led by the Field Trip Chairman Dr. T. E. Pulley. After all greetings and a few instructions, some of us went to look through beach drift, and some went on the jetty. In the drift we found some live sand dollars, some Dentalium and Pandora with the other usual washup. On the jetties were found live Epitonium and Anachis.

At 11:30 we separated for lunch and were to meet again at 1:00. We ate a hearty lunch and again gathered on the beach in front of Island Retreat where many of us were staying. We lined up and headed for Fish Pass hoping to find Simnia that live on the sea whip which frequently washes in there. Donald Oates found the first one, a lovely large yellow Simnia with rose on it. Since it was so windy, the surf was up, and there were many brave young men out in the water there trying to catch the waves.

At 3:30 several of us left to go into Port Aransas to a Craft Show the city was sponsoring. Thelma Loughmiller was the only one who bought anything. The rest of us didn't find anything we wanted to spend money on.

We met back at the beach at sunset in front of Island Retreat for hotdogs fixed by Dr. Pulley. He makes his own chili for these, and they are delicious. It was very windy on the beach, and as it got darker, it got colder. Although we were all enjoying each other's company, we didn't linger too much longer after we finished eating.

At 9:00 Saturday morning we all met and started our trek to our other scheduled shelling spots. The four of us in our car decided we would have looked like a funeral procession if we had all turned on our lights. We had about 12 cars.

Our first stop was the bay side of Fish Pass. Some who wore waders went on out into the water. Two sieves were being used, and a few things were brought up from the mud. A large, beautifully colored, live Busycon perversum was found and given to someone who didn't have one in her collection. Also found were some nice Mercenaria (some with purple) and Crepidula which were in old Busycon.

On to Corpus Christi Pass we caravaned! A few members waded out and did some sieving and just fun looking. I took this opportunity to have Bill patch my leaky waders with duct tape. From now on duct tape will be on the list when we are going to be wearing waders. These are a must if you want to stay dry and warm. I like to wear my waders in winter even if I'm not going to get into the water. They stop all wind and help you stay much warmer.

We stayed only a short time at Corpus Christi Pass, which wasn't very productive. From there we went on to Kennedy Causeway which crosses Corpus Christi Bay. We all parked under the bridge, and some of us

waded out into the bay hoping to find live pectens. The sieves were brought out again, and the work started for live specimens. We found one live Bubble, many Chione, a few Mercenaria, several small Sea Cucumbers, live Tagelus, but only two live pectens. There were many fresh-dead pairs of pectens.

Those who didn't want to get in the water gleaned through the drift and found several nice things. While we were out in the water having the fun of searching, Dr. Pulley had set up camp under the bridge to cook hamburgers. After our hard work of bending, lifting, stooping for our prizes, we were ready for his delicious hamburgers. Forty people, HCS members and visitors, gathered to eat and enjoy fellowship together.

After everyone had eaten their fill (some had 2, some 3 hamburgers) we all got back in our procession and headed back over the causeway toward Bird Island Basin, which is down toward Padre Island. When we got there, many people were gathered for a wind surfing contest. It was exciting to see all those young people in their wet suits with multi-colored sails on their windsurfers. We went on past these and found our own place. The wind had picked up, and it was getting colder again. A few species were found here with sieves and just careful looking. We didn't stay here long, and when we dispersed each went his own way. Our group of four went over to the small beach area by the ferry hoping for Epitonium and maybe another Recluzia. We did find five Epitonium but that was all. By then we were very cold and felt like we had been beaten by the wind.

Others followed Dr. Pulley to the Gulf beach to shake Gorgonia and sieve for Donax. Our new member, Joe Deering of The Houston Chronicle, continued taking pictures of us, the sea, the birds, and the shells.

On Sunday several members took the jetty boat over to St. Joseph Island, where a few things were found. We had decided to come on home even though the weather that day was beautiful. It was in the 70's, and the sun was shining for the first time during our stay. Since it was a holiday weekend, we wanted to get home before the traffic was too bad. We reluctantly waved goodbye to Port Aransas where we have had many good times and have found so many good shells. I found my first Janthina there and always look forward to going back.

I have learned in the past ten years that those who really love shelling will brave any kind of weather and almost any other obstacle to go out and search for that elusive specimen that might be in the next few feet of drift, on the next few rocks or in the next wave. Usually the sacrifices are worth it. Bill and I have had many experiences, good and bad, because we love to shell. We look forward to many more exciting times. The more I learn, the more I look forward to new places and different specimens.

Field trips are great for learning when and how to look for shells and cleaning and preserving techniques, but also, just as important, you get to know fellow HCS members and share experiences with them.

Listed below are species found on our field trip:

(Only whole pairs or live shells listed) (Live ones with asterisk)

*Crepidula plana
*Busycon perversum
*Nassarius vibex
*Anachis semiplicata
*Mitrella lunata
*Mercernaria mercenaria texasiana
*Crepidula convexa
*Donax variabilis
*Tellina tampaensis
*Anomalocardia auberiana
*Cumingia tellinoides vanhyningi
*Tellina texana
*Martesia sp.
*Tagelus divisus
*Bulla striata
*Epitonium "albidum"
*Epitonium angulatum
*Siphonaria pectinata
*Tagelus plebius
*Ensis minor
*Amygdalum papyrium
*Chione cancellata
Dentalium eboreum
Sinum perspectivum
*Argopecten irradians amplicostatus
*Polinices duplicatus (and egg case)
*Anadara transversa (juv. on jetties)
Oliva sayana
*Terebra dislocata
*Diastoma varium
*Simnia marferula
Crepidula fornicata
*Mactra fragilis
Cavolina sp.
*Thais haemastoma
*Pandora trilineata
*Brachidontes exustus
*Crassostrea virginea
*Ostrea equestris
*Pteria colymbus (tiny juv.)
*Isognomon sp. (juv.)
Dinocardium robustum
Atrina serrata
*Laevicardium mortoni
*Alaba incerta
Dosinia discus

FIELD TRIPS ANNOUNCED

SUNDAY, February 3	Bolivar flats for angel wings - 0.8 at 0833 Meet at 8 a.m. at "garbage dump" Gulf beach.
SATURDAY and SUNDAY March 2-3	PORT O'CONNOR - 0.5 AT 0725, March 3 Details to be announced in Newsletter and meetings.
SKIP APRIL	NO MINUS TIDES IN DAYLIGHT BUT - Look for Janthina brought in by high south winds. Check Matagorda Beach in April and early May for Epitonium.
SUNDAY, May 26	FRESH WATER TRIP Meet at 9 a.m. under I45 bridge over San Jacinto River to wade and collect fresh water clams.

T. E. Pulley, Field Trip Chairman

FLORIDA FOSSIL PIT

By Sunny Sappington

Shells, shells everywhere and not a shore around! I'm describing a sand pit at Sarasota, Florida, which has been a treasure trove for fossil seashells and shellers for many years. As bulldozers move the shell material to be picked up by cranes, virgin sands are uncovered exposing shells that have been buried for millions of years. Besides many of the same shells we find today, there can be found worm clusters, numerous lefty cones, frilly murexes and other rare shells like the extinct vase and the Miocene Ecphora.

This pit is operated by the Macasphalt Company. Called the Newburn Pit, it is located on Newburn Road just north of 17th Street which is about 5 miles east of the Gulf and Highway 41. There is a company office at the entrance of this working pit, and all who wish to shell must stop here, sign a release form, don hard hats, and follow a guide to a designated area. Also, at this writing only Mondays and Thursdays are visiting days.

Bob and I spent a fun day there in October. We recommend taking a rock hammer or other sharp object for probing and digging, sturdy buckets (as these shells are heavy), a thermos or cold drink and snack (this gets to be hard work).

Call ahead. We found Adam Nosal, a retired personnel manager of Macasphalt, a very pleasant and helpful guide. You may call him at 813-955-1982 if you are in the area, want to fossil hunt and get pertinent information as to directions and times the pit will be open.

Fig. 1 Sunny Sappington is shown in Newburn Pit near Sarasota, Florida, and recommends you try collecting fossils here.

Photo by Bob Sappington

SEARCH AND SEIZURE

By Constance E. Boone

This issue of TC features three of the club's field trips from the Fall season. We hope that the accounts encourage you to participate in the planned events this spring and next year. It will be your best way to learn more about mollusks.

On each of the excursions, we fielded questions concerning the expected fauna or the evident fauna. The common refrain seemed to be: "What will we find here?" I realize that on some of my trips elsewhere I have been just as questioning! We all want to KNOW what to look for and how to look for it.

We will be glad to help you look for shells, but we can never guarantee them! Just please note that NO FIELD TRIP IS EVER A DRY RUN! You'll learn something, if you are willing to try.

On a special HMNS class field trip to the Gulf Beach, Freeport side near San Luis Pass, in November, Dr. T. E. Pulley was trying very hard to find mollusks to discuss with his students. He had members sieving in the surf, and a few Donax and worms were being brought up. One student came to him with an animal he identified as Branchiostoma caribbaeum (old Amphioxus), a primitive chordate that may be near the ancestral line of the vertebrates (fishes, amphibia, reptiles, birds, mammals). He remarked that this was the first time he had collected this animal in the surf zone and also in the Galveston area. This animal, according to Dr. Pulley, usually lives in finely ground shell. He has taken it in Lydia Ann Channel at Port Aransas and on Heald Bank where strong currents have swept away sands and mud and only broken shell remains.

Dr. H. W. Harry reports that on one occasion only he found this animal abundant in lower Galveston Bay.

On that same field trip with the Fall class conducted by Dr. Pulley, we found several kinds of worms. I never seem to know these, and I have asked Dr. Pulley to give me the names of the worms. The worm tube with shells we find so commonly in what I call "worm goop" is the covering for Diopatra cuprea. The U-tube worm is Chaetopterus variopedatus.

Then there are anemones I never seem to know. The sand anemone we find in the sand at San Luis Pass (and elsewhere, of course) is Paranthus rapiformis. The jetty anemone is Bunodosoma cavernata.

At Port Aransas, Will Peterman approached me that first morning on the beach near the jetty and asked me where he would find Epitonium. The beachdrift seemed very poor, but I told him to look hard in the debris at the high tide line. A few minutes later, since I had waders on, I went out among the jetty rocks to see what I could find in the algal mats on the rocks. Believe it or not, there "standing" up for me to see in the mat was a live Epitonium. I called to Will and his mother, neither of whom had on waders, and showed them my specimen. It didn't take long for Will's mother to descend to the crevices between the

rocks to search for AND FIND some of the juvenile Epitonium. The three I retrieved in this manner turned out to be Epitonium "albidum" and Epitonium angulatum. This is not the first time I have found juvenile Epitonium in the algal mat. Since there are anemones in the jetty rocks, I assume that they eat these. According to Dr. Robert Robertson, holder of the Pilsbry Chair of Malacology at the Academy of Natural Sciences of Philadelphia and author of many papers on Epitonium, Epitonium do not suck juices from prey but tear off pieces to eat. I have never been able to prove what any of ours eat in that I have never actually observed this feeding operation. Dr. Robertson says they are shy in captivity. That day at Port Aransas, I found a small rock with three anemones on it and brought this in with my Epitonium specimens and watched them the three days we were there. I never could get the little specimens to stay on or even especially near the anemones. Only when I was dismantling my little aquarium did I find one Epitonium with a mucous thread and small blob of jelly-like, clear substance near the aperture. What this was, I do not know. And, also, you may again be wondering why I have put the specific name albidum in quotes. Dr. Robertson has been making quite a study of this species in the Caribbean. He doubts that our species we have been giving this specific name is really that species. But what it really is remains for future study by professionals.

Back in the bay at Bird Island Basin, we did a lot of sieving. How many of you came home with the species we got from the mud and grasses? There were surely a number you would get there and not find in Galveston. Though many were quite tiny, you do have to learn to collect what is there if you are going to complete your catalog of Texas shells. At one point, I used a tea strainer to swish through the grasses and thus collected Diastoma varium, Nassarius vibex, and Mitrella lunata. I held about four of the first species on the tip of a finger and offered them to a club member. With dismay, she said: "But, Connie, I can't even see shells on your finger!" You'll have to learn to gather such shells and get some kind of lens to view them!

Other observations from that field trip: We did not find any turtle grass in the bays we visited. The Atrina shells in such abundance over on St. Joseph Island were all Atrina serrata.

There were no dry runs!

EDITOR'S NOTE

For the very first time I received an abundance of copy by the deadline! The result is this bonus issue. Thank you!

Deadlines for next issues: March 1 for April issue; June 1 for July issue. Keep your reports coming!

TEXAS CONCHOLOGIST, Vol. XXI, No. 2, January, 1985

SHELL COLLECTING IN FIJI

By Emilio F. Garcia

When the heavy-set middle-aged Fijian lady pulled the fishing line out of the water the last thing anyone expected to see caught in the hook was a very large Oliva miniacea. We had hired the "Coral Sea" out of Suva, the capital of Fiji, to go shell collecting at Sandbank, one of several reefs at the entrance of Lauthala Bay, east of Suva, and as each of us came aboard after our reef walking and/or snorkeling we would look with delight at this beautiful fast-moving animal, which had been placed in salt water for some shots. This was one of many exciting moments we had during an eighteen-day trip to the Fiji Islands, May 13 - May 30, 1984.

The trip had been on the drawing board for nearly two years, so when fourteen of us finally landed in Nadi that early morning it seemed almost unreal; and there was the bus, ready to take us to Naviti Beach Resort, on the southern coast of Viti Levu, Fiji's main island.

This southern coast, called the Coral Coast, is protected by a series of fringing reefs roughly shaped as half-moons, usually with a river mouth at each end. If one wants to walk the reef at low tide, the safest points of entrance are at these ends where the reef is more solidly built. Trying to get to the edge of the reef by crossing in the middle can be not only very difficult but dangerous, because of the great variation of depths, from exposed areas at low tide to six feet of water. There is a profusion of live, fragile coral, impossible to walk on in places, or to swim through.

This was the case at the reef in front of Naviti Beach Resort, where we arrived around 10 a.m. that first morning in Fiji, with the tide falling rapidly, exposing more and more tempting reef. Who could resist! Many of us, ignoring jet lag, rushed to it with our collecting gear, anxious to see what it had to offer. Soon we started finding cowries, murexes, turbans and even a Harpa amouretta. At the end of the day, it was hard to believe we had not yet spent a night in Fiji.

After a couple of days of exploring the reef each of us had a favorite area to collect. If one wanted cowries, most of them were in the more solid areas of the reef. Walking on it, under rocks we found Cypraea annulus, C. arabica, C. caputserpentis, C. erosa, C. errones, C. carneola, C. moneta, C. isabella, C. lynx, C. asellus, C. vitellus, C. helvola and C. labrolineata. We also found Conus vitulinus, C. ebraeus, C. mustelinus, C. marmoreus, C. textile, C. flavidus, C. lividus and C. coronatus; beautiful solid orange Murex brunneus, Haliotis ovina, Distorsio sp., Latirus barclayi, Mitra imperialis, M. coronata, M. ticaonica, Turbo chrysostomus, Trochus virgatus, T. pyramis, Morula funiculus, M. margariticola, M. granulata, Maculotriton serriale, Lambis crocata, Engina zonata, E. lineata, Cymatium gemmatum, Columbella torturina, Pyrene scripta, P. deshayesi, Pisania gracilis, Peristernia nassatula, Cryptopecten speciosus, beautiful Spondylus nicobaricus, etc.

Inside the reef, in 1 to 6 feet of water, sand bottom, some grass and

coral heads, were found Terebra crenulata, T. affinis, T. funiculata, T. columellaris, T. babylonia, T. argus, Fragum fragum, F. unedo, Trachycardium angulatum, Polinices melanostoma, P. tumidus, P. flemingiana, Natica walteriana, Gafrarium tumidum, Trochus niloticus, Glycidonta marica, Fimbria fimbriata, Neocancilla papilio, Oliva annulata, Cerithium nodulosum, Harpa amouretta, Casmaria ponderosa, Modulus tectum, Rhinoclavis sinensis, R. aspe[, Cerithium echinatum, C. moniliferus, Strombus luhuanus, S. gibberulus gibbosum, S. mutabilis, Bulla vernicosa, Trochus pyramis, Peristernia columbarium, Nassarius albescens, N. olivaceus, N. echinatus, Conus leopardus, Conus virgo, etc. Four species of nerites, Littorina, etc. were found at the shore.

One day we decided to check the reef east of Naviti Beach and had a couple of taxis take us to a point on the highway from which we would walk down to the reef. Wrong move!! We ended up in the middle of the half moon shape of the reef, and trying to get to the exposed outer area was extremely difficult. Only a handful of us made it. Our efforts, however, were rewarded, because while crossing some of the umpteen, miserable, deep pockets of water and sharp coral, Iva Thompson found a live Lambis truncata and a beautiful, fully grown, Strombus sinuatus, the first live-collected specimen all of us had ever seen.

Once on the hard reef we found, among others, Excellichlamys spectabilis, Cypraea talpa, Cypraea minoridens, C. fimbriata, C. mappa, magnificent Turbo petholatus, Cymatium hepaticum and one, beautifully clean, Charonia tritonis. We were so busy with our collecting we ignored the tide coming up fast. What seemed like solid ground from the distance became once more a nightmare of interminable, difficult passages, with coral branches always ready to tear at your skin; now walking in four inches of water, now wading in four feet, without being able to see the bottom because the sun was already too low.

Next day as we rode east, along the Coral Coast toward Suva, and as the weather deteriorated more and more, I had rather sinful thoughts towards all that literature I had read, telling me that May was the dry season in Fiji. By the time we got to the capital it seemed as if the sky was going to fall on us, and an hour later torrential rain began to fall. It would last for almost 48 hours.

We had made arrangements with the "Coral Sea" to take us on three collecting trips: to Rattail Reef, in Suva Bay, to Sandbank Reef, and to the islands of Makuluva and Nukulau, east of Sandbank Reef. Much to the surprise of the less optimistic members of our group, the weather cooperated and we were able to meet our schedule. Rattail was disappointing. It seemed "deserted" on top of the reef. (Ed. Note -- HCS members on the Ruth Fair trip in 1977 found Rattail great.) Mitra cucumerina, Cypraea erosa and C. annulus were the only common species. A Latirus belcheri here, a Cypraea clandestina there, and a sprinkle of Conus virgo, C. miliaris and C. coronatus found in the more protected areas, was all we could find. Sandbank was more profitable. As the name indicates, it has large sandy areas, and for those who snorkeled there were Oliva carneola, O. annulata, O. miniacea, Xenoturris cingulifera, Lophiotoma acuta, Mitra episcopalis and a number

of small ceriths and strombs. The reef walkers collected Lambis lambis, Cypraea tigris, Conus leopardus, C. virgo, C. textile and a number of other species found at Naviti Beach. The trip to Makuluva and Nukulau was also rather disappointing, particularly to the former. A few interesting crabbed species were found in Nukulau.

All in all, we found the waters around Suva very unproductive and rather polluted, with marine life, in general, and molluscan fauna, in particular, very poor. Dead coral, algal growth, and other indicators characteristic of polluted waters were observed by the group, suggesting that this area is indeed contaminated. The muddy sand in front of Travelodge was smelly and unattractive although we tried it, hoping to find olives.

From Suva we flew to Nadi, where a bus was waiting to bring us to the sugar port of Lautoka and to the "Blue Lagoon", a nice cabin cruiser which would take us on a three-day trip through the Yasawa Archipelago, an unspoiled chain of islands 60 kilometers north of Viti Levu.

At 7 p.m. the cruiser left Lautoka Wharf, while the lucky passengers enjoyed cocktails and hors d'oeurvres during the 45-minute run to a small coral atoll, where it anchored overnight. At daybreak, while heading for the Yasawas, breakfast was served as the cliffs and rocky outcrops of the first islands rose out of the ocean. By mid-morning we had reached the magnificent Sawa-I-Lau area, with incredibly white sand, beautiful cliffs and interesting mushroom-shaped islands. The boat had other passengers from New Zealand to Canada. We were the only shellers. A picnic was slated on one island, but we spent our time collecting. On the exposed rocks we found an interesting form of Chicoreus brunneus, smaller than normal and with totally white mouths. A number of Favartia brevicula, Mitra scutulata and M. aurantiaca were also found in this habitat. The wide sandy areas produced a vast number of Strombus gibberulus gibbosum and S. mutabilis, and also Imbricaria punctata, Vexillum cadaverosum, V. semifasciatum. Costellaria obeliscus, Conus aristophanes, Strombus lentiginosus, Oliva miniacea, O. annulata, O. episcopalis, O. tricolor, Conus arenatus, C. eburneus, Terebra affinis, T. areolata, T. dimidiata (including the largest I have ever seen, found by Barbara Hudson), Pyramidella sulcata, P. dolabrata, Otopleura mitralis, Atys cylindricus, Vanicoro helicoidea, Natica onca, Mitrella ligula, Nassarius graniferus, N. acuticostus, N. gaudiosus, N. concinnus, N. luridus, Cerithium egenum, etc.

After Sawa-I-Lau we made several short stops, including one at a village where we had the opportunity to buy shells from the natives. In one of the stops, under miserable weather again, some of us decided to risk the elements. Connie Boone and Barbara Hudson kept turning rocks to find Cypraea tigris, a species that, although usually common, had eluded many of us.

And then came our final stop, Nanuya Lailai. We had reached the area after low tide, and the weather was not yet cooperating, but the snorkelers decided to jump in, nevertheless. And it wasn't bad at all. In spite of worsening weather, strong currents and poor visibility, we did rather well and were full of enthusiasm for our Fijian

feast that had to be held that evening on board the "Blue Lagoon" instead of on land as scheduled. As darkness fell, each of us began to appear on deck wearing our own version of a "genuine" Fijian outfit. I, for one, was wearing a shirt I had bought in Brazil and which looked "tropical", and a "pareu" which two friends had got for me in Viti Levu and dared me to wear that evening. It was an extravagant evening filled with lots of Fijian music, singing and dancing, and with Fijian beer and "kava", the local drink which tastes somewhere between dishwater and mud. Dancing consists of jogging up and down, and you were invited by Fijian partners.

The next morning we started getting our gear together soon after breakfast, but notwithstanding the awful rain, wind, thunder and lightning we had one last collecting adventure. I had more fun that last morning than at any other point in the trip. In the sandy areas we found many beautiful Lioconcha castrensis, and also Asaphis violaceus, Codakia tigrina, Polinices maurus, Pitar obliquatus, Oliva dactyliola, Trachycardium orbita, Vexillum costatum, Mitra mitra, Terebra subulata, etc. On hard surface we found Conus planorbis, C. rattus, C. vexillum, C. terebra, C. emaciatus, C. flavidus, C. sanguinolentus, Cypraea punctata trizonata, C. felina, C. teres, Lambis lambis, Lima fragilis, Latirus belcheri, Mancinella mancinella, a large, exquisite Cronia biconica, etc. Inside a dead Trachycardium orbita there was a large specimen of the very interesting species, Turris cryptorrhaphe; Pteria macroptera looked like flying swallows on the seawhips, and Calpurnus verrucosus looked like living lace on top of wide-branched soft coral. In an area where there was a fifteen-foot drop alive with coral, I found a Murex ramosus crawling about in sand, and Marcy Vomaske came back with a Cypraea cribraria with an almost red background, instead of the brownish-beige color of Philippine specimens. The find of the day, however, was made by Iva Thompson. When she showed me this rather dirty cone, I thought momentarily that it was a Conus marmoreus form vidua, but after close inspection, I saw the beautiful reticulated golden pattern, and I knew it couldn't be that. What caught me off guard was the size and the unusual pattern. What Iva had collected was a Conus ammiralis with a reversed color pattern, that is, narrow dark bands and wide light bands. It also turned out to be a world record, measuring a huge 84 mm. in length.

Judging from our collecting experiences in Fiji, the malacofauna of the island group is very rich in numbers of species. Several of us collected nearly 250 species in spite of the inclement weather conditions and short collecting time. Many of the species collected, however, were represented by only a few specimens, and many more were seen only in their immature stages, particularly in Viti Levu. In addition to the polluted waters around Suva, the bad hurricanes lately in the area may have had a significant effect on marine life.

(Dr. Garcia was tour leader of the Fiji trip. He is a professor of languages at the University of Southwestern Louisiana. Each year he organizes shelling trips. His next trip is to Micronesia May 29 - June 9, 1985. Contact him at 135 Oak Crest Drive, Lafayette, La. 70503.)

Fig. 1 Map of Fiji and Yasawas, with dotted lines indicating route for the Garcia shelling tour in May, 1984.

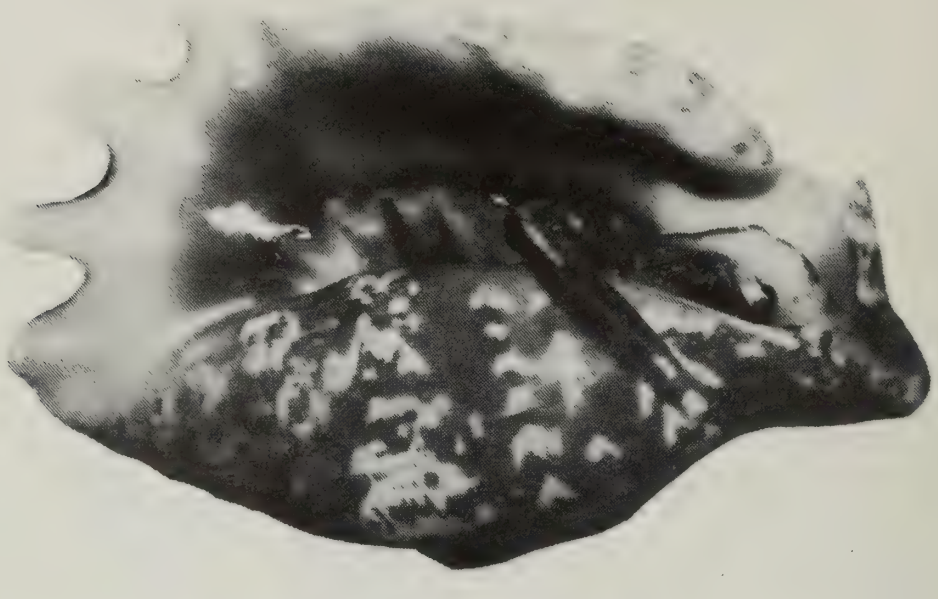

Fig. 2 Live Strombus sinuatus collected by Iva Thompson of Florida at Navite Resort on the Gold Coast, Fiji. Natives collect these, but this was the first one seen alive anywhere by the participants on this collecting trip.

Photo by Constance Boone

Fig. 3 Conus ammiralis collected by Iva Thompson in the Yasawas, with the color banding differently spaced from the usual pattern. Specimen is 84 mm. in length, a world record size.

Photo by Iva Thompson

TEXAS CONCHOLOGIST, Vol. XXI, No. 2, January, 1985

AN ERYCINACEAN BIVALVE ASSOCIATED WITH AN UNUSUAL BRYOZOAN COLONY FROM QUEENSLAND, AUSTRALIA

CONSTANCE E. BOONE AND HAROLD W. HARRY

The larger things of a coral reef area are so spectacular and captivating that the smaller objects, although equally marvelous, are usually overlooked. While on a dredging trip in northeastern Australia, one of us (CEB) found several small, brown, lacy rosettes which she had not previously seen, either in the field or in the manuals illustrating common marine organisms of the tropics. On closer inspection, she saw that among the fronds of the rosettes there were numerous minute bivalves, of the type generally called erycinaceans or leptonids. The classification of that group is poorly worked out, so that they are difficult to identify, but many of them are known to be associated with particular organisms, as commensals. We have been unable to identify either the bryozoan species which forms these rosettes (Figs. 1-4) or the bivalve (Figs. 5-8), but the specimens seem sufficiently interesting and unusual to merit publication of their characteristics, insofar as we have been able to determine them.

The specimens were found in a sample dredged from 55-60 meters depth, 1.5 nautical miles due west of Grubb Cay, off Townsville, Queensland, Australia, on 17 September 1983. Mr. T. C. Good, of Townsville, did the dredging, which was near coral of the Great Australian Barrier Reef, on a sandy bottom made up of white calcareous fragments of reef inhabitants, with many foraminifera and a few small mollusks present. One of the rosettes was placed in alcohol, and the other five were air-dried.

To the undersides of the rosettes were attached a few small serpulid worm tubes, some hydrozoans and a few cementing foraminifera of several species. There were no organisms attached to the upper surfaces of the rosettes, but here were nestled the many small clams. In one spot 25 or more were counted in a single field of the microscope, at low power. The bivalves were found on four of the six rosettes. There was no evidence of byssal threads, but the bivalves and sand grains were agglutinated to each other and the rosettes by having been dried directly from sea water.

The rosettes are flattened cones, circular on top and pointed below (Fig. 2). Those collected range in size from 30 to 40 mm. diameter, and are about 15 mm. tall. Probably they rest on sand bottom, unattached or attached only slightly to some firm object, in quiet water. Each rosette is formed by essentially a single pliable sheet, consisting of numerous flattened, subrectangular units. The sheet is coiled to form about 3 or 4 whorls. At regular intervals throughout it there are lanceolate holes, several times larger than the units. The units are individual bryozoan animals (technically called zooids), also known as moss animals or polyzoa. Each zooid consists of an encasing box, in this case broad and flat on top and bottom and with narrow sides, containing one animal. No details of the animals within

the boxes were determined. The sides of these boxes are thick, white and calcareous, but the upper surfaces are thin, brown, pliable cuticle (Fig. 3), apparently unattached at their peripheral ends to the sides of the boxes.

However, the lower surfaces of the boxes are thinly calcified, sometimes completely, but usually leaving a very small area of cuticle (Fig. 4). In the inner angle of most, if not all, of the lanceolate holes is a mass of tissue, from which emerges a long tube, very thin, cuticular and much shriveled in the preserved specimens (Fig. 3). Some of these seem to be as long as the diameter of the rosette, but many are broken to shorter lengths. What their function might be is not known, and we can find nothing in the literature on bryozoa about such.

The membranous top surface, loose at one end to allow extension of the animal's tentacles, may relate this species to the genus Membranipora. But species of that genus seem to grow in irregular sheets, and although only one layer of zooids thick, most adhere throughout their extent to some firm substrate. Nor do they seem to produce the large holes that occur in these rosettes.

The marvel of this species is the precise, freely extending form which each colony achieves, and the regular spacing of the holes, so that the colony resembles a bit of lace. It resembles pictures of species of the extinct order Cryptostoma, the last of which died in the Paleozoic Era, hundreds of millions of years ago. But possibly it belongs to the family Reteporidae, as defined by Hyman (1959:384 ff), of which some living species of the Indo-West Pacific area have an erect growth form and appear lacy.

THE ERYCINACEAN BIVALVE

The largest specimen of the bivalve found is 4.0 mm. long, 3.22 mm. high (the one drawn in Figs. 5-8 is slightly smaller), the other specimens ranging downward to less than a third of that size; it is not known whether they are live bearers. The only specimen with flesh was poorly preserved and broken, but there appears to be only a single fusion of the mantle behind, below the excurrent siphonal opening, and one demibranch of the gill on each side.

The shell is small, thin, pure white, moderately inflated, equivalve, slightly inequilateral with beaks just in front of the midpoint of the length. The umbos are inflated, nearly touching, turned slightly forward. Both ends of the shell are rounded, the hind one more broadly than the front, and the ventral margin is evenly curved. There is no lunule or escutcheon. The surface of the disc is slightly flattened, but there is no radial trough on it. The sculpture of very faint, closely spaced growth lines produces a silky texture.

The pallial line and muscle scars are faint, but the scars appear to be somewhat elongate and the pallial line broad, with ragged upper margin and no sinus. The ligament is thin, elongate, beginning at the umbos and extending about half the length of the post-dorsal margin. A single cardinal tooth, finger-like, projects across the midline

below the umbo of the right valve, fitting into a socket between two smaller cardinals of the left valve. A very slight lateral tooth, of considerable length but poorly defined, narrow and straight, develops on the postero-dorsal margin behind the ligament in the left valve, with a shallow socket, also vaguely defined, in the right valve.

This clam may belong to the family Kelliidae as defined by Chavan (1969:N522 ff). Specimens of the bivalve and bryozoan have been deposited in the mollusk department of the U. S. National Museum of Natural History, Washington, and additional material is in the collection of Constance E. Boone.

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EXPLANATION OF THE FIGURES

Fig. 1. Upper side of the bryozoan rosette, 30 mm. diameter.

Fig. 2. Central part of lower surface of same rosette, to show flimsy attachment; a calcareous worm tube is near the top, and a smaller foraminiferan toward the left, both cemented to the white, calcareous surface. The many small dashes are the uncalcified lower membranes of the zooid boxes (see Fig. 4); scale line applies only to this figure, not to Fig. 1.

Fig. 3. Enlarged view of the upper surface of a rosette, to show arrangement of zooids (stippled membranous surfaces) around the holes, from the inner angle of which each has extending a long, thin, membranous tube.

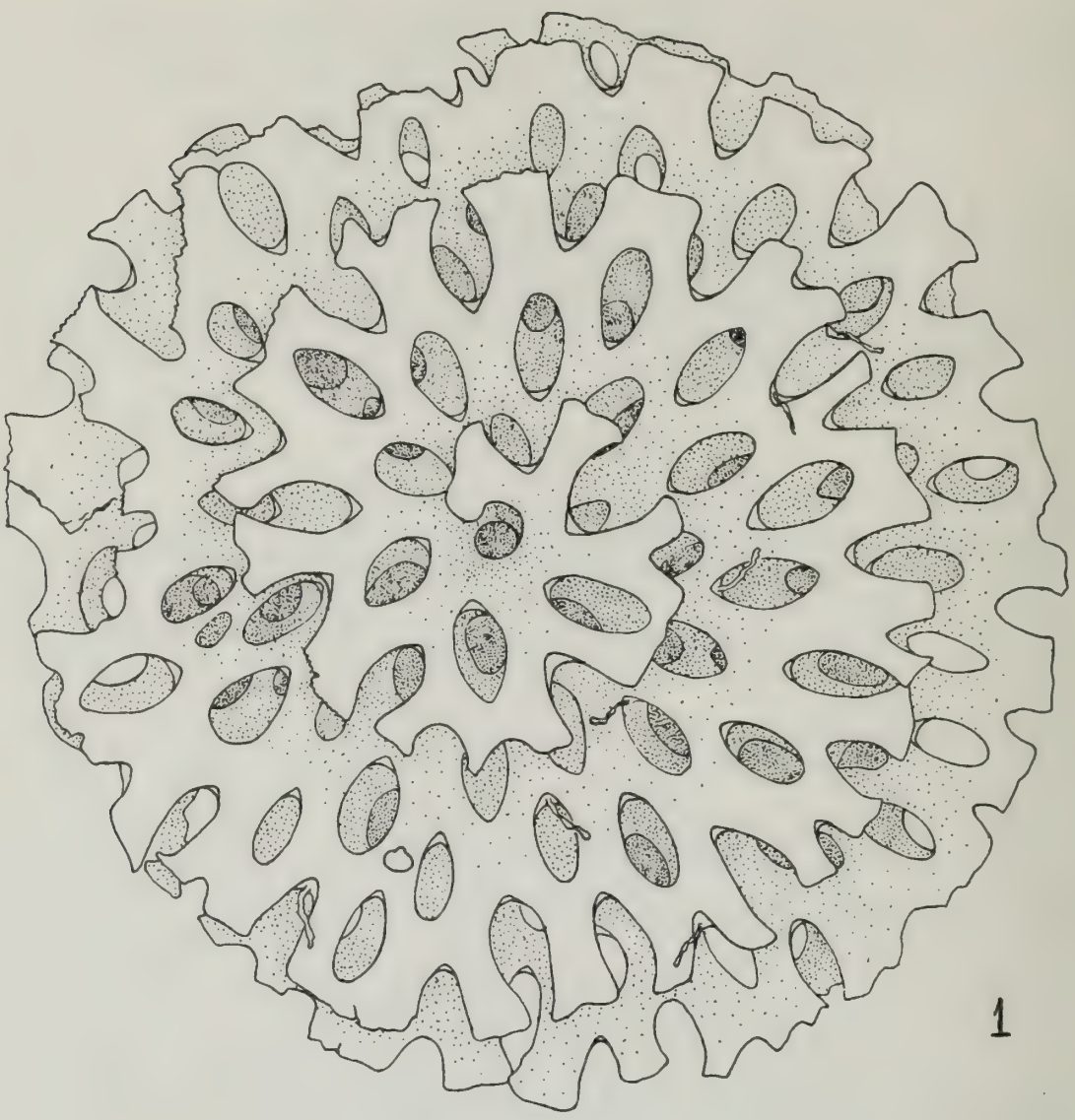
Fig. 4. Lower surface of same area of a rosette of Fig. 3, at same scale. This surface is partly calcified, restricting the exposed membranes and completely covering some.

Fig. 5. Dorsal view of the bivalve.

Fig. 6. Left side of same shell of Fig. 5, at same scale.

Fig. 7. Interior of valves of the bivalve, left valve below. Same scale as Figs. 5 and 6.

Fig. 8. Interior view of ligament (cross hatched) and teeth of same specimen of the bivalve, with valves slightly opened but joined. Slightly larger scale than the previous figures.



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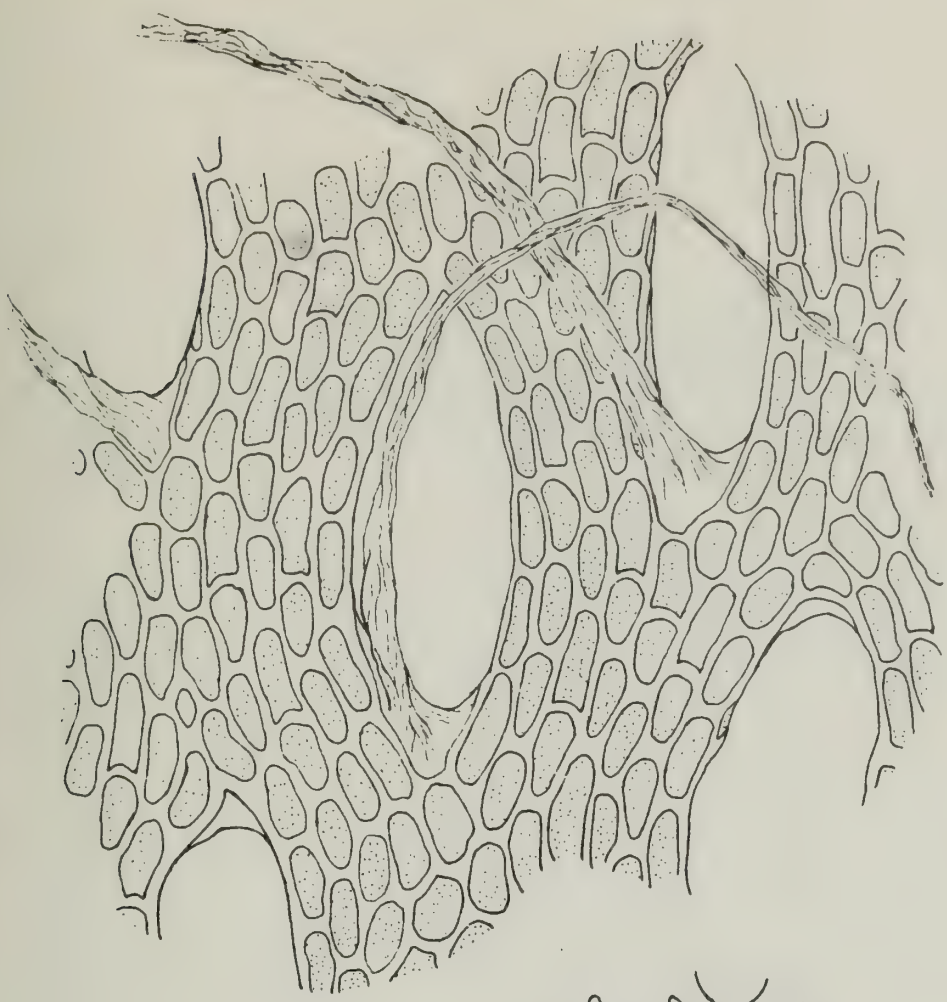

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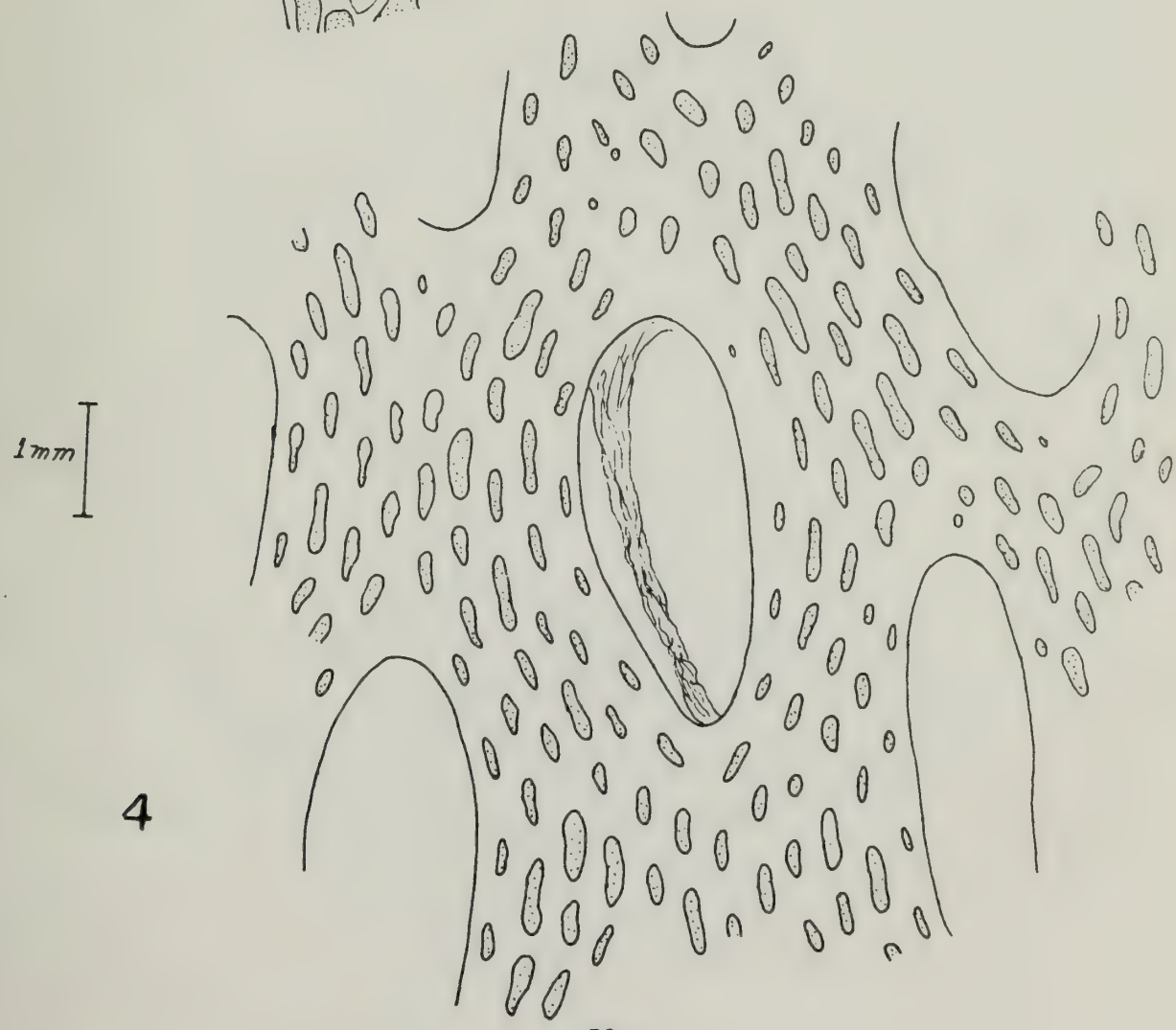

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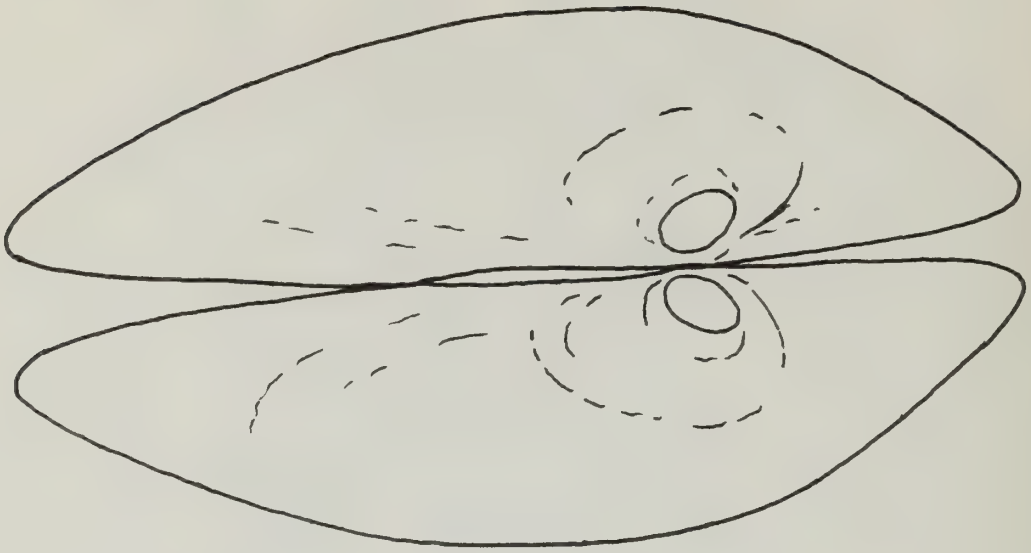

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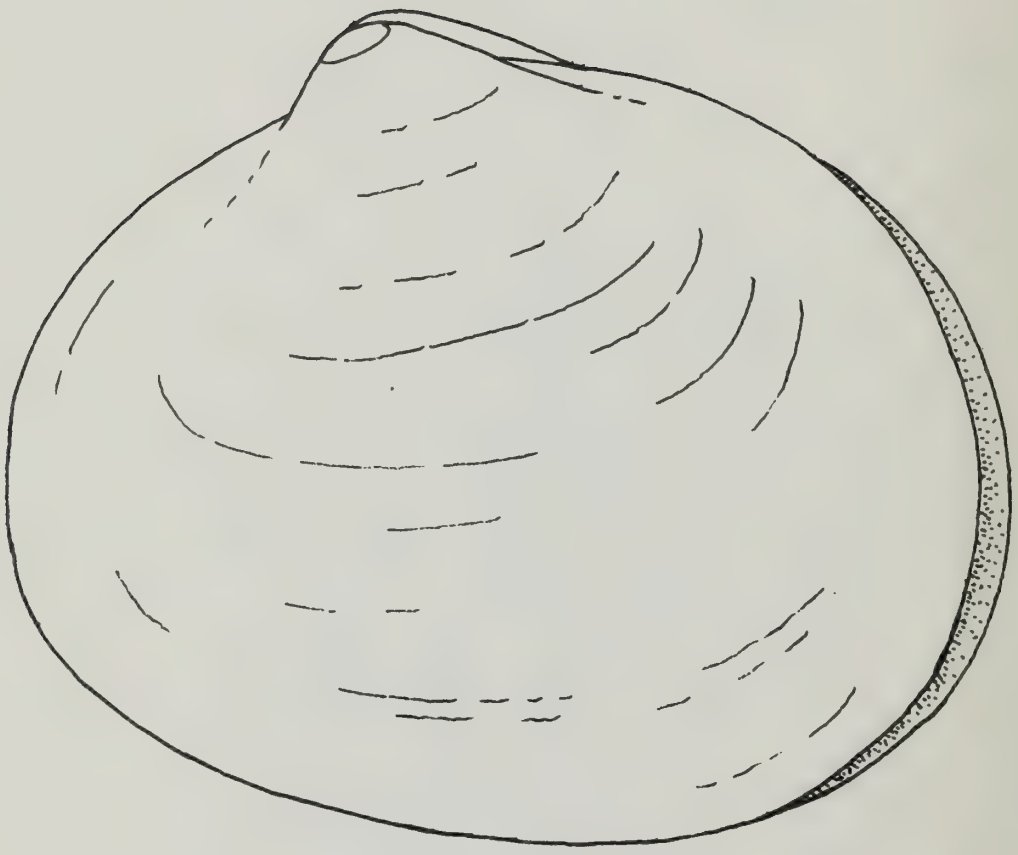

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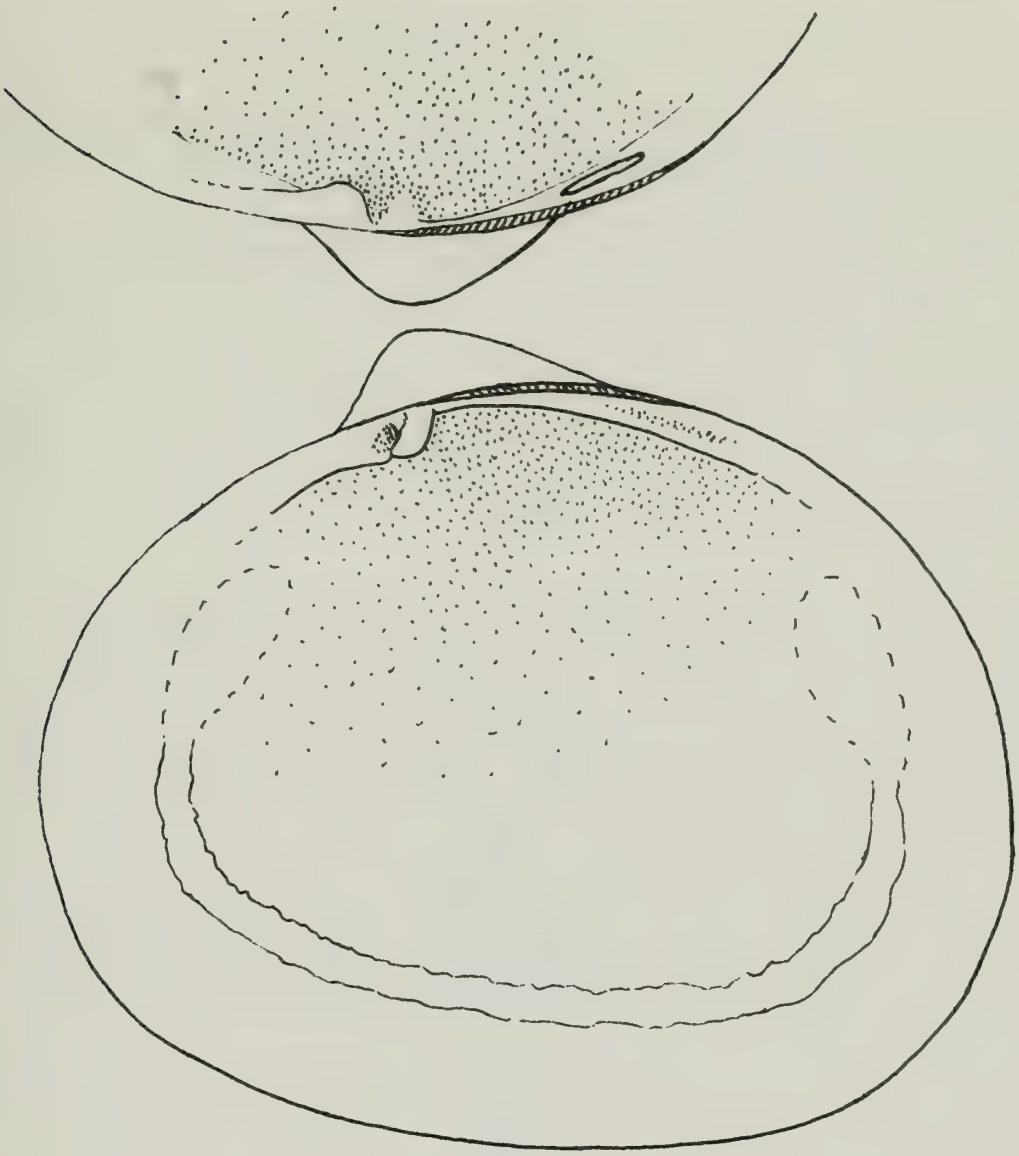

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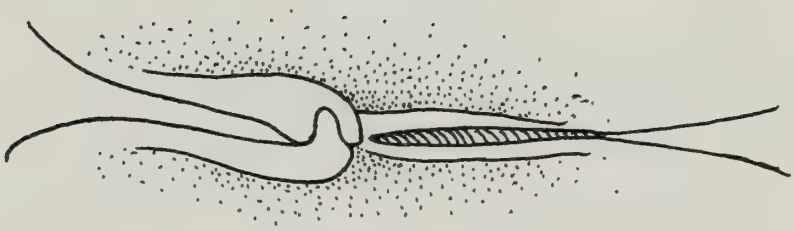

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TEXAS CONCHOLOGIST, Vol. XXI, No. 2, January, 1985

ACTEOCINA (AND RELATED FORMS) IN TEXAS

BY

PAULA M. MIKKELSEN

As part of a survey of acteocinids in the Western Atlantic, by Paul S. Mikkelsen and myself, numerous lots from the Houston Museum of Natural Science (HMNS) were examined and identified. Many of these lots were part of the Northwest Gulf Survey by the Bureau of Commercial Fisheries or from the collections conducted by Mr. Harold Geis (see Fig. 1 for localities). Some of the results have been recently published (Mikkelsen and Mikkelsen, 1984) in a systematic treatment of three species of Acteocina; other species will be treated in detail later. However, to clarify the taxonomy for workers interested in Gulf of Mexico material, a summary of the results and brief description of the Texas acteocinid fauna seemed in order. I am indebted to Dr. T. E. Pulley and Mrs. Constance E. Boone for their assistance and attention to necessary detail in this research.

Members of the genus Acteocina (and others, commonly called "barrel-bubbles") are familiar, in a general sense, to anyone working on micromollusks from beach drift or offshore bottom-dredge collections. Specimens are usually in the 2-3 mm. size range, smooth, white, and cylindrical; most have an extended spire, a prominent protoconch, and a single columellar fold. Because the shells tend to be morphologically similar between species, anatomical features must also be examined. These include the radular teeth and a set of gizzard plates, both of which can be extracted from preserved or dried specimens. As a result of our studies and the earlier work of Marcus (1977), the characteristics of these last two structures determine the generic placement of the species. For species identification, we have determined suites of consistent conchological characters for use in routine sorting.

A critical feature of the acteocinid shell is the hyperstrophic protoconch or nuclear whorls at the apex. [The term "hyperstrophic" describes the whorls of the protoconch which coil at right angles to the rest of the shell, or teleoconch. A shell with such a protoconch is called "heterostrophic", i.e., with two different types of coiling.] The protoconch whorls are formed during the larval life of the snail, and their appearance reflects the type of larval development which the species undergoes. We have determined two distinct types of protoconch (Figure 2): (1) The planktonic type has conspicuously curved sutures and a highly visible globular nucleus (Figure 2a). It appears tapered when viewed from the top or side (Figure 2b) and consists of one-and-a-half whorls. (The specific number of protoconch whorls is considered unimportant for general sorting and species identification.) Species with planktonic-type protoconchs hatch from their egg mass as free-swimming veligers and spend a period of time in the water column before settling to assume a benthic lifestyle. (2) The direct-developing type (Figure 2c) has a straight suture and lacks the globular nucleus of the previous type. It is wider from top or side view (Figure 2d) and consists of 3/4 of a whorl. Species with direct-type

protoconchs hatch from the egg mass as benthic crawl-away juveniles. Of the 7 Texas species, 6 are of the planktonic type and 1 is of the direct-developing type.

Acteocinid radulae (Figure 3) are extremely minute, which explains why so few have been examined until recent years. Some species were thought to lack a radula, when in probability the radula had been lost or overlooked in preparation. The radular formula is typically 1-R-1, meaning the central or rachidian tooth is flanked by one lateral tooth on each side. The typical rachidian tooth (Figure 3, R) is roughly rectangular in shape with its bi-lobed leading edge bearing fine denticles. Each lateral tooth (Figure 3, L) is cusp-shaped and usually has one or two rows of denticles. The adult radula consists of 14-16 rows of teeth.

The three calcareous gizzard plates (Figure 4) are located in the muscular gizzard of the digestive tract, more or less in the "neck" region of the snail. Their grinding surfaces come together to crush injested food particles (detritus, foraminifera, etc.). The relative sizes and shapes of the three plates are taxonomically important.

While I have referred to these species thus far as "acteocinids," implying the family Acteocinidae, there are actually several families containing genera which "look like" an Acteocina. Among the best-known is Retusa (of the family Retusidae), recognized by the lack of a radula, a columellar fold, and eyes in the living adult. A good example is Retusa obtusa (Montagu, 1803) from the northern Atlantic; there are no known species of Retusa with exposed spires in Texas waters (several involute forms occur which will not be discussed here). Most "acteocinids" (and all Texas forms discussed here) possessing radulae, columellar folds and eyes in the living adult (there are other anatomical differences as well) are currently placed in the conservative family Scaphandridae. [Some workers split this family into several others, including Cylichnidae, Acteocinidae, and the restricted Scaphandridae.] These "acteocinids" are assigned to a number of genera, as mentioned above, based on radula and gizzard plate structure; those present in the Texas fauna are described below.

GENUS ACTEOCINA GRAY, 1847

Syn. Cylichnella Gabb, 1873; Utriculastra Thiele, 1925.

Shell with exposed or involute spire; with at least one columellar fold. Lateral radular teeth (Figure 3a) with one row of denticles, often on an expanded "wing". Gizzard plates consisting of one deltoid "unpaired" plate (Figure 4a, U) and two smaller, non-identical "paired" plates (Figure 4a, P).

Acteocina canaliculata (Say, 1826) "Channeled Barrel-Bubble"

(FIGURE 5a)

Shell thick-walled; cylindrical to pyriform (= broader at posterior end). Shoulder rounded; subsutural sculptural band lightly impressed and with a weak pattern of axial growth lines. Spire exposed; spire height variable, but usually relatively low. Protoconch of the planktonic type. Lateral radular teeth with "wing" bearing one row of denticles. Unpaired gizzard plate T-shaped. Average length 2.5 mm. See additional remarks under A. candei.

By far, this is the most wide-spread species of Acteocina in the Western Atlantic, ranging from Prince Edward Island, Canada, to Texas. It is principally an inshore, estuarine species, although it has been rarely recorded living to depths of 40 meters and may be found (usually empty shells) in offshore dredged material. In many Texas lots, the spires were coated with a black tar-like substance, presumably picked up from the sediments. The HMNS collections contained 58 lots of A. canaliculata, 24 of which contained live-collected specimens. Most (and all live) lots were from inshore locations such as Galveston Bay, Christmas Bay, Matagorda Bay, and Corpus Christi Bay. Offshore locations yielding empty shells included Heald Bank and Claypile Bank. Texas depths ranged to 47 meters for empty shells, or 3 meters for living specimens, illustrating this species' tendency to be live-collected from rather shallow waters.

See discussion of published Texas records under Acteocina candei.

Acteocina candei (d'Orbigny, 1841) "Cande's Barrel-Bubble"

(Figure 5b)

Shell, radula and gizzard plates as in Acteocina canaliculata, except: subsutural sculptural band of shell strongly impressed with distinct axial ribbing; spire height generally greater; shell shape more uniformly cylindrical; protoconch somewhat larger in relation to the shell. Average length 2.5 mm.

This is principally an oceanic species, preferring open ocean or nearshore localities with oceanic conditions. It is widespread throughout the Caribbean and overlaps the range of Acteocina canaliculata from Cape Hatteras to the Texas coast. The HMNS collections included 38 lots of A. candei, 2 of which contained live-collected specimens. Depths ranged to 58 meters for empty shells, and to 20 meters for live records. This species was especially common at locations offshore of Galveston.

Acteocina candei is extremely similar to A. canaliculata and was formerly synonymized with it (Marcus, 1977). However, it has recently been shown to be a distinct species (Mikkelsen & Mikkelsen, 1984). The impressed and ribbed subsutural band is a good character to rely on, although we have seen specimens of A. canaliculata, especially in Texas collections, with coarse growth lines on the subsutural band,

suggesting A. candei's sculptural pattern. The overall shape of the shell is more cylindrical and the protoconch is slightly larger than in A. canaliculata. This last feature, although a subjective impression at present, suggests that there are developmental differences between the two species.

In published Texas records, "Retusa candei" reported from coastal bay systems (Odé, 1972a, 1974a, 1974b) are most probably all A. canaliculata, as evidenced by their given estuarine habitats. On the other hand, Odé's (1972b) report of "R. candei" from the stomachs of seastars is probably correct; numerous such lots from offshore of North Carolina which I've examined contained mainly A. candei. Using this same "locality-indicates-identity" reasoning (which is admittedly imperfect), Odé & Speers' (1966) reference to "Retusa candei" probably includes both A. candei and A. canaliculata because it references shells from beach drift (probably A. candei) and from mud flats (probably A. canaliculata). Both A. candei and A. canaliculata were included by Odé (1973a) in the Northwest Gulf Survey species list; their given localities and depths are identical, so they would need re-examination to determine their actual identities. Andrews' illustrations of "Retusa canaliculata" (see Andrews, 1971) and of "Acteocina canaliculata" (see Andrews, 1977, 1981) are clearly A. candei, but the descriptions and given localities suggest a mixture in this series as well. All of these cases clearly illustrate the confusion that has existed between these two species in the past.

Acteocina recta (d'Orbigny, 1841) "Straight Barrel-Bubble"

(Figure 5c)

Shell thin-walled, translucent, cylindrical with nearly parallel sides, finely spirally striate throughout its length. Spire nearly flat. Shoulder with two distinct keels: one adjacent to the suture, the other at the shoulder; the two keels are separated by a trough. Protoconch of the planktonic type. Lateral radular teeth with "wing" bearing one row of denticles. Unpaired gizzard plate T-shaped. Average length 2 mm.

Acteocina recta ranges from central eastern Florida, to Texas and throughout the Caribbean to southeastern Brazil. This species is rather common in collections from offshore of Texas. Of the 39 HMNS lots containing this species, 2 contained live-collected material. All localities were oceanic, with areas offshore of Galveston and Freeport frequently recorded. Depths ranged from 13-128 meters for empty shells, and from 36-44 meters for living records.

In published Texas records, "Retusa sp. A" appeared on preliminary lists of the Northwest Gulf Survey (Odé, 1971, 1973a); nearly all HMNS lots so labelled which I've examined were found to be Acteocina recta. However, the second of these lists (Odé, 1973a) also included "Retusa sp. B", which proved to consist of a mixture of A. recta and several other species. The "small deep-water Retusa sp." from the mudlumps of the Mississippi Delta (Odé, 1973b) may be A. recta.

Acteocina bidentata (d'Orbigny, 1841) "Two-Toothed Barrel-Bubble"
(Figure 5d)

Shell thick-walled, involute, spirally striate near the anterior end. Columella with two subequal folds. Radula and gizzard plates as in A. canaliculata. Planktonic-developing (although protoconch is not visible, being immersed in the succeeding whorl). Average length 2.5 mm.

Unlike others covered in this paper, this species is involute. However, it is included here because it is frequently found in lots containing the other species discussed. The anatomical work of Gosliner (1979) showed this species to be congeneric with A. canaliculata. Because A. bidentata is the type species of the genus Cylichnella, that genus is therefore a synonym of Acteocina.

Our work has not thoroughly examined the geographical range of Acteocina bidentata, but published records are probably believable in this case because of the species' distinctness. Acteocina bidentata ranges from North Carolina to Brazil. The HMNS collections were not thoroughly examined for this species, although empty shells were frequently encountered in lots from beach drift and offshore dredged material.

In published Texas records, this species appeared as "Cylichna bidentata" in Odé & Speers (1965) and Andrews (1971), and as "Cylichnella bidentata" in the later editions of Andrews (1977, 1981).

GENUS TORNATINA A. Adams, 1850

Shell with exposed spire; with one columellar fold. Lateral radular teeth (Figure 3b) with two rows of denticles. Gizzard plates consisting of one "unpaired" plate (Figure 4b, U) and two smaller, nonidentical "paired" plates (Figure 4b, P).

Tornatina inconspicua Olsson & McGinty, 1958

(Figure 5e)

Shell thin-walled, translucent, smooth, cylindrical, with no subsutural band. Suture deeply channeled. Columella with a single "thickened" fold. Planktonic type protoconch. Radula lacking rachidian teeth. Lateral radular teeth with two rows of denticles, one set somewhat finer than the other; articulating process of tooth expanded into a thin flange. Unpaired gizzard plate (Figure 4b) heart-shaped. Average length 2 mm.

Tornatina inconspicua ranges from Cape Hatteras to Texas, and through the Caribbean to Uruguay. It was found in 14 HMNS lots, all consisting of empty shells. It is an offshore species, recorded frequently off of Galveston and Freeport, in depths from 10-16 meters.

SPECIES WITH INDEFINITE GENERIC STATUS:

"Species G"

(Figure 5f)

Shell thin-walled, cylindrical, with a horizontal subsutural band. Spiral incised lines inconsistently recorded. Planktonic type protoconch. Average length 2.5 mm.

This is a form about which little is known. We have recorded it frequently enough to warrant continued separation, although its range and conchological features overlap those of Acteocina candei, which it may ultimately prove to be. HMNS collections yielded 2 empty shells, from 14 meters off of Galveston.

Radula and gizzard plate morphologies are unknown.

"Species J"

(Figure 5g)

Shell relatively large (for the group), thick-walled, cylindrical, with close spiral striations throughout its length. Subsutural sculptural band absent; suture deeply channeled. Direct-developing type protoconch. Average length 4 mm.

"Species J" has been recorded from the Florida Keys, south Texas, the Caribbean and Central America. Three lots of HMNS material yielded 4 empty shells. All were from offshore of the southern Texas coast (Port O'Connor to Padre Island), from depths of 7-15 meters.

This is probably Tornatella bullata Kiener, 1834, although we have yet to locate type specimens to verify this identification. All published figures fit our shells quite well as does the conspicuously large size range (5-11 mm.). The 9 mm. shell length sometimes cited for Acteocina canaliculata (Say) is actually from Bulla canaliculata d'Orbigny, 1841, which is a synonym of T. bullata. No information is known about the radula or gizzard plates of "species J" or of T. bullata.

Our studies on Western Atlantic "acteocinids" are ongoing and material from all locations is still needed to fill gaps in geographical ranges and anatomical information. Anyone with specimens available for examination on a loan basis is asked to contact me at Harbor Branch Foundation, Inc., R.R. 1, Box 196, Ft. Pierce, FL 33450-9719.

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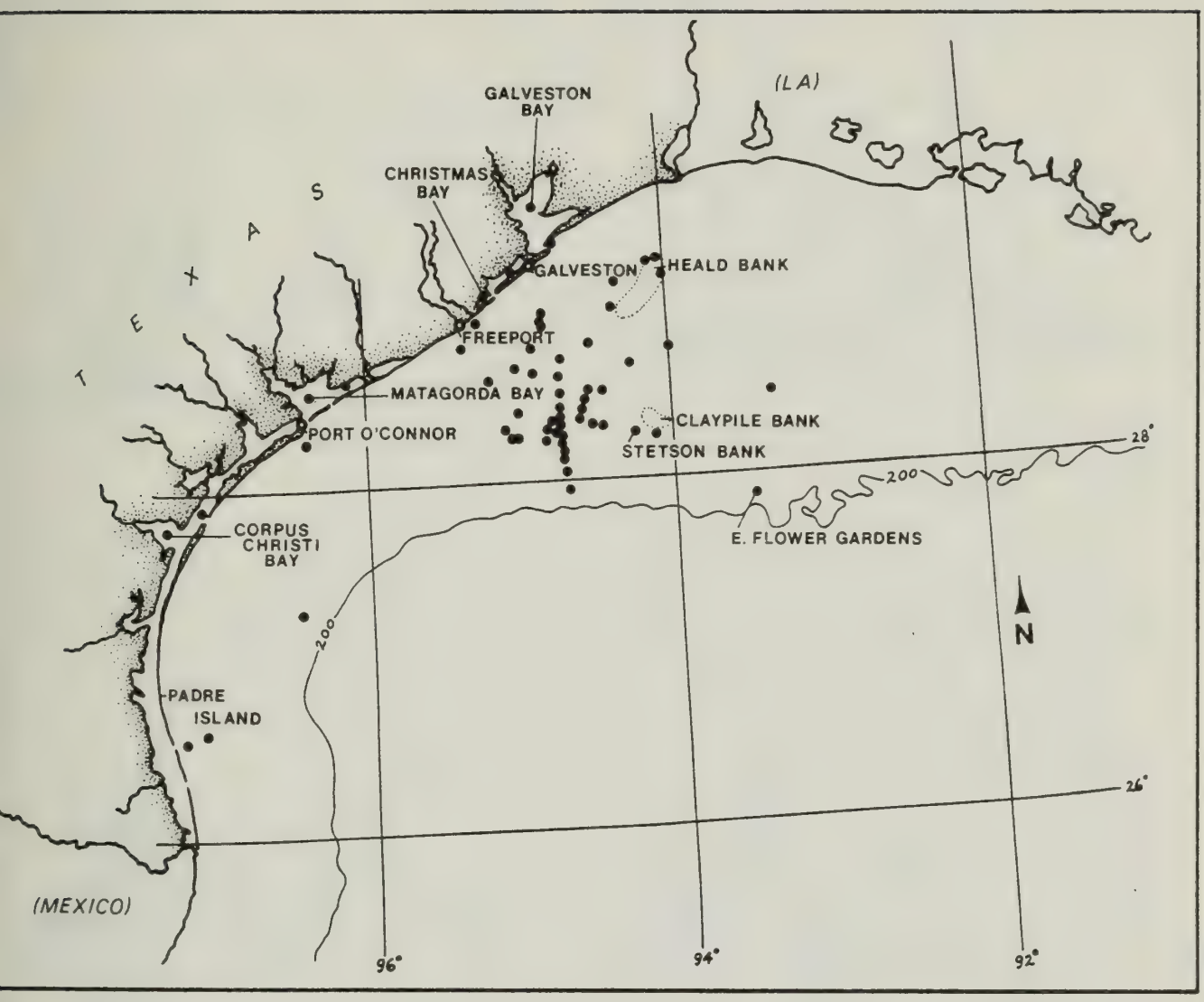

Figure 1. The Texas Gulf coastline with collection sites of examined specimens indicated by solid dots (●).

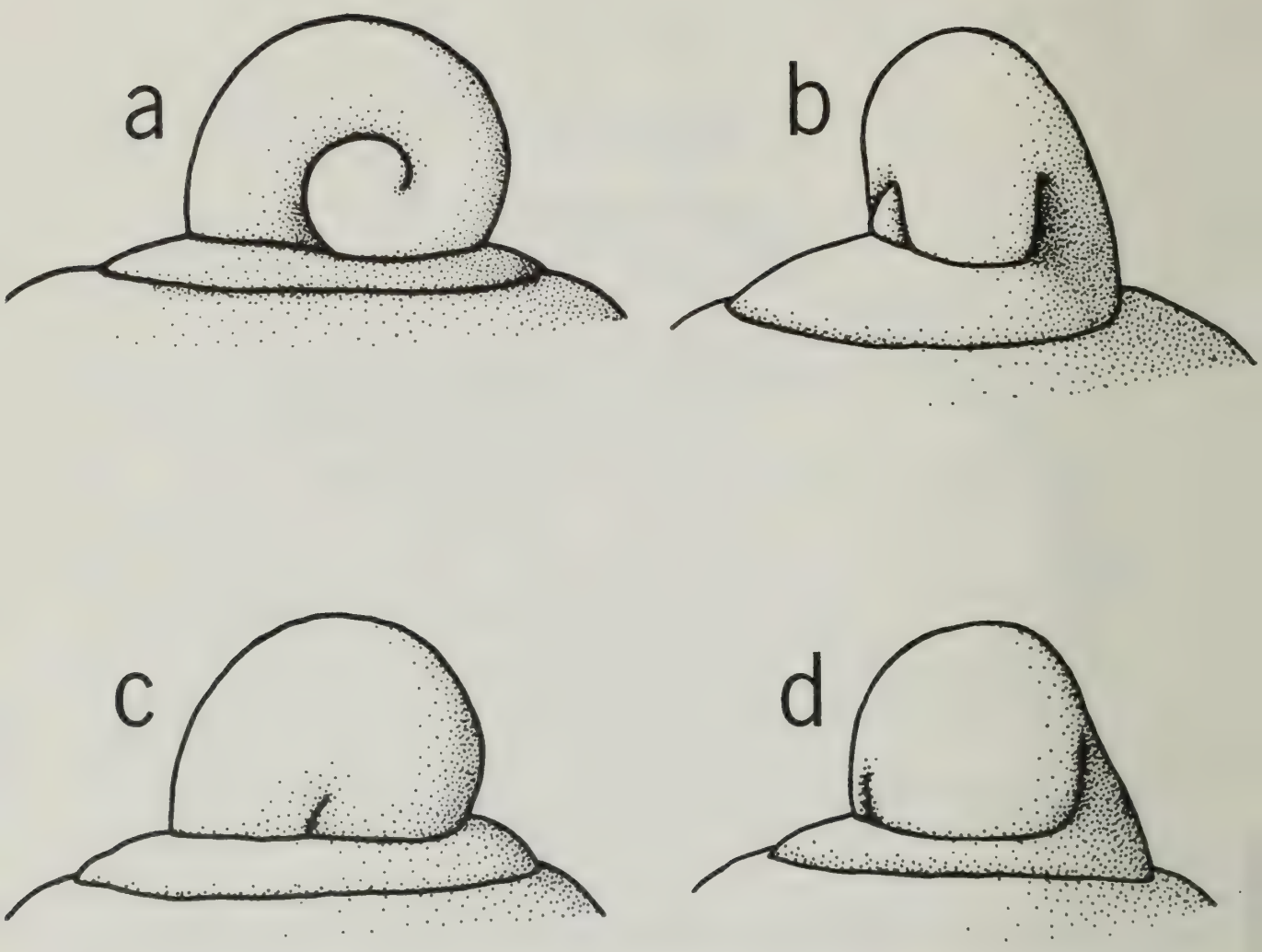

Figure 2. Acteocinid protoconchs. a-b. Planktonic type. c-d. Direct-developing type.

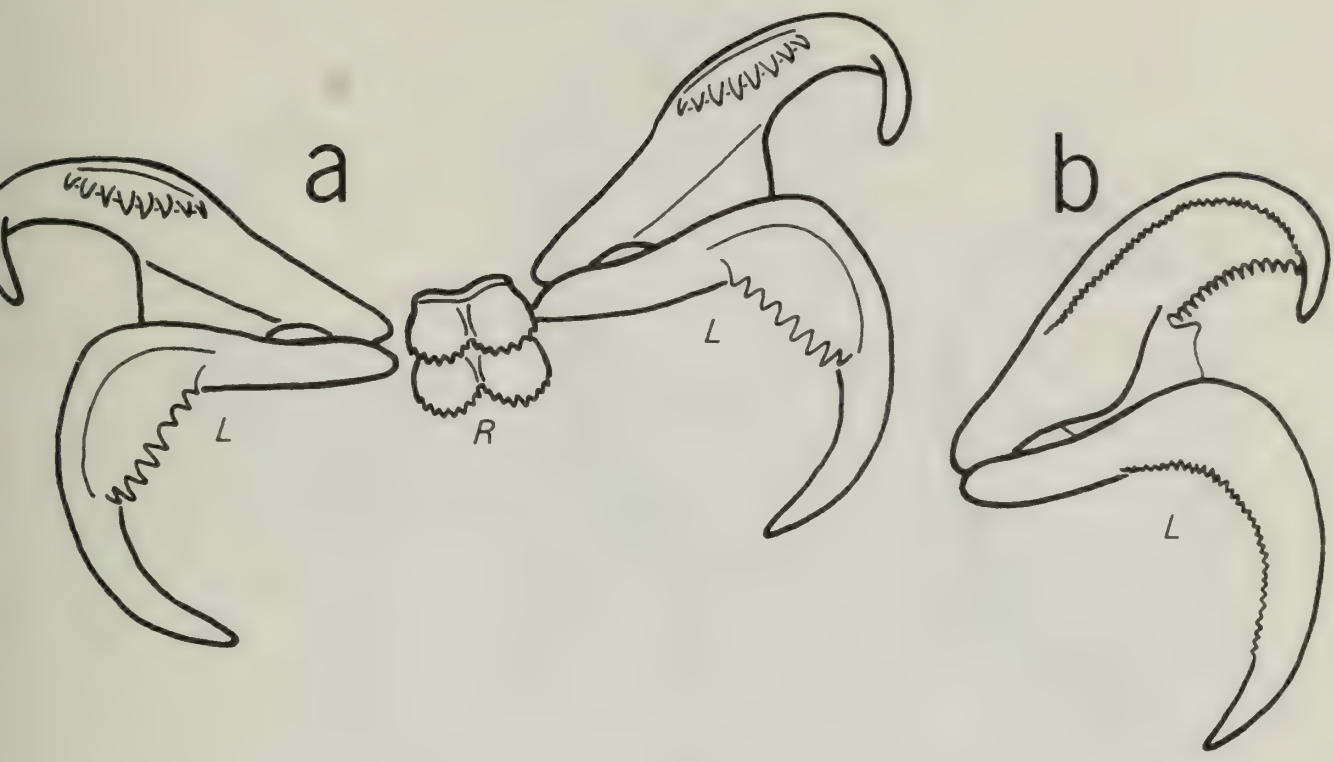

Figure 3. Acteocinid radular teeth. a. Two complete radular rows of Acteocina. b. Two lateral teeth of Tornatina. R = rachidian tooth. L = lateral tooth. Lateral teeth approximately 50 microns (0.05 mm.) in length.

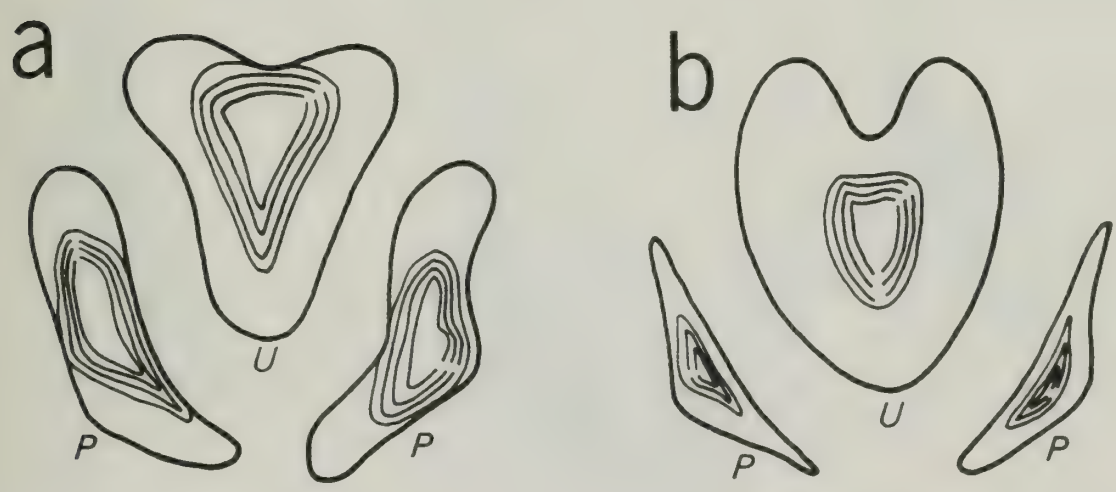

Figure 4. Representative acteocinid gizzard plates. a. Acteocina canaliculata. b. Tornatina inconspicua. U = "unpaired" plate. P = "paired" plate. "Unpaired" plates approximately 800 microns (0.8 mm.) in length.

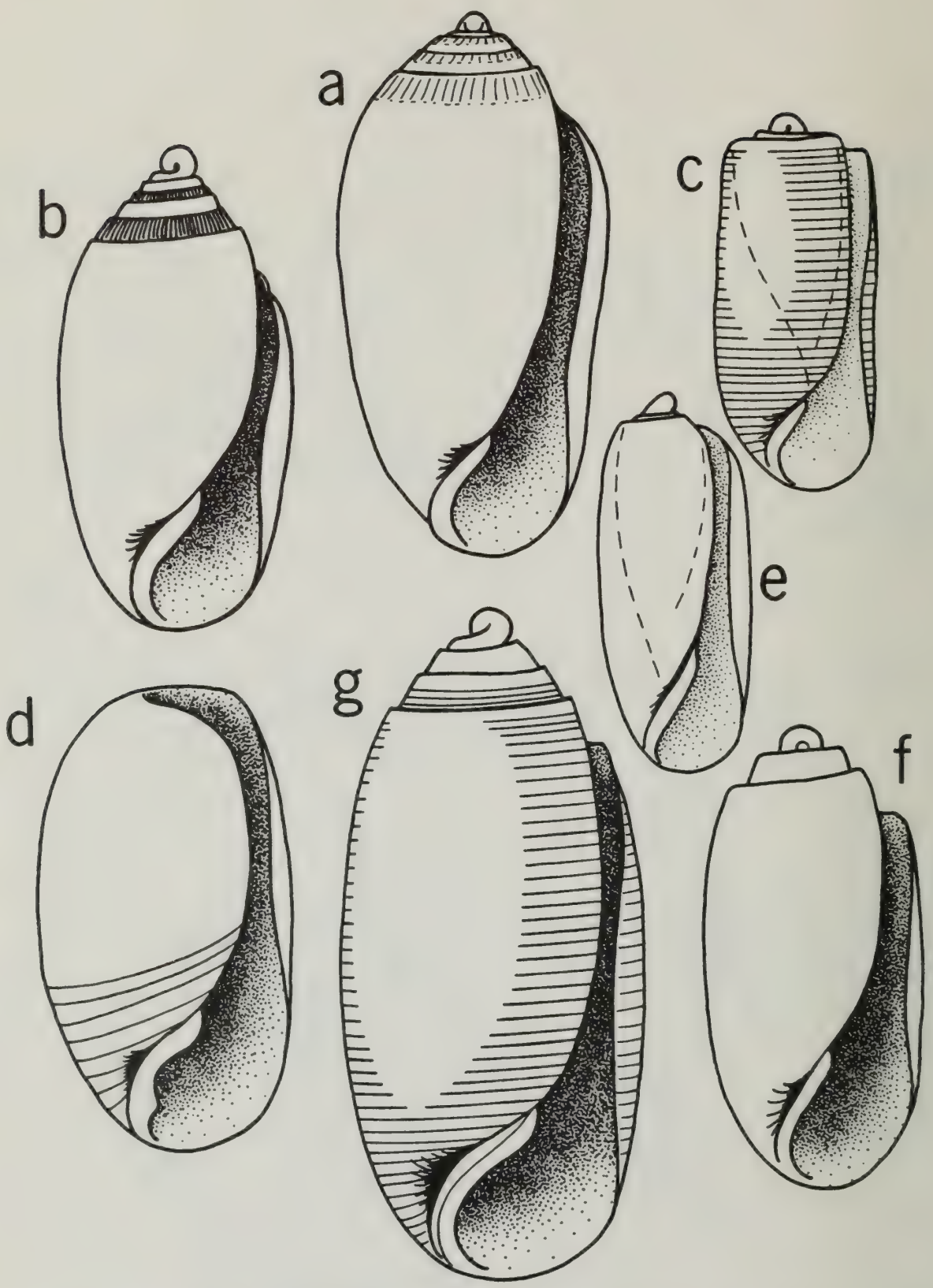

Figure 5. Shells of Texas acteocinids, drawn approximately to scale. a. Acteocina canaliculata. b. A. candei. c. A. recta. d. A. bidentata. e. Tornatina inconspicua. f. Species G. g. Species J.

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INTRODUCED POPULATION OF THE TAMAULIPAN PREDATORY LAND SNAIL, EUGLANDINA TEXASIANA, AT SAN ANTONIO

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The Tamaulipan predatory land snail, Euglandina texasiana (Pfeiffer, 1852), ranges on the Gulf Coastal Plain from deep southern Texas south to northern Veracruz (Pilsbry 1946:196; Fullington and Pratt 1974). Texas records have long been concentrated around Brownsville, Cameron Co. (Pilsbry 1946:196), but more recent records of native populations have included Harlingen, Cameron Co. (Pratt 1965); Santa Ana National Wildlife Refuge and Las Palmas Wildlife Management Area near Madero, Hidalgo Co. (Pratt 1965), and Arroyo Colorado State Park, Willacy Co. (Neck 1981). More recently, introduced populations have been observed in Corpus Christi, Nueces Co. (Adelaide Johnstone, pers. comm.) from eggs and/or snails transported with nursery stock.

Recently, I discovered a population of E. texasiana at San Antonio, Bexar Co., some 360 kilometers north of the northernmost native locality. Live adults, young and eggs were collected in Brackenridge Park near the San Antonio River in the central part of San Antonio. Date of collection was 15 March 1984. Total collection of E. texasiana from Brackenridge Park consisted of two dead and two live adults, two dead and two live young, and four eggs. Three eggs were close to hatching with substantial shell material in the embryo. The remaining egg was either freshly laid or infertile as there was no indication of embryonic development.

At this site E. texasiana was found under leaf litter and downed wood in an old drainage ditch ("bar ditch") along the side of an abandoned road currently utilized as an equestrian trail. This trail is about 11 meters wide and is parallel to and about 40 meters distant from the San Antonio River. The collection site occurs within a wooded tract dominated by plateau live oak, Quercus fusiformis; cedar elm, Ulmus crassifolia; and Texas oak, Quercus texana. Understory dominants are green hawthorn, Crataegus viridis; deciduous yaupon, Ilex decidua; greenbrier, Smilax bona-nox; and mustang grape, Vitis mustangensis. The majority of the leaf litter consists of intact leaves of Texas oak with lesser amounts of live oak and cedar elm. Soil is a dark gray clay with some small gravel present.

The extent of the E. texasiana colony at Brackenridge Park is unknown. Both collection sites (about 20 meters apart) have downed wood which is rare in this mid-city park. Most wood on the ground is removed by grounds maintenance workers or burned by park visitors. The slightly lower elevation of the remnant drainage ditch allows accumulation of

water which persists in this area because of the presence of leaf litter and downed wood.

Origin of this population of E. texasiana may be related to dumping of soil and vegetation trimmings from other areas of the park. Ornamental plants which may have been purchased from nurseries in deep South Texas are present in the park. A flood control structure, Olmos Dam, on the San Antonio River just upstream from Brackenridge Park reduces the likelihood of transport from residential yards of north central San Antonio.

The only other large snails present at the collection sites are Rumina decollata and Mesodon thyroidus. Shells of the latter species were abundant (28 and 10 shells at two microsites), but no living specimens were located. Perhaps E. texasiana feeds upon M. thyroidus. Living larger snails present included Helicina orbiculata and Glyphyalinia umbilicata. Additional snails recovered from soil samples taken at these microsites include the following: Gastrocopta procera, Gastrocopta contracta, Strobilops texasiana, Helicodiscus singleyanus, Euconulus chersinus trochulus, Zonitoides arboreus, Polygyra mooreana, and Praticolella berlandieriana.

Shells of E. texasiana from Brackenridge Park are larger than any shells collected from native brush tracts or residential yards in deep South Texas. Most shells from this latter area are less than 28 mm. in length; largest shells measured 33.0 mm. Shells of both living adults measured 33.8 mm. in height. Fullington and Pratt (1974) give the size range of E. texasiana as 26 to 36 mm., but give no localities for these large specimens. Large size of the Brackenridge Park specimens is probably due to more frequent activity periods because of slightly more precipitation, less evaporation, and greater ambient buffering due to more developed woodland (than is present in deep South Texas). Eggs of the Brackenridge Park population (length varies from 6.2 to 7.3 mm.) are somewhat smaller than eggs from native populations (length from 6.5 to 8.0 mm.).

Examination of the remnant drainage ditch on the opposite side of the old road revealed no further E. texasiana. However, one live adult Euglandina singleyana (W. B. Binney, 1892) was discovered. Shell length of this individual was 39.15 mm., well within the normal size range. Brackenridge Park is within the native range of E. singleyana (see Fullington and Pratt 1974). Collection site of E. singleyana differed from the two sites with E. texasiana in the presence of limestone rocks which are characteristic of most sites which support E. singleyana.

Collection of live E. texasiana in San Antonio with young, eggs, and dead adult shells in March 1984 indicates that this species can survive the extreme cold experienced by this area in December 1983. Lowest official temperature was -7.8°C (10°F) on 30 December.

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McLean, J. H.
1984 Systematics of Fissurella in the Peruvian and Magellanic Provinces (Gastropoda, Prosobranchia). Contributions in Science No. 354, Los Angeles County Natural History Museum, Calif. 70 pages.

McLean, J. H.
1984 The world of marine micromollusks. Terra, Vol. 22 No. 6, pp 26-30 (Magazine of the Los Angeles County Natural History Museum, Calif.; this has some exquisite color photographs of micromollusks)

IN MEMORIAM, SEWELL H. HOPKINS (1906-1984)

Dr. Sewell H. Hopkins was a professor of Biology at Texas A & M University for nearly all of his career. He specialized in parasitology and marine biology, and besides training many students in those disciplines and invertebrate zoology, he was coordinator of "Project 9" of the Texas A & M Research Foundation. That was one of the earliest intensive efforts (about 1946-1956) to study the effects of oil drilling on oyster production and other fisheries on the coast of Louisiana. It involved many specialists in diverse subjects, resulting in numerous publications as well as many valuable mimeographed reports. During his later career he was interested in the effects of dredging on oyster production on the Texas coast, serving as coordinator of several projects in that area for the U.S. Army Engineers. An extensive paper on Rangia cuneata was one of the publications resulting from that work. After his retirement in 1976 he moved to Gloucester, Virginia, which was his ancestral home. But he remained actively interested in science, publishing on the ecology and phylogeny of oysters. He was a member of the American Malacological Union. His many contributions to the biology of the northwestern Gulf of Mexico are of lasting importance. (H. W. Harry)

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FROM THE NEWS

UPI put out a story in September on some giant killer octopuses being blamed for drownings of two native fishermen on an island of Kiribati in the Tarawa group off Australia. The report said both men were dragged down and held under water until they drowned. The octopuses were said to be 9 to 12 feet long, much bigger than the 3 - 6 foot ones killed for food. What interested me also was the statement that it was a Kiribati tradition for a diver to allow an octopus to cling to him and then surface with it to kill the octopus by biting a nerve behind the eye! A spokesman said "We are obviously going to have to find another way to kill octopuses."

C. B.

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VOLUME XXI NO. 3

HOUSTON CONCHOLOGY SOCIETY

Epitonium angulatum

APRIL, 1985

The TEXAS CONCHOLOGIST is the official publication of the Houston Conchology Society, Inc., and is published quarterly at Houston, Texas. It is distributed as part of the dues to all members.

The Society holds regular meetings the fourth Wednesdays of the following months: August, September, October, January, February, March, April, and May. The meeting is held the third Wednesday in November. Meetings are held at the Houston Museum of Natural Science, Caroline Street in Hermann Park, beginning at 7:30 p.m.

The TEXAS CONCHOLOGIST is published October, January, April and July. It is mailed postpaid to regular members in U.S. postal zones. Overseas members will be charged additional postage. Only one copy will be mailed a family membership.

Dues extend from the beginning of the fiscal year of June 1 through May 31. However, the July issue of the TEXAS CONCHOLOGIST each year is the fourth quarterly due on the regular dues year beginning June 1 of the previous year. Memberships will be accepted throughout the year but will receive quarterlies of that fiscal year. Members receive meeting Newsletters and have all other privileges provided by the Society's by-laws.

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The TEXAS CONCHOLOGIST accepts contributions for publication from amateurs, students, and professionals, subject to approval by the Editor. Manuscripts should be typed, double spaced and should be in the hands of the Editor the first day of the month preceding publication dates. Photos accompanying such material are welcomed.

MATAGORDA ISLAND, 1985

By Bob Sappington

After an absence of three years, the Houston Conchology Society returned to Matagorda Island. The March field trip under the able director, Dr. T. E. Pulley, had 29 participants - men/women and children of all ages.

This was the third time for us to visit Matagorda Island, which is some 160 miles from Houston and near Port O'Connor. The first trip had some rain but did take place. The second trip was rained out at the dock, and this trip looked marginal at first.

Matagorda Island is some 10 miles from Port O'Connor so water transportation is vital to the trip. The Texas Parks and Wildlife Department does not really encourage visitors, so if you want to visit, you arrange for your own transportation. However, once you are on the island, TP&W is quite friendly and provides transportation in new pick-ups to the other side of the island where the beaches and shells lie waiting for the eager collector.

Some participants arrived Friday night, and a few had literally shelled their way from Houston. The Tarpon Inn served as Headquarters and has always been quite nice to our group. The remaining participants got up early Saturday morning and drove down from Houston.

Assembly was at 9:30 Saturday morning on La Pesca's dock. Sure enough, the weather was overcast and foggy, and there were anxious moments. Finally, the first boat, a shrimper piloted by Captain Delbert Scott, left with half the group. Captain Scott inched and edged his way down the Intercoastal Canal and out into the bay. Relying on his knowledge of the waters, an occasional buoy, and a sporadic channel marker, we made our way to Matagorda Island almost on target. The second boat followed shortly, and by eleven all were on their way to the beach.

The day remained foggy and overcast but mild all day. The Parks people dropped the groups by pick-up load down the beach over a two mile stretch.

The shelling crew had arrived and was taking positive action. The battle was now joined — there was no turning back.

There was Helen Eberspacher with two sacks worn like bandoleers so she could pick up shells with both hands, Lonnie and Jan Hobbs trundled their "dolly" loaded with equipment down the beach. The costumes and equipment were bizarre, outstanding, practical, and impractical. It was all there, and this was before people started exchanging goodies for lunch, an even more outstanding activity.

The beach was a beehive of activity for several hours ranging from shouts of excitement at a new find to howls of disappointment upon proper identification.

A number of new collections were started. Dr. Pulley and Ed Frazer

were in serious competition to see who could collect the best selection of "hard hats" washed ashore. Lauretta Marr had an encounter with a jack rabbit who was attracted to husband Ron's straw hat. Everyone found several dollars on the beach (sand that is).

While no spectacular finds were recorded, a number of good shells were collected. Judy Endsley was pleased with wee Epitonium, two of which were identified as Epitonium novangliae.

About 3:30, we began loading into the pick-ups to leave the foggy beach. Two miles later on the other side, it was a magnificient day with blue skies and still waters. The boat trip back was a delight. Captain Scott had boiled shrimp and began serving refreshments plus letting one of his nets down to show how they operated. We assembled about 5:30 p.m. on the patio of Mrs. Howard Hanks' home for a real "show and tell" and to exchange experiences.

Mrs. Hanks is a long time member who has a home in Port O'Connor. Her hospitality was much appreciated. After show and tell a number of us visited Mrs. Hanks to see her collection. Those who were at our last meeting and heard Constance Boone talk about rare shells will remember that Mrs. Hanks has a rare left handed Busycon spiratum plagosum which was on view. (This was collected by Mrs. Hanks at Port O'Connor.)

A partial listing of the shells collected would include: Dinocardium robustum, Dosinia discus, assortment of tiny Epitonium, Oliva sayana, Architectonica nobilis, Janthina janthina, Donax, Dentalium, Phalium granulatum, Spirula spirula, Raeta plicatella, Polinices duplicatus, and lots of valves to help you start an identified Texas collection.

Dr. Pulley revealed at "show and tell" that low tide was at 7 a.m. Sunday morning and there would be an opportunity to dig for angel wings in the mud flats. He said there were three kinds and had scouted the situation and could almost guarantee all could be found.

There were groans from those who were leaving that evening and shouts of glee from those who were staying.

Sunday morning 7:00 a.m. came and our intrepid collectors assembled once again. Although fewer in number we did have about a dozen of Houston's best. With one exception, who shall remain nameless, all found angel wings including Cyrtopleura costata, Barnea truncata, and Petricola pholadiformis. We did not get live Pholas campechiensis but found many valves.

Several nice busycons inhabited by crabs were also found. Beach drift yielded good pairs of bivalves such as Mactra fragilis, Solen viridis and Diplodonta.

By 8:30 a.m., all collectors had their limit, and we departed for breakfast and the return trip to Houston.

Although no records were set and no rare shells were found, all agreed it had been one of our best trips. Fun and fellowship was outstanding as we became better acquainted with both old and new members.

NOTE ON BEACHED COCKLE VALVES

By Jan Hobbs

At our Matagorda field trip "show and tell", we compared Atlantic Cockle (Dinocardium robustum) valves (which were plentiful) after listening to an explanation by Dr. Pulley why certain valves are selected for the beach. He told how the rip currents begin forming between sand bars as water spills over the bars faster than it can flow out. The current flows parallel to the beach between bars until it finds a cut to return to the sea, when it becomes the dangerous rip currents (not undertow). This current between bars sorts valves according to the direction it is flowing. The left halves are caught and sent one direction (this time to the beach) and the right halves are carried in the other direction (in this case farther offshore). Sure enough, we all had one side only, except in the few cases of whole shells still attached together.

FIGURE LEGEND

Fig. 1 Helen Eberspacher's attire attracted much atention from other field trip participants. Her happy smile is probably prompted by the collection of a really Texas-sized Polinices duplicatus.

Fig. 2 Field trip leader, Dr. Thomas E. Pulley, spent most of his time collecting hard hats and other items, cast up on Matagorda Beach.

Fig. 3 Our new members, The Ed Frazers, collected hard hats, rope, and anything remotely looking like a shell! Ed claimed Connie Boone pointed to a wee Epitonium in the drift line which he never could see. Thereafter, he tried to find his own, even to the point of once picking up a bird dropping which he thought was E. angulatum.

Fig. 4 Three members, Claudia Wagner, Luana Huggins, and Merle Kleb are trying to decide if it is worth getting wet and muddy to go out and dig angel wings on the flat at Port O'Connor on the March field trip. Luana is holding a small angel wing given her by a member out digging. Eventually, all of them waded out to join the others deep in mud holes.

Fig. 5 Our new members, Pat and Bob McElroy, were certainly two of the most enthusiastic diggers for the several kinds of pholads. You dug a hole in the sandy clay, layered off the mud and fished around to find the holes to follow down and retrieve the specimens. All were small, but there are very vew places you can dig some of the species easily.

Photos by Bob Sappington

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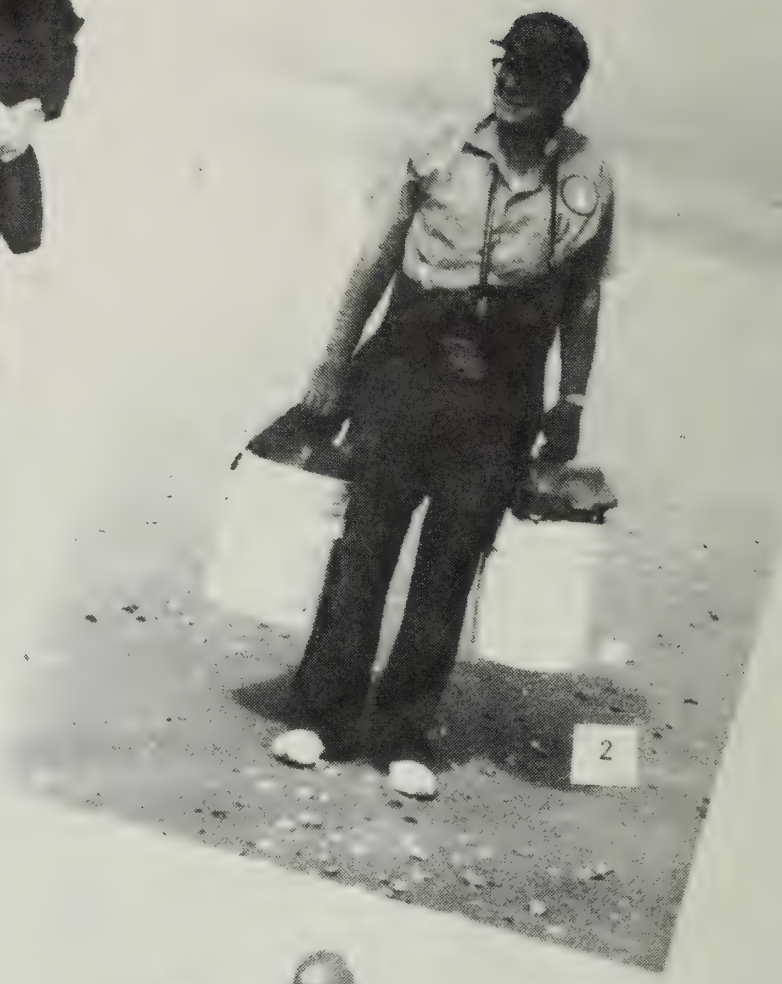

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A SHELLING TRIP TO GUADELOUPE

By Judy Endsley

Our original intent for choosing to spend our January vacation at Caravelle, the Club Mediterranee on Guadeloupe in the Caribbean, was for my husband to enjoy the Club amenities while I was out shelling. As it turned out, the amenities of the club were so distracting that I had to constantly prod myself to get out and do some shelling. The island of Guadeloupe itself proved distracting; it is a beautiful green butterfly-shaped island situated between Antigua and Dominica. Guadeloupe is actually two islands, separated by a narrow salt water channel called the Riviere Salee. The northeast island section is called Grande-Terre; it is flat and covered with sugar cane fields. The southwest island section is called Basse-Terre, and it is very mountainous, lush and tropical; it is dominated by a majestic dormant volcano called La Soufriere. It may seem strange, if you understand French a little, to call the flat island Grande-Terre (great land) and the mountainous island Basse-Terre (low land) - the names have more to do with the trade winds. Grande-Terre faces the highest winds, while Basse-Terre is on the leeward side and has "lower" winds.

Guadeloupe and Martinique, with their numerous associated outlying islands, together form a "departement" of France, and have been so since 1946. These islands have been a part of France since 1815. Guadeloupe itself was discovered in 1493 by Columbus on his second voyage to the new world; he named the island after the monastery of Guadelupe in Estremadura, Spain. Attempts to colonize the island, however, did not succeed until 1635, when the French finally subdued the fierce Carib Indians who lived on the island. The British had control of the island briefly in the late 1700's, but traded it back to France in exchange for their rights in Canada. The main exports of the island today are sugar, bananas, and a very good rum.

The Club Caravelle is situated on perhaps the prettiest beach on the island, St. Anne's beach, within walking distance of the fishing village of St. Anne. St. Anne is located on the southern side of Grande-Terre. Unfortunately, pretty beaches do not always mean good shelling. We had a little luck on this beach, however, finding plenty of *Cittarium pica* (I have a whole growth series), *Nerita versicolor*, and *N. tessellata*. I was surprised not to find any *N. peloronta*, as these are usually associated with the other nerites mentioned. *Littorina ziczac* was also plentiful, as was *L. meleagris* and *Nodolittorina tuberculata*. I also found several *Astraea tuber*. Other shells found were a single beautiful half of *Lima scabra*, *Leucozonia nassa* and *L. ocellata*, *Purpura patula*, *Tegula excavata*, several well worn and crabbed *Coralliophila caribea*, *Codakia orbicularis*, *Mactra fragilis*, *Columbella mercatoria*, and *Acmaea pustulata*. I also found a good-size (but somewhat battered) juvenile Queen conch (*Strombus gigas*). The most impressive find was on the fourth day of snorkeling: my husband, who is not a sheller, but who has much better eyes (and lungs) than I do, came up with two heavily encrusted vase shells, both live, about 77 mm. long. They were found right next to each other, and were almost a perfect pair, except that one had a slightly bent spire. Later cleanup and identification proved them to be the uncommon Spiny Caribbean Vase shells (*Vasum capitellus*), with the distinctive orange

mouth and three folds on the columella.

There were almost daily snorkeling trips to the reef in front of St. Anne; we were able to sign up for one. Due to somewhat rough seas (one couple, overcome with seasickness, swam into St. Anne rather than ride the boat back) we were only able to stay about an hour. The currents were quite strong, so it was quite a struggle to swim out on top of the reef. I didn't find very much on the reef, but the captain of our boat found a beautiful (but dead) Scotch Bonnet. I couldn't find anyone at the club who was knowledgeable or even interested about shelling, so I was not able to get much information on good local shelling spots. I was told that the shelling would probably be better on the eastern (Caribbean) side of the island, and I believe there was some truth to this statement. On our fifth day we took a snorkeling excursion to Pigeon Island, which is a little island on the eastern side of Basse-Terre. We took a glass bottom boat out to the reefs by the island, and the snorkeling was beautiful. Pigeon Bay, however, is a nature preserve, and we were not allowed to collect or even touch anything there. My eyes aren't very good underwater, but I did see a Simnia on a sea fan, a Lima scabra, and several coral and algae-encrusted gastropods which could have been anything. I sifted through the beach drift on the beach where the glass bottom boats embarked from, and in two hours there collected 22 different species (all dead, of course), including two very fine juvenile Queen conchs (80 and 50 mm.). This was two more species than I had collected in four days of snorkeling and rock-turning at St. Anne. Most of these were different species from those at St. Anne's beach. The list includes Strigilla carnaria, Anadara notabilis, Fissurella nimbosa, F. augusta, Hemitoma emarginata, H. octoradiata, Acmaea pustulata form pulcherrima, A. antillarium, Arca imbricata, Divaricella quadrisulcata, Aquipecten gibbus, Terebra cinerea, Laevicardium laevigatum, Trachycardium muricatum, Glycymeris pectinata, Bulla striata, a very worn Polinices lacteus, a tiny but perfect Olivella verreauxi, and Donax denticulatus. Shells which were found in common with St. Anne's beach include the Strombus gigas, Tegula excavata, and plenty of small Cerithium litteratum. In addition, there were a couple of other limpets which I haven't yet identified, and a large freshwater snail. I didn't dare collect anything live from that beach; as it was, people looked askance at my little collecting bag when I returned to the bus, until I explained that dead empty shells couldn't reproduce, and that it probably wouldn't harm the nature preserve if I picked a few up.

There is another Club Mediterranee on Guadeloupe, called Fort Royal - this club is properly located on the eastern (Caribbean) side of the island, and if I had to do the trip over again I would probably choose to go to this club. The Club Caravelle was lovely, though; the food was quite French and very good, with a Creole buffet on the beach at lunch every day. Half the beach is dedicated to nude sunbathers, and the other half appears to be mostly topless, so if you have any inhibitions about nudity this is not the place for you. There were plenty of activities at the club; these included picnics, sailing, windsurfing and kayak lessons, aerobics and yoga classes, and a nightly cabaret show as well. My husband Barry and I wanted to practice our French so we elected to take a couple of excursions of the island; one was a tour of the island with a wonderful Creole lunch at Chez

Paul in Matouba, and the other was a morning shopping spree in Pointe-a-Pitre, which is the main city of the island. We didn't find a lot to spend money on, outside of the duty-free shops, but the native market in the center of the shopping district was very colorful. One note — the local people generally do not like to have their picture taken, so I trained my lens instead on the displays of local produce.

I don't know if going to a Club Mediterranee on a lovely beach somewhere is the best way to collect shells, but it certainly was a great vacation, and I definitely intend to do some more research on this thesis. If we had had some idea of good shelling spots on the island, we probably would have rented a car for the day and done some touring. We learned from our bus excursions, however, that driving on Guadeloupe is only for the stout-hearted; the roads are narrow (but well maintained) and the accident rate is the highest in France. We feel the only mistake we made on this trip was staying just one week, and the worst part of the trip was coming home. Isn't that the way all good vacations should end?

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AMERICAN MUSEUM TOPS SIZE RECORDS

The American Museum of Natural History in New York has more giant records of seashells than any other institution in the world, according to the newly issued 1985 WORLD SIZE RECORDS. The prestigious British Museum, with 28 world records, comes in second, while the Los Angeles County Museum is a close third with 23 record sizes.

This new supplement of Wagner and Abbott's Standard Catalog of Shells has just published results from 21 museums and over 300 private collections. The largest known Glory-of-the-Seas Cone is 6 inches long [this specimen is owned by Natalie Howard of our club]; the biggest Chambered Nautilus, owned by a lady in Florida, is 10 inches, and can you imagine a cowrie from off the Dry Tortugas 7 1/2 inches! A New York collector owns the largest known Triton's Trumpet which is over 16 inches.

Biologists believe that most super-sized living specimens have grown beyond their reproductive stage in life. Collecting them does not endanger the species. Among collectors, the value of a world size record may run from 5 to 10 times that of a normal specimen. The 1985 WORLD SIZE RECORDS was published by American Malacologists, Inc., P.O. Box 2255, Melbourne, Florida 32902. Including mailing, the cost is $7.00 for this 32-page booklet listing over 1,000 up-to-date maximum size records.

[The Editor notes that very few records have been turned in by Texas collectors. For instance, I was amazed to read that the record size Amaea mitchelli (specimen actually from Texas) is owned by a Floridian! Theresa Stelzig of Corpus Christi does own the record sized Lyropecten nodosus, the Lion's Paw. Dr. T. E. Pulley can officially measure a shell for you to submit an entry. Our club library will have this new edition.]

SEARCH AND SEIZURE

By Constance E. Boone

BONAIRE OR BUST

For some years I have dreamed of going to collect my own Voluta musica. I have many in my collection from Aruba and some other lower Caribbean islands, but I wanted to collect one myself.

Therefore, in December when Barbara Hudson and I declined to go to the Philippines again just before the holidays, we decided to go on Kirk Anders' trip to Bonaire in mid January. We expected it would be warm there, and Kirk is the only one allowed to go into Bonaire with a group to collect shells. Shelling is banned there normally. Kirk has been going only every two years.

Another club member, Ruth Goodson, also decided to go.

The day we were to leave, January 13th, was that miserable day when the streets froze, and we had sleet and snow. The night before as we listened anxiously to the weather forecasts, my son kept telling me that I should go out and spend the night at the airport hotel while I could still get out there. My reasoning was that if it was that bad the next day the plane wouldn't go anyway.

We got to the airport and found our plane delayed an hour and a half. We worried quite a bit; we had only two hours between planes in Miami to get the ALM/KLM flight to Bonaire. We did as the airline representative suggested -- we checked our luggage all the way through to Bonaire.

We loaded the plane. Our seats were over the wing, and we sat on the ground as the ground personnel proceeded to hose down the icy wings with salt water.

We got to Miami with little time to spare. We got to the Dutch airline desk and met the pilots of our plane ready to depart on a bus to an open space at the end of the runway. It seemed there was no terminal base for that plane that day. We were pretty well assured we would not have our luggage on that plane, and we didn't. (It arrived 2 days later.)

Just before we had departed from Houston, I had received a call from Kirk who said he had been in the hospital for tests and would have to return. He said a couple, knowledgeable on shelling in Bonaire, having been there twice before, had agreed to take over the trip. Bob and Alice Pace are from Miami and specialize in Caribbean shells. They had signed up anyway to go on this tour. It ended up that we were only seven persons in all. Bob had not been given the age and vital statistics sheets that we had signed for Kirk. He had been told we were in our "50's". You can imagine his surprise when he found that we were all over 60! He is in his 30's.

Everyone, except Barbara and me, were certified scuba divers. We were the only ones not to have wet suits along.

The first day we shelled around the Bonaire Beach Club Hotel, and we prepared to go night shelling for Voluta musica. With no luggage yet, we shared garments and rented or bought underwater flashlights. That night after a late dinner, we finally started for Lac Bay. It was windy, and the shallow water was ripply. Barbara and I had flimsy clothing for the very cool night. The water was cold! We tried wading around, but we weren't seeing anything. Bob was snorkeling and immediately began to find the music volutes. I couldn't stand it; I donned snorkeling gear, took my flashlight and held my breath and plunged in. So what if I got pneumonia. My sons say to live dangerously anyway; this was as good a way as any to obey their instruction for an exciting life. It took me only about a minute or two to yell that I had found a volute. It took Barbara only about one more minute to get her snorkel and plunge in, too. So we all did get music volutes that night — not as many as Bob says they have collected in the past, but enough to satisfy my yearning to collect this shell.

One more night during the time we were there, the most ardent collectors went back to collect the volutes. I DID NOT GO. Barbara Hudson borrowed Ruth's wet suit and went. They got a few more, but I had already by that time collected one in the daytime. I felt I had done my thing.

Bonaire is a laid back little island 50 miles north of Venezuela, 30 miles east of Curacao, and 86 miles east of Aruba. It is part of the Netherland Antilles. Since I have been home I noticed that a dive shop owner was quoted in the travel section of the newspaper as saying that the "in place" for divers was Bonaire. There were many divers there. The underwater reefs are said to be spectacular. But you are not allowed to collect shells or coral on these dives.

We worked very hard to get the shells we did get. Bob and Alice Pace could not believe the scarcity of even common shells they had collected on other trips to this island. Explanations ranged to the fact that there had been a very bad storm last Fall in the area to the fact that divers had increased traffic on the reefs. The natives, of course, have eaten the mollusks, and at this time they are not allowed to collect Strombus gigas because it has almost disappeared. We saw only a few live juvenile rollers. There is a research station there with an ongoing experiment to raise this species. Bob said there were many dead juveniles in the waters along the coast where that station is housed.

This island is famous for the flocks of flamingoes. We saw many, and it was a joy to be on a beach and look up and see them wing over.

The island has an industry to leach out salt from the salt water in open salt pans. The coarse salt is heaped high in mounds as it is taken off the pans and readied for shipment to be refined.

Much of the island is now a national park. There are many birds and cactus that are worthy of study here. I have been in Mexico and our West and have never seen so much tall cactus as we saw here. The fence-post-size cactus is used for fencing. Most of the interior of the island is rather bare. Only the resorts on the edge of the bay

side have lush tropical flowers and palms. There are abandoned concrete buildings on some bays that were someone's dream of resorts that didn't make it. We understand that the buildings fell apart at one place.

Bob Pace has sent me a listing of the shells he got, and I am publishing this here for your information. I know that he has recommended to Kirk that no tour be planned for shelling for several years. The fauna is much reduced right now. We did get the volutes we went after. We did get most of what Bob lists, except he was the only one to get the lovely Strombus gallus. He is like a fish in water, and he never gives up. While the rest of us were shivering, he stayed with the night collecting when he got the two Strombus.

Barbara Hudson brought home a suitcase full of drift. I had a ball one day on our trip to Klein Bonaire, the little island in the bay off our hotel area when I found a coral rock snorkeling that seemed to be covered underneath with tiny shells. I lugged that rock to shore and sat there in the sand and rain picking off Epitonium, Rissoina, Arene, turrids, etc. Therefore, I know that I have added a small number of species to my collection, and that always makes me happy. Ruth Goodson did some free diving with Bob and got a small jar full of Pecten, Thais, Bursa, Cypraea and others. That pleased her.

The three of us from Houston did not get sick, although Ruth would not scuba after she stopped up a bit with sinus. Bob and Alice Pace were doing their first dives after certification, and they did a lot the last few days of our trip. Both were very ill with pneumonia and other viral infections when they returned home. We are sorry about that, because both tried very hard to make our trip successful. We feel it was.

Bob's log:

Sunday, 13th, 1st day, arrival at Bonaire. Night diving (only Bob and Ruth) behind Hotel Bonaire. Nothing to speak of -- a couple of Hyalina avena, three species of turrids, Olivella dealbata, baby Vasum capitellum (both live/dead crabbed), Nassarius albus (one specimen), and a couple of dead Terebra (species to be named/or identified). Bob and Ruth tried.

Monday, 14th, 2nd day, collecting around hotel. Behind hotel off beach front — a few Vasum capitellum, Fissurella barbadensis, Cittarium pica, Astraea tecta (large, found on wall of North dock), Hyalina avena, Olivella dealbata, more of the unidentified Terebra, one fresh dead Voluta musica, a few Coralliophila caribaea, Pisania auritula and tincta, Engina turbinella, Pisania pusio, Conus mus, Mitra barbadensis, Thais deltoidea, Drupa nodulosa, one dead specimen of Alice's little Murex, small Bursa thomae (but adult), Trivia pediculus, 2 specimens of Cypraea spurca acicularis, and 1 specimen of Cypraea cinerea, 1 wentletrap species ?, dwarf Cerithium litteratum, Nerita peloronta, N. tessellata (small), N. versicolor, Littorina mespillum and L. meleagris, 1 dead Pyramidella dolabrata, about three species of

bivalves (several specimens of each species), 3 dead Dolicholatirus ernesti, and one live Leucozonia leucozonalis. All were in the water or around the water's edge here. Long list but poor pickings compared with other trips.

Night dive at Lac Bay [this was really snorkeling]. Connie, Ruth, Barbara, Alice and Bob -- Voluta musica (but not like previous trips), one live and one dead Natica canrena, one live Strombus gallus, a couple of unidentified Marginella species, (maybe someday new species?), also a couple of the Terebra species, Natica livida (dead and small but colorful), and a handful of Olivella dealbata. Also about three species of chitons and a few live Jaspidella jaspidea.

Tuesday, 15th, 3rd day, collecting at Bachelor's Beach, salt pans at piles and salt loading pier, slave huts, lighthouse, sea intake, and Sorobon of Lac Bay -- Near the slave huts found an area that had both beachdrift shells and tide pools with rocks. Nerita peloronta, N. tessellata, N. versicolor, and Puperita pupa, Echininus nodulosus, Tectarius muricatus, Fissurella barbadensis, Arene tricarinata, perhaps another Arene species, a couple of unidentified wentletraps, Littorina nebulosa (Connie, you were right on the name), Littorina mespillum and L. melagris, one dead but nice color Heliacus cylindricus, a few but not many of Planaxis nucleus, and a million of Planaxis lineatus, Cerithium litteratum, dead, Epitonium lamellosum in the beach drift, arks, trivias, marginellas, both Planaxis, nerites, olivellas, etc.

Next stop sea intake -- Conus mus, Conus regius, Murex bellus (dead a very long time), dead Pyramidella dolabrata, Olivella dealbata, some Jaspidella jaspidea, two species of arks, Tellina fausta, Diodora listeri, Fissurella barbadensis, Thais rustica, a couple of Anachis (dove shells), one dead but gem Nitidella laevigata, several Nitidella nitida, Mitra barbadensis, one Mitra nodulosa, several Hyalina avena, a couple of turrid species, two Astraea caelata (crabbed/small), a couple of dead Bulla striata. The whole gang was here for this killing. Again somewhat of a list but not great. Also two species of Tegula.

Final leg of this day's journey -- Lac Bay. Music volutes, Natica canrena, Natica livida, Olivella dealbata, one live Oliva reticularis (others also got one or two), Jaspidella jaspidea, one Hyalina avena, two other Hyalina species, a couple of Triphora species, the Terebra things again, and fresh dead Epitonium lamellosum.

Wednesday, 16th, 4th day, Karpata, Meer (flamingo sanctuary), Onima (Indian inscriptions), then back to west side of Lac Bay for Melongena. Then to Lagoen for Murex. One Voluta musica, Olivella dealbata, Jaspidella jaspidea, two Dolicholatirus ernesti, two Leucozonia leucozonalis, two Cypraea spurca acicularis, one live specimen (small) of Alice's little Murex, a couple of Vasum capitellum. Moved on to next collecting spot which was the part of Lac Bay where the Melongena were, also one Voluta musica and several dead Engoniophos unicinctus. Lagoen

produced nothing but dead Murex brevifrons [Alice got one live!] and live Nassarius vibex.

Thursday, 17th, 5th day, Downtown Kralendjik, then to Flamingo Beach Hotel for lunch and shelling -- One dead Alice's little Murex, one Cypraea cinerea, Cypraea spurca acicularis, Hyalina avena, Olivella dealbata, Engina turbinella, Pisania tincta, Pisania auritula, Pisania pusio, Cerithium litteratum, color forms; baby triton trumpets, Bursa thomae, Bursa granularis cubaniana, Terebra species (the two unidentified species) and several false cup and saucers, two species of chitons, Astraea tecta, Arene muricata (Reeve, 1843).

Night dive at Lac Bay, volutes and one Strombus gallus.

Friday, 18th, 6th day, Boat trip to Klein Bonaire -- Two species of chitons, Arene tricarinata, terebras, one Arene muricata, Nassarius vibex and N. albus, Olivella dealbata, several species of Rissoina, two wentletrap species, Hyalina avena, Engina turbinella, Mitra barbadensis, Mitra nodulosa, Jaspidella jaspidea, Fissurella barbadensis, Natica livida, three Dolicholatirus ernesti, and Vasum capitellum, Epitonium dalli dead and perhaps another Arene.

Saturday, 19th, 7th day, Around the hotel and back to beach area near slave huts -- We drove to Cai but found nothing. Went back to tide pool area near slave huts. Found more Arene tricarinata, all four nerites, all five Littorina, Vasum capitellum, fresh dead Epitonium dalli, one Epitonium lamellosum, both Planaxis and those Terebra again.

There were a few other species I list that Bob simply forgot or we acquired from him. I was pleased with Vexillum puella.

I brought home a container of oysters in alcohol, taken from the mangrove roots in Lac Bay for Dr. Harold W. Harry's continuing study. I thought I was collecting Crassostrea rhizophorae, but Dr. Harry tells me they were all Ostrea equestris. They were on roots that were in water about waist deep around the mangroves, and all I collected were on roots that were hanging free in the water and not imbedded in the mud. Dr. Harry tells me that the oysters had covered over the ends of the roots and they couldn't anchor.

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AMU TO MEET IN JULY IN RHODE ISLAND

The American Malacological Union's annual meeting will be held from July 28 - August 2, 1985, at the University of Rhode Island at Kingston, Rhode Island.

Dr. Melbourne Carriker, president, has announced plans for three symposia: one on molluscan egg capsules, organized by Jan Pechenik, a second on molluscan radulae, organized by Bob Bullock and Carole Hickman, and a third on ecology of freshwater molluscs, organized by Eileen Jokinen.

Housing will be in the university dorms. Information on registration and reservations will be available to HCS members in April.

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CEPHALOPODS OF THE NORTHWESTERN GULF OF MEXICO

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INTRODUCTION

The cephalopods of the Gulf of Mexico were first documented in a publication by Dr. G. L. Voss (1956) based upon an extensive collection available to him at that time. Aside from incidental scientific reports of other species occurring in the Gulf, a more recent faunal survey was completed by Lipka (1975) in a study that concentrated upon species that occurred in the oceanic waters within the Gulf. Voss listed a total of 42 species within the Class Cephalopoda, and Lipka was able to increase the number of species in the Gulf to 84. However, it should be stressed that there are probably more species than this in the Gulf of Mexico, but it will be a matter of time before more rigorous collecting efforts turn up new species. Furthermore, the ever-changing status of cephalopod systematics makes it impossible to deliver a definitive number of species in any region of the world (Roper, 1983).

No one has attempted to list or describe cephalopods occurring only in the Northwestern Gulf of Mexico and this article does not hope to fulfill this requirement. What I do hope to accomplish is to present to the reader some idea of the number of species that are thought to occur along these coasts, as well as some suggestions of where these animals might be observed or collected by someone who is shore-bound or able to venture only short distances in small boats. This automatically excludes all cephalopods that inhabit the "oceanic realm" within the Gulf. In oceanographic terms, that means animals that inhabit waters beyond the continental shelf greater than approximately 50 meters deep. Of course, the Texas and Louisiana coasts have a very extensive and broad continental shelf area ranging between 40 and 100 miles offshore.

Unfortunately, there is rather little to see for the shell collector who inhabits Northwestern Gulf beaches. There is generally no part of an octopus that may be washed up on a beach once the animal has died. The only hard part in the squid is the pen or gladius that is a cartilage-like structure supporting the body; however, these do not float very well and they are seldom found on beaches. The cuttlebone of the cuttlefish does float and is found on beaches throughout the world, but as recently described by Boone (1984) these cuttlebones represent animals that lived and died on the African or European coasts and floated with currents to the Gulf of Mexico. However,

around jetties, wharves and shallow water one can occasionally observe a live octopus feeding and foraging, as well as the small bay squid Lolliguncula brevis (Fig. 1) that is found throughout estuaries and bays along the Gulf Coast. Furthermore, fishermen often capture both squids and octopuses by rod and reel, and it is fascinating to catch even a glimpse of these remarkable animals while they are alive.

In the following sections I will outline briefly the general groups of cephalopods, their numbers, and give some idea of their occurrence in the Gulf of Mexico. When possible I will state which are known to occur in the Northwestern Gulf.

SUBCLASS NAUTILOIDEA - the living fossil Nautilus is not found in the Americas, but only in the Indo-Pacific region.

SUBCLASS COLEOIDEA - these represent the modern day living cephalopods.

ORDER SEPIOIDEA - these are squid-like creatures inhabiting all of the world's oceans. At present there are thought to be five families, 18 genera and 192 species world-wide. Of these, eight species have been found in the Gulf of Mexico; however, none of them are commonly found along the coastlines. Occasionally the shell from Spirula spirula may be found washed up on beaches.

ORDER TEUTHOIDEA - these are known as the "true squids." World-wide there are approximately 25 families, 84 genera, and 242 species. Fifty-six species are known to occur in the Gulf of Mexico, but all but five of these species occur in deep oceanic waters. Three species - Loligo pealei, Loligo plei, and Lolliguncula brevis - occur commonly along the Texas and Louisiana coastlines (Fig. 2). The small bay squid, Lolliguncula brevis, is particularly abundant in bays, estuaries, and nearshore. It is the only cephalopod species known to tolerate lower salinities down to 16 parts-per-thousand (ppt). This species often takes baited hooks and is caught commonly by the local bay and near-shore shrimp fishermen. It is commonly sold in bait shops as "white squid." Occasionally one can observe them under bright lights off piers and wharves where fishermen congregate. All three species are caught occasionally by shrimp trawlers and a recent scientific article (Hixon et al., 1980) analyzed some of the market considerations for better utilization of these species by local fishermen.

ORDER VAMPYROMORPHA - this is a very unusual and rare deep sea octopus-like creature. It has been found in the Gulf of Mexico, but only in the deepest water well away from the coastline.

ORDER OCTOPODA - the redoubtable octopus is most familiar among the cephalopods and has been the subject of folklore for many centuries. Unfortunately, the taxonomic problems posed by an animal with no hard parts has resulted in a very confused state over the number of species and their accurate identification. Coloration of live animals is an excellent way to tell species apart, but this is not practical or useful in preserved specimens. Furthermore, only recently have the body patterns of these animals been described in the scientific literature. World-wide there are 12 families, 43 genera, and approximately 220 species. In the genus Octopus alone there are over 108 species. Nineteen species are known to exist in the Gulf of Mexico. Of these, Octopus vulgaris and Octopus burryi occur along the coastlines in the Northwestern Gulf of Mexico with O. vulgaris particularly abundant on rock jetties from Port Aransas southward. The small pygmy octopus, Octopus joubini, is thought to occur along the South Texas coast near South Padre Island, but there are no known specimens from that area in university museums. Octopus defilippi has been found in the larval form on the outer continental shelf, but is fairly rare in the Northwestern Gulf.

DISCUSSION

It is obvious from this brief synopsis that there are few species of cephalopods likely to be encountered nearshore in the Northwestern Gulf of Mexico. However, scientists do not have a clear picture of the occurrence, distribution and abundance of the cephalopods in this area. The nearshore octopuses in particular have not been looked at very carefully, and amateurs and professionals alike are encouraged to collect specimens when possible and to gather as much data as they can to help confirm identifications. Color photographs of the live animal, information on date and place of capture, and habitat structure are extremely helpful in making the specimens useful to systematists. For those interested in a wonderful account of the many fascinating aspects of octopuses, one should consult Lane (1974) who has assembled a very readable book that is found in many local libraries. Other notable popular accounts have been provided by Voss (1967), and Voss and Sisson (1971) in National Geographic Magazine, and by Cousteau and Diole (1973).

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Fig. 1 - The bay or brief squid Lolliguncula brevis Blainville photographed in laboratory tanks. This species is common along the Gulf coast.

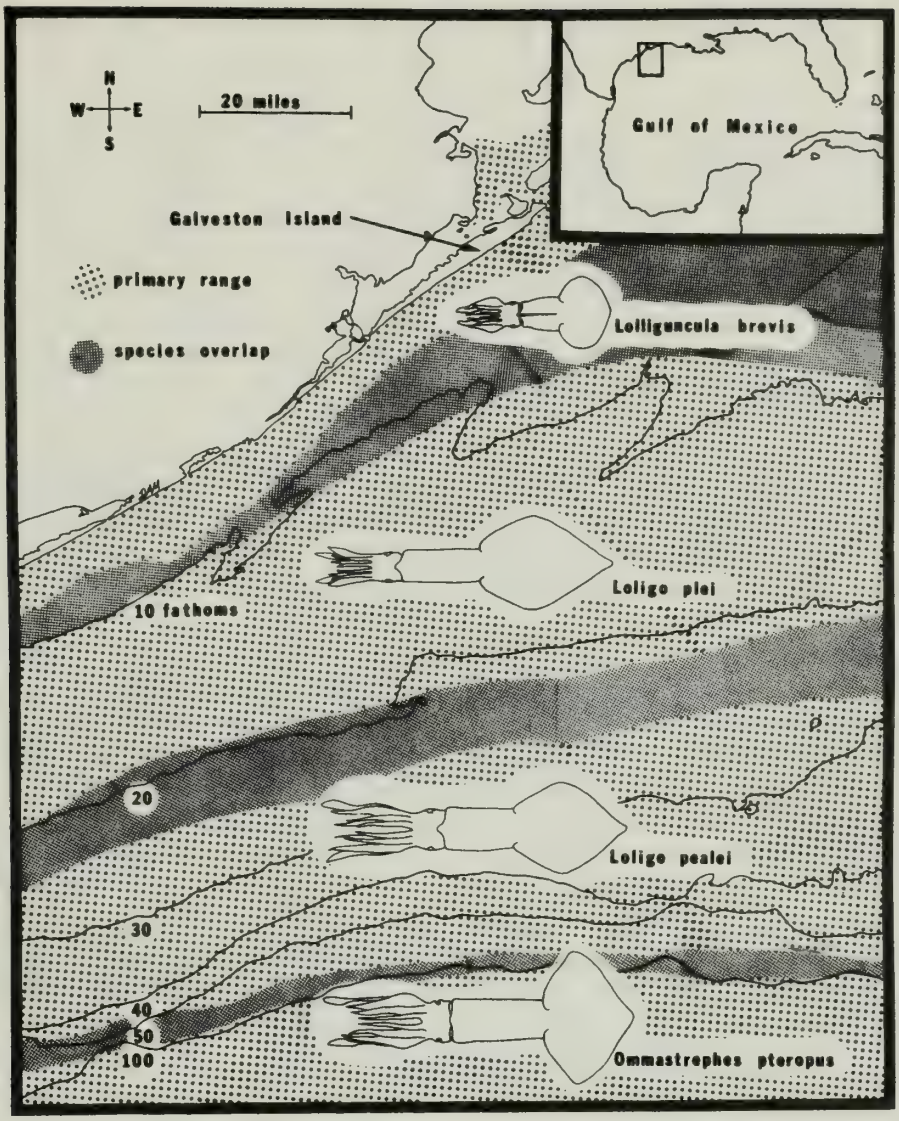

Fig. 2 - Areal distribution of the squids of the NW Gulf coast. Ommastrephes pteropus is an oceanic squid found only beyond the continental shelf.

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THE PAPER NAUTILUS, ARGONAUTA SP., FROM THE COASTAL WATERS OF TEXAS

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Before dredging became widely used, American conchologists had other ways of getting shells which lived below low tide and well away from shore; some species washed in on beaches, especially after storms; a few were found in the mud stuck on anchors of sailing ships; but a more reliable source was the stomach contents of fish, caught chiefly on the rich fishing banks off New England. Several new species of mollusks were named and described from the latter source, in the first half of the nineteenth century.

British students were most active in dredging the ocean floor, beginning about the middle of the last century. In the 1870's, they led the way with the famous world-wide oceanographic exploration on the Challenger, and during the next sixty years most other major western nations sent out similar but smaller expeditions.

Parallel with the inevitable improvement of dredging techniques, trawling methods were developed, whereby nets of various sized bags and mesh were pulled through the water to sample the many organisms which live between the surface and the bottom of the ocean. Perhaps the efficiency of these new techniques caused most conchologists — to their detriment — to neglect the examination of fish stomachs, but the practice became more widely spread among ichthyologists, who wanted to know what the fishes eat.

So it happened that in the summer of 1966 Jim Daily, then a student of fisheries science at Texas A and M University, found several specimens of a paper nautilus, Argonauta sp., in the stomach of a fish, the dorado or dolphin, Coryphaena hippurus, which he caught south of Freeport, Texas. These Argonauta were small, about 50 mm. maximum dimension, and they had been preserved in alcohol when I saw them. One of the shells was drawn by Selma F. Snider, here reproduced as Figure 1. Shortly thereafter Harry and Snider (1969) cited this catch as an example of a mollusk which undoubtedly occurs in the Gulf of Mexico, but for which there were no published records based on dredging, trawling or shore collecting. Our conclusion was based on data presented by Voss (1956). Harry and Snider also noted that Warmke (1961) had reported Argonauta from the stomach of a fish caught near Puerto Rico, but at the time we had not seen her paper, and merely relied on information in the title, which had been listed somewhere (exactly where, I do not now recall). On seeing the paper by Harry and Snider, Don Erdman sent me a typed copy of Warmke's very short and informative paper, which is quoted here in its entirety:

"Brown paper nautilus recovered from fish stomach in Puerto Rico"
By Germaine L. Warmke, in Caribbean Journal of Science, 1961, 1(4):142

"A one-inch specimen of the brown paper nautilus (Argonauta hians Solander) has been found in the stomach of a dolphin (Coryphaena hippurus Linne) in Puerto Rico. The specimen was found on April 6, 1961, by Donald Erdman, Biologist for the Fish and Wildlife Service of Puerto Rico, in a fish caught in deep water about 7 miles south-southwest of La Parguera. The animal itself, reasonably well preserved, was almost completely retracted within the shell."

"This pelagic cephalopod, although of world-wide distribution in warm waters, to our knowledge has not previously been reported from Puerto Rico. The specimen was female, as indicated by its fragile 'shell' containing numerous eggs in an advanced stage of development. The Argonauta male has no shell."

"The octopoda 'shell', unlike the shell in most other mollusks, is not a true shell produced by glands within the mantle. Its 'shell' is secreted by special glands and is attached to the dorsal arms of the body and acts as a basket in which the eggs are carried."

"Argonauta hians Solander, unlike the common paper nautilus (Argonauta argo Linne) which reaches 4 to 8 inches in size, has a shell only 2 to 3 inches in length. The shell is fragile and paper thin; it is brownish white and has a rapidly broadening keel that bears a few nodules."

"These beautiful Argonauta shells are sometimes washed ashore in Florida, Cuba and other warm water regions, but for some reason they never seem to appear in Puerto Rico. It would be interesting to learn if these species are found in other Caribbean Islands."

The most informative accounts I have found about the habits and habitat of paper nautili are in the older literature, such as Cooke (1895) and Tryon (1884). The shell is produced by broad expansions of the upper pair of arms (diagrammed in Fig. 2, without the suckers); with the help of the other pairs of arms it can creep on the bottom, and on other objects, but it also swims well, by ejecting water from the funnel below the animal. At times some or all the arms except the top pair are tucked inside the shell. The males are much smaller, about 1 cm. long, and they do not form shells.

The most recent monograph of the genus Argonauta is by Robson (1932). He recognized 3 valid species, plus 3 more that may be "good" or biological ones, and relegated numerous other nominal species to the synonymy of those, or considered them unrecognizable from the brief descriptions. He published a brief key to the shells of the 6 species which he considered to be valid.

There is reliable evidence from other sources of the occurrence of Argonauta sp. in the Northwestern Gulf of Mexico. The Houston Museum of Natural Science has a triangular fragment of a shell of Argonauta sp., about 2 cm. maximum dimension. It was evidently from the side

and keel of a shell. This was in a dredge sample, taken 40 miles north of Port Isabel, Texas, in 11-14 fathoms, in June, 1951, by Thomas E. Pulley.

The Brazosport Museum of Natural Science at Lake Jackson, Texas, has a specimen of Argonauta argo imbedded in plastic. Mildred Tate informs us that this is a complete female specimen, including animal, shell and eggs, about twice as large as the A. hians of Fig. 1. It was dredged on April 12, 1973, in 220 feet of water, 80 miles south of Freeport, Texas. Joe Morris, who was doing contract research for Dow Chemical Co., collected the specimen, and kept it alive in an aquarium for several days. Mildred Tate also received several Argonauta shells from a shrimper, during a 10 year period; the shrimper trawled only in the northwestern Gulf of Mexico. Roper and Yonge (1975) summarized all the published records of pelagic cephalopods (those that live between the bottom and surface of the ocean), and noted that the species of Argonauta seem to live only near or at the surface of the oceans.

The rarity of Argonauta specimens in trawled and dredged samples seems to indicate there is a better chance of getting them by examining the stomachs of marine game fish, particularly of Coryphaena, of which a sketch is provided in Fig. 3. In her booklet on the food and game fishes of the Texas coast, Pew (1954) provided some interesting directions for catching this fish. She noted that dorado is a better common name than dolphin for this fish, as the latter is also used for the porpoise, which is a mammal. Coryphaena is found world-wide in warm seas, most specimens weighing 5 or 6 pounds, but the record by 1954 was 75 1/2 pounds. "The dorado's habit of following drift wood or patches of seaweed (Sargassum) is a very marked characteristic. In the summer when they are most numerous, a cast near any such flotsam is almost always rewarded with a strike. Once found, the log or other drift is sometimes secured to the boat. When this is done or when a hooked fish is left in the water as a decoy, it is possible to catch most of the fish in the school, as they appear not to be alarmed by the presence of a boat or by the commotion made by the fisherman. Dorado are seldom found alone or in pairs. The food consists mostly of small fishes such as mullet and flying fish, but they may be caught on most any type of bait."

Some who read this may be sports fishermen who seek the offshore giants with rod and reel, or they may know people who do so. Perhaps they will have the opportunity to find more Argonauta specimens. When a fish is cleaned, by removing the internal organs, the stomach can be cut open and the contents put in a plastic bag, which should then be put in the ice chest, to retard the decomposition caused by the acid digestive processes of the stomach fluids. Ashore, or directly after the contents are taken, if one goes prepared, alcohol should be added to the bag; this will permanently stop the digestive process and preserve the material. Cheap 70% isopropyl rubbing alcohol will do, or the more expensive ethyl alcohol which can be bought in any drugstore. In an emergency one can use gin, vodka, tequila or any liquor of high proof. On shore the material can be washed in water, and any specimens of the animal put in clean preservative. Shells may be air dried. Remember that it is very important to write down the circum-

stances of where, when, how and by whom the specimens were caught.

The stomachs of other fish than just Coryphaena should also be examined. Voss (1954:476) noted that "As many as 24 pairs of beaks of Argonauta argo L. have been taken by the author from the stomach of a single sailfish (Ostiophorus)." He did not indicate whether this fish, which is also found in warm water around the world, was taken in the Gulf of Mexico; nor did he indicate how these beaks were identified as belonging to Argonauta. Cephalopods in general, both squid and octopods, have a pair of small, horny beaks just inside their mouth, and they are practically identical throughout the class. They resemble those of a parrot, but the larger beak is below and the smaller above.

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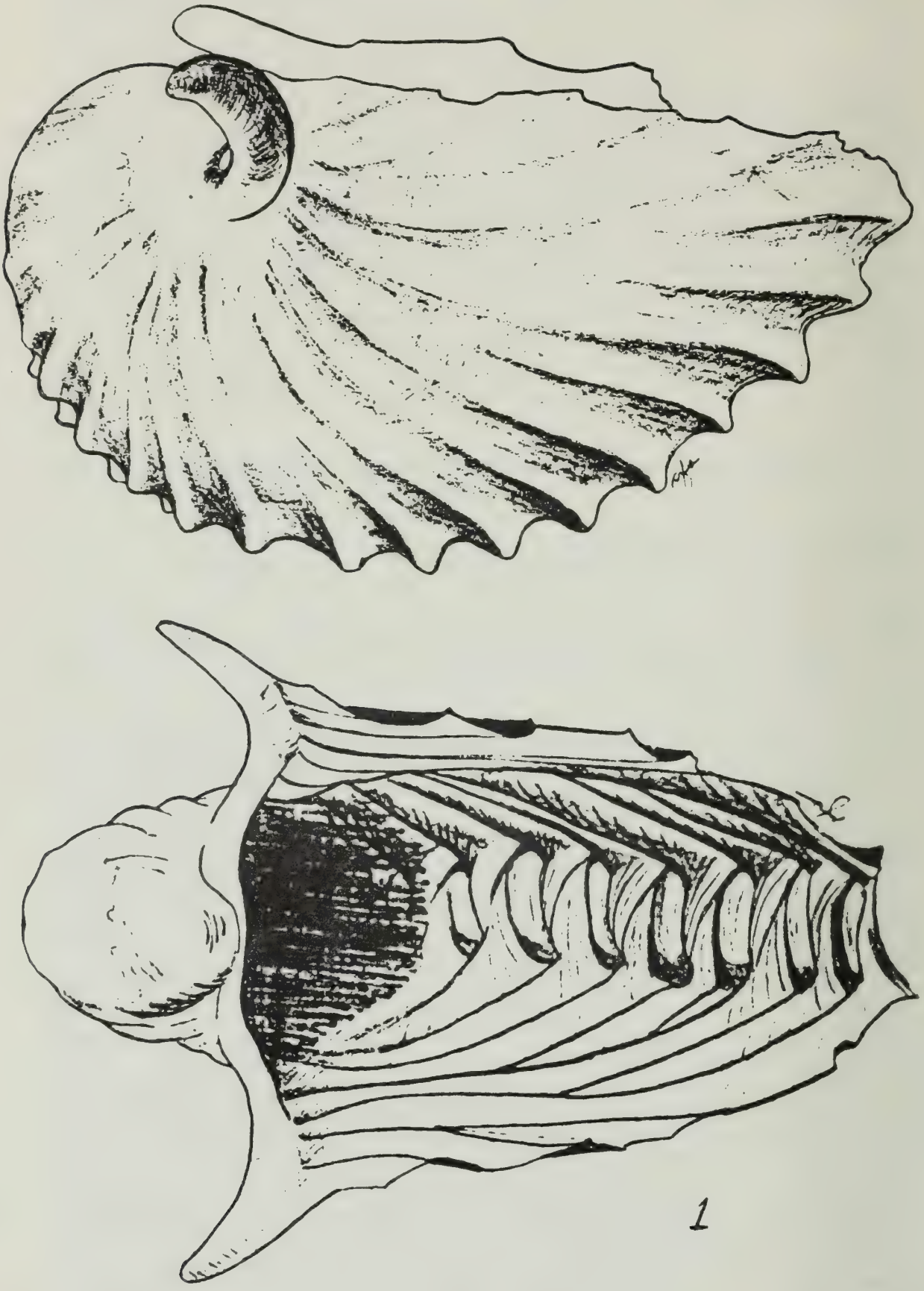
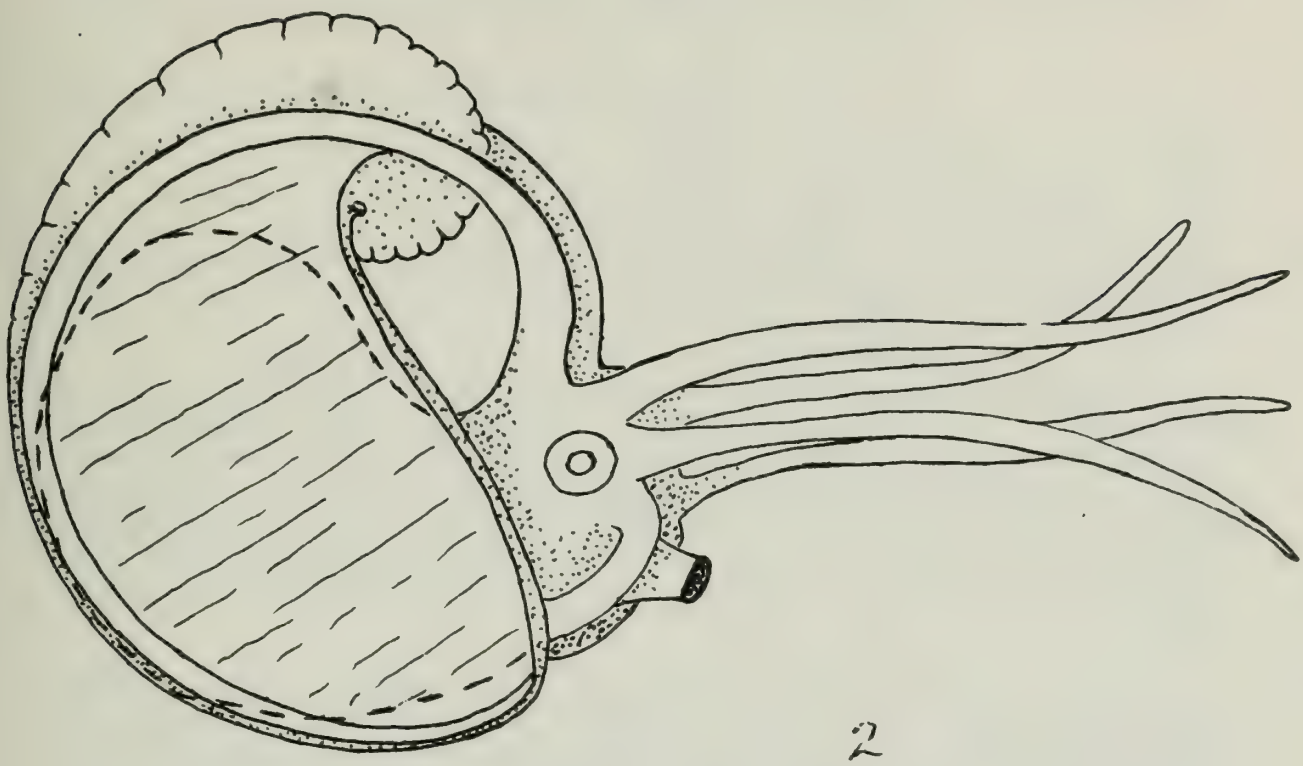


Fig. 1. Side view (above) and apertural view (below) of a shell of Argonauta cf hians, 50 mm. long. Drawn by Selma F. Snider from a specimen found in the stomach of Coryphaena hippurus which was caught by Jim Daily, south of Freeport, Texas.



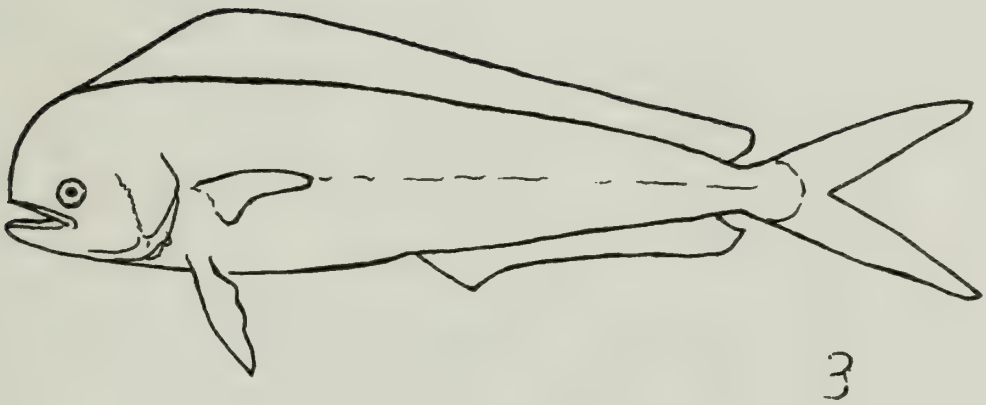


Fig. 2. Diagram of a side view of Argonauta, to show the relation of the animal to the shell. The suckers on the tentacles have been omitted.

Fig. 3 A sketch of the fish, Coryphaena hippurus, to show its shape.

TEXAS CONCHOLOGIST, Vol. XXI, No. 3, April, 1985

MONOGRAPH By H. Odé

DISTRIBUTION AND RECORDS OF THE MARINE MOLLUSCA IN THE NORTHWEST GULF OF MEXICO

(A Continuing Monograph)

Family NERITIDAE Rafinesque, 1815

Four species of this widespread tropical family of gastropods occur in Texas. Only one of them is a Nerita. The other species belong to the genera Neritina and Smaragdia.

The proper habitat for the genus Nerita is largely absent in the Northwest Gulf of Mexico (limestone intertidal rocks), and the only species of Nerita has been collected on manmade piers and jetties. The two much smaller species of Neritina are able to live in brackish water and usually inhabit muddy tidal flats of coastal bays of changing salinity. The fourth species is a small one belonging in the Subfamily Smaragdiinae. Its habitat is in turtle grass of the coastal bays.

I have discussed this family in the Texas Conchologist, Vol. III(2), September, 1966. Since that time little new information has been obtained. Reports on additional species have to my knowledge never been confirmed. The following books and papers will provide some information on this family.

H. D. Russell, 1941, The recent mollusks of the family Neritidae in the Western Atlantic. Bull. Mus. Comp. Zool., Vol. 88, 345-404, figs. 1-4, plts. 1-7.

G. L. Warmke and R. Tucker Abbott, 1961, Caribbean Sea Shells. 346 pp.

R. Tucker Abbott, 1974, American Sea Shells, 2nd ed. 663 pp.

J. Andrews, 1977, Shells and Shores of Texas. 365 pp.

Genus Nerita Linné, 1758

Although not directly of interest to the Texas fauna, we may mention here that the type of the genus N. peloronta Linne has been reported for Texas, but no authentic material is known to me. It might be of interest here to make some remarks about the name "peloronta". The species known popularly as "bleeding tooth" received its scientific name because of the rather loose ways of latinization employed by Linne. As a young man Linne spent some time in the Netherlands during which period he worked out his system of plant classification. Then he became undoubtedly also familiar with some of the shell species Dutch traders imported from Indonesia. In the Java Sea off the coast of Java lies a small island from which a species of Nerita was

imported, much prized by Dutch collectors and called by them "poelerontjes" which is a Dutch diminutive constructed for the Malay name Poeloe (which means island in Malay) Oron. Linne, either by design or by error used the latinization of this dutchified Malay for a Caribbean species!

73. Nerita fulgurans Gmelin, 1791

Sometimes this species can be collected alive on the jetties of Port Aransas and Port Isabel. A particularly nice lot of live shells was collected at the Coast Guard Station in Port Isabel. We note here that the maximum size of the species in this lot is considerably in excess of the measurements given in the literature (Abbott, 1974 gives 1 inch). I believe that it is true that a species often at the extremity of its range reaches an abnormally large size.

Records HMNS Survey Collection: 4 lots, of which 3 collected alive.
Depth range: Alive on rocks in intertidal zone.
Geographical range: Southeast Florida, Texas, West Indies, Bermuda, Brazil (Abbott, 1974).
Maximum size: 32 mm.

Genus Neritina Lamarck, 1816

The species of Neritina are much smaller than those of Nerita. They are smooth and glossy and often as in N. virginea very beautifully colored by an amazingly variable pattern of dots, lines, stripes, etc.

74. Neritina virginea (Linné, 1758)

This species is found in beach drift along many locations in the Northwest Gulf of Mexico. Unfortunately, there is no material from Louisiana in the HMNS Collection, although the species undoubtedly lives in Louisiana west of the Mississippi Delta. In Texas it is known to live in the Port Aransas and Port Isabel areas. In the Galveston area dead shells are regularly found at San Luis Pass and Bolivar Peninsula, but live material is here unknown to me. [The Editor was present in Christmas Bay when a former HCS member collected one tiny live specimen.] Also at Sargent and Matagorda Beach dead material is not uncommon. In offshore dredging (10-20 fms. offshore Galveston) the species is quite rare, and all of this material is undoubtedly of Pleistocene origin. Its basic color is either a drab green with superimposed striae, dots, and triangular or halfmoon shaped spots, or a purple color. Hardly any two shells with a closely similar pattern can be found.

Records HMNS Survey Collection: 15 lots, of which 6 contain live collected material.
Depth range: Intertidal zone.
Geographical range: Florida to Texas, West Indies, Brazil, Bermuda (Abbott, 1974).
Maximum size: 16 mm.

75. Neritina reclivata (Say, 1822)

This species is in the Northwest Gulf of Mexico much rarer than the previous one. Dead shells occasionally can be found in beach drift, but in most instances are quite worn. In the collection of the HMNS is only a single lot of live collected shells from Location 1481, Vermillion Bay, Louisiana, many alive and fresh. Because of the excellent condition of this material I noted an important structural difference with the previous species. This difference I have never found mentioned in other descriptions. Under very high magnification, the glossy surface of N. reclivata can be seen to be spirally striated by very closely spaced rows of extremely fine pustulus. It is true that not in all our material of reclivata this microscopic sculpture is present. Whether this is due to the state of conservation or species variability I cannot say without study of more material. Live material from Texas is known from Galveston Bay and Port Isabel and dead material is known from Matagorda Bay. [The Editor reports that Merle Kleb has collected live specimens at Caney (Sargent) and a nice lot has been deposited in HMNS collections.] The color pattern of this species is somewhat different from that of virginea in that it lacks the triangles, halfmoons and other shaped dots and blotches which interrupt the radial lines. It must be noted that the old and worn beach specimens of this species are always of large size, much larger than those of virginea. Also in this case, the maximum size of Texas material is considerably in excess of the size given in the printed record. Abbott makes mention of the fact that from Texas to Panama a "globose form or subspecies" occurs which replaces the typical form. In the collection of the HMNS is one lot of this form.

Records HMNS Survey Collection: 11 lots, of which 1 contains live collected material.
Depth range: Intertidal mud flats.
Geographical range: Florida to Texas to the West Indies (Abbott, 1974).
Maximum size: 20.5 mm.

76. Neritina reclivata subspecies?

In the collection of the HMNS is only a single lot of this particular form, which is indeed quite different in appearance from all others in our area. The color is purple which is highly unusual for reclivata. No trace of a micro sculpture can be seen.

Records HMNS Survey Collection: A single lot from Location 1544, Galveston side of San Luis Pass, beach drift. No live material.
Depth range: Intertidal flats.
Geographical range: Texas to Panama (Abbott, 1974).
Maximum size: 11.3 mm.

Genus Smaragdia Issel, 1869

Small, very oblique nerites. In Texas only a single species.

77. Smaragdia viridis (Linné, 1758)

This, the smallest nerite in the Northwest Gulf of Mexico, has been collected from Port Aransas southward. It lives in the hypersaline coastal bays of South Texas among turtle grass and can sometimes be taken in shell rubble. The subspecies viridemaris Maury, 1917 probably is not significant. The species was originally described from the Mediterranean. It is now believed that the western Atlantic form is not sufficiently different to merit a separate name. Andrews has observed that on cloudy days or in late afternoons the animal appears to be more active. She also gives an erroneous maximum size of 16 mm.

Records HMNS Survey Collection: 4 lots, of which 1 contains live collected material.
Depth range: 0 - 5 fms. in coastal bays.
Geographical range: Southeast Florida, West indies, Bermuda (Abbott, 1974).
Maximum size: 8.3 mm.

(To be continued)

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A NEW SHELL CLUB IN AUSTIN

By Vicki Monro

Getting a new club off the ground is difficult — but fun!

We have been growing for over a year, and now the Austin Shell Club has about fifteen members. We are dedicated as a forum for both the amateur collector and the professional malacologist. We meet at the Austin Nature Center the second Tuesday of each month, September through May, at 7:30 p.m.

Dues are $5.00 a year. Our officers are Ms. Rosalie Taylor, president; Ms. Vicki Monro, vice-president and program chairperson; Ms. Debbie Pfertner, secretary, and Ms. Diane Parma, treasurer.

For a new club so far from the coast of Texas, we have had some interesting and entertaining programs. They have included: "Collecting on the Texas Coast," "What's in Your Bucket" which related experiences, good and bad, of a shell collector; "The Water Planet" film, "Crab Fossils and Their Modern Counterparts," "Pectens," and "Collecting Marine Fossils in the Austin Area."

We plan to have a field trip to Corpus Christi. In April we will have a program by Dr. Helmer Ode on "Land Snails in Central Texas."

Anyone living in the Austin area is most welcome. Please call Vicki Monro at 512 892-1269 or Rosalie Taylor at 512 250-5762 for more information.

We have some members so new they don't know an olive from a scallop -- and others who have been collecting for a long time. An interest in mollusks is all that is required.

TEXAS CONCHOLOGIST, Vol. XXI, No. 3, April, 1985

THREE GREENHOUSE SNAILS NEW TO TEXAS

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Modern land snail faunas of almost any geographical area now consist of both native and introduced species. Introduced snails include species which are able to maintain viable populations in areas which do not receive recurrent human impact. Other introduced species are only found in areas which are impacted regularly by human activities, e.g. residential yards which receive supplemental water. Still other introduced species are unable to survive under ambient conditions and persist only in greenhouses. McGee (1965) reported two greenhouse snails from Texas. Records of these greenhouse snails are significant, however, because many non-native species, which now have established populations in Texas, may have originated from nursery stock sources which existed in commercial or private greenhouses. Records of greenhouse snails from other geographical areas have been reported (Meeuse and Hubert 1949; Karlin 1956; Dundee and Watt 1962; Hermann et al. 1965).

During a survey of the molluscan collections of various museums in Texas, records of several species which were heretofore unknown from this state were discovered. In all cases, these snails (sometimes unidentified) were collected from greenhouses or recently-received outdoor nursery stock.

NEW TEXAS GREENHOUSE SNAILS

Succineidae: Succinea campestris Say, 1817

Succinea campestris occurs naturally from Florida to North Carolina in coastal sand dune habitats (Pilsbry 1948:827).

One specimen (with soft parts and shell preserved in fluid) exists in the collection of the Dallas Museum of Natural History (DMNH 2974). The shell measures 14.3 mm. in height and 8.7 mm. in width with 3.5 whorls. The shell is whitish horn with the dark body visible through areas of shell with less pigment. The specimen was collected by Richard W. Fullington and Joe P. Harris on 24 June 1971 at the Dallas Parks Department nursery in Crawford Park on Elam Road in southeast Dallas, Dallas County. Identification was by E. P. Cheatum.

Interestingly, Capizzi (in Hanna 1966) reported S. campestris on orange tree nursery stock in Portland, Oregon. Hanna (1966) reported that S. campestris "is not known to be a resident of any of the western states."

Gastrodontidae: Ventridens cerinoideus (Anthony, 1865)

Ventridens cerinoideus ranges along the Coastal Plain from North Carolina south to Florida and Alabama (Pilsbry 1946:452).

One specimen of V. cerinoideus was collected from the old botany greenhouse at the University of Texas at El Paso, El Paso, El Paso County (MALB 1387). The date of collection and collector are not given on the label. The specimen measures 6.2 mm. in diameter and 4.1 mm. in height with 5 7/8 whorls. This shell is that of an immature specimen very similar to one pictured by Pilsbry (1946: p. 451, fig. 242c).

Achatinidae: Lamellaxis mauritianus (Pfeiffer, 1852)

Lamellaxis mauritianus is presently known from many tropical and subtropical areas as well as greenhouses in the temperate zone; the native range of L. mauritianus is unknown (Pilsbry 1946:179). Apparently, all published records with notes of L. mauritianus in North America are from greenhouse populations in Illinois (Pilsbry 1946), Missouri (Hubricht 1972), New York (Pilsbry 1946; Feinberg 1962), Oregon (Hanna 1966), and Washington, D.C. (Pilsbry 1946). However, the record from an old cemetery in Key West (Dundee 1974) may represent an outdoor population. Recently, Deisler and Abbott (1984) have reported L. mauritianus from Nassau, New Providence Island of the Bahama Islands.

Two specimens of L. mauritianus were collected from the old botany greenhouse at the University of Texas at El Paso. The specimens measure 6.0 mm. in length and 2.4 mm. in width. No date or collector is recorded with the lot.

DISCUSSION

Of the three species reported above, none would be expected to establish populations in the respective geographical locations.

El Paso is located in the northern portion of the Chihuahuan Desert. Average annual rainfall is 200.4 mm. (7.89 inches), mostly in July, August, and September thunderstorms. Winter temperatures at El Paso (average January temperature, 42.9 degrees F, extreme low, -8 degrees F) may be too extreme for the tropical Lamellaxis mauritianus. Ventridens cerinoideus may be able to survive such temperatures although the low moisture conditions would not be conducive to population maintenance by this species. Urban snails of El Paso were reported by Metcalf (1968), who found species which were more xeric-adapted.

These three snail species should not, at this time, be considered members of the Texas snail fauna until reproducing populations are found under natural climatic regimes.

Consideration of the standing of these species in the Texas fauna does

raise an interesting point. Should a species be considered a member of the fauna of a region, albeit introduced, if the species occurs only in urban situations in modified habitats with supplemental watering? The answer given to this question will vary among researchers and is, in reality, merely a decision of where to "draw the line" between greenhouse snails and fully naturalized snails which maintain populations in areas which do not experience direct human impact.

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WINTER BEACHCOMBING

By Lynn Blair

The third weekend in January my family and I drove to Sargent, Texas, for a day of shelling. Sargent does not have a pretty beach; it is really covered with tar and debris. But it is, in my opinion, an interesting beach to hunt on. The weather was very cold (mid 30's), and the wind was blowing hard. My son and I were the only two brave enough to venture out in the weather to look for shells.

After two and one half hours of crawling along the drift line, I turned up eight pairs of angel wings. One pair was Barnea truncata (Say, 1822), and the other seven were Cyrtopleura costata (Linne, 1758), none of them over an inch in length. All of the pairs still had animals in them. I also found several pairs of Petricola pholadiformis (false angel wings).

The tiny shells were lying on top of the clay at the beach. They appeared to be glued to the surface. I lost two pairs just by touching the shells, not expecting the wind to blow them away. There were many Epitonium lying on the surface of the sand. I collected about 35 in a 10 foot area. These included Epitonium rupicola and Epitonium angulatum. The others would be difficult to name because they were worn shells, none perfect. All in all, I had a grand day even if my prizes were tiny.

Over the Presidents' Day Holiday, I took my family to Corpus Christi. On the beach behind the hotel we found the largest Donax I have ever seen on Texas beaches.

We went to Bird Island and collected razor clams, tellins, Anachis semiplicata, and other shells. Then we drove on the beach east of Malaquite Beach all the way back to the park entrance and then back up to Port Aransas. The beaches were littered with soft coral (sea whip). On this we found yellow and purple Neosimnia uniplicata. [Editor's Note: If Cate's name is legitimate, we should call this Simnia marferula.] The shells were in many stages of growth, and some were both purple and yellow.

I had heard that you could find thousands of sand dollars on the beaches here. I only found two and broke one of them trying to rinse the sand off of it. I didn't believe those stories until I met a couple of campers near us. They had five one gallon milk jugs full of nothing but sand dollars that the lady had found over a two-day period! I was really envious of her.

Returning to the hotel from Padre Island, I stopped by one of the roadside areas on the bay. There I picked up over a hundred Argopecten irradians amplicostatus (our bay scallop). I had hopes of collecting enough of them for our Cub Scout group members to make little mirrors for their mothers for Mother's Day.

By the time we drove home the car smelled so bad from all of the critters we collected I was ready to have my car fumigated. But even with the smelly car, shoes full of tar, sun and wind burns, aching back, sore knees, and sand everywhere, shell collecting is still my favorite thing to do.

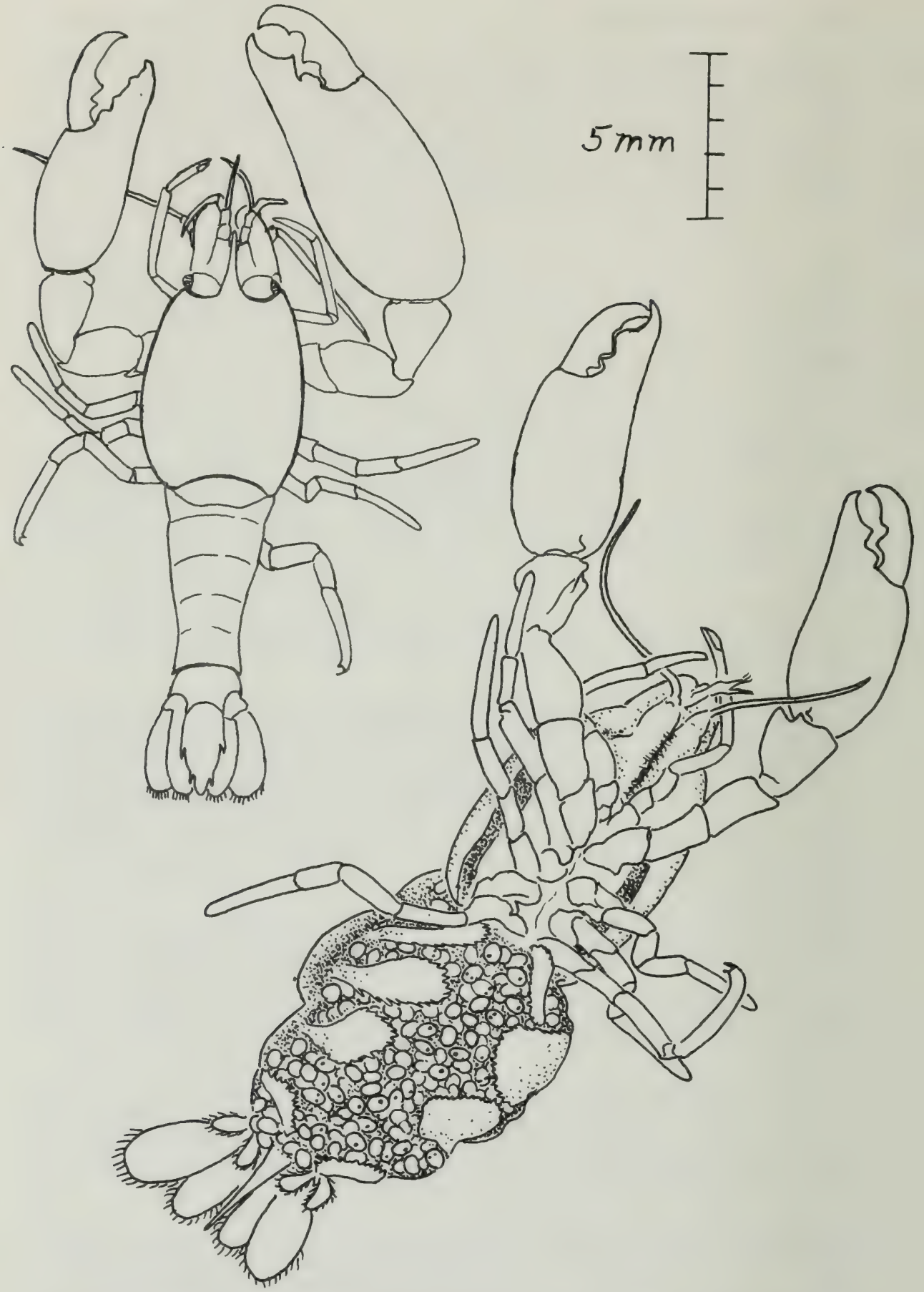

Fig. 1. Pontonia margarita Smith, 1869, from a specimen of the pearl oyster, Pinctada mazatlanica (Hanley, 1856) collected at Jaco Beach, Costa Rica by Helen Cornellisson. At left, the dorsal view of the male, 17 mm. long. At right, ventral view of the female, 25 mm. long, showing developing eggs.

TEXAS CONCHOLOGIST, Vol. XXI, No. 3, April, 1985

THE COMMENSAL SHRIMP, PONTONIA MARGARITA SMITH, 1869, IN THE PEARL OYSTER OF THE EASTERN PACIFIC

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Bellaire, Texas 77401

Knowing that I am interested in studying the anatomies of oysters and their close relatives, Helen Cornellisson kindly brought me four specimens of pearl oysters, Pinctada mazatlanica (Hanley, 1856). She collected these at low tide at Jaco Beach, on the west coast of Costa Rica, on 28 September 1984. They had been placed in plastic bags soon after they were collected, and covered with alcohol. The fluid was poured off, leaving the specimens merely moist, for the flight home. One shell was juvenile, 70 mm. high, but the other three were near average maximum size, 100 mm. high. There were no pearls in any of them, but the flesh of all was in excellent condition. Two of the larger specimens had in their mantle cavities the commensal shrimp, Pontonia margarita Smith, 1869. One had only a single male, but the other contained a pair, and the female was carrying eggs (Fig. 1).

In July, 1984, I had bought four live specimens of these pearl oysters from a street vendor who was evidently selling them as food, in the old part of Acapulco, Mexico. Conditions were not suitable for examining them alive, so they were treated as the ones from Costa Rica, and brought home merely moist, after discarding the excess fluid in which they had been soaked. Each of them had a pair of these shrimp, but only two of the female shrimp were carrying eggs. Although the pearl oyster fisheries of the eastern Pacific, from Mexico to Panama, have been extensively documented in Mexican, French and American papers, I have found only a passing reference to these shrimp, which may be rather common in this species of pearl oyster.

The shrimp are very soft bodied, and although the preserved specimens are pure white, when alive they are said to be transparent and colorless, like the grass shrimp, Palaemonetes spp., which belong to the same family, Palaemonidae. Superficially, Pontonia margarita resemble miniature cold-water lobsters, of the genus Homarus, because of the pair of enormous chelipeds (pinchers), but on close inspection, one sees that these are the second pair of thoracic legs, rather than the first. The first pair of legs also end in pinchers (are chelate), but they are very small. The other three pairs of walking legs all end in two minute immovable claws, or talons, which evidently help the shrimp to move around in the gill chamber of the mantle cavity. There was no visible damage to the flesh of the oysters in any of the six specimens which contained the shrimp.

According to Williams (1965:48), this shrimp occurs not only in the pearl oyster on the west American coast, from the Gulf of California

to Columbia and the Galapagos Islands, but it is also found on the east coast from North Carolina to both coasts of Florida. In the latter area it has been found in "Aequipecten gibbus and Pteria colymbus". Williams also writes of another species, Pontonia domestica Gibbes, 1850, saying it is known from the eastern American coast from North Carolina to the Chandaleur Islands, Louisiana and also in the Bahamas and in the eastern Atlantic at the Madeira Islands, off the coast of Africa. This species he reported in "Atrina seminuda, A. serrata and Pecten sp.".

Although I have occasionally found the little commensal "pea crabs" (Pinnotheridae: see Williams, 1965) in the mantle cavity in species of Pinnidae and Ostreidae, I have never before found these shrimp, nor have I seen any mention of them in pearl oysters, in the literature which is essentially malacological.

However, Rosewater (1965) reported 5 species of palaemonid shrimp are known as commensals in the giant clams, distributed among Tridacna gigas, T. squamosa and T. maxima. As many as three species of shrimp are known from the first two species of these clams, but only 2 from the last one. Whether more than one species of shrimp live in one individual clam was not stated. From a fourth species of these clams, T. crocea, only a pinnotherid crab is known. None of these shrimp are of the same genus as the one found in the pearl oyster of the eastern Pacific.

Literature Cited

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1965 The family Tridacnidae in the Indo-Pacific. Indo-Pacific Mollusca 1(6):347-396.

Williams, Austin B.
1965 Marine decapod crustaceans of the Carolinas. U.S. Department of the Interior Fisheries Bull. 65(1):i-ix, 1-298.

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PUBLICATION ANNOUNCEMENT

According to the recent newsletter of the Paleontological Research Institution, the third edition of the International Code of Zoological Nomenclature will be available in the spring of 1985. Although published in London, it can be bought in the United States more easily by sending $21.50 (by check or money order, and this includes postage) to the American Association for Zoological Nomenclature, Room W-115, National Museum of Natural History, Washington, D.C. 20560.

This edition is about 250 pages long. The same text is in English on one page, and in French on the page opposite. A working knowledge of this code, which changes in slight but important details between editions, is essential to anyone seriously interested in the "correct" names and classification of animals, including mollusks.

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Texas CONCHOLOGIST

VOLUME XXI NO. 4

JULY, 1985

The TEXAS CONCHOLOGIST is the official publication of the Houston Conchology Society, Inc., and is published quarterly at Houston, Texas. It is distributed as part of the dues to all members.

The Society holds regular meetings the fourth Wednesdays of the following months: August, September, October, January, February, March, April, and May. The meeting is held the third Wednesday in November. Meetings are held at the Houston Museum of Natural Science, Caroline Street in Hermann Park, beginning at 7:30 p.m.

The TEXAS CONCHOLOGIST is published October, January, April and July. It is mailed postpaid to regular members in U.S. postal zones. Overseas members will be charged additional postage. Only one copy will be mailed a family membership.

Dues extend from the beginning of the fiscal year of June 1 through May 31. However, the July issue of the TEXAS CONCHOLOGIST each year is the fourth quarterly due on the regular dues year beginning June 1 of the previous year. Memberships will be accepted throughout the year but will receive quarterlies of that fiscal year. Members receive meeting Newsletters and have all other privileges provided by the Society's bylaws.

RATES AND DUES

Family membership	$10.00
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The TEXAS CONCHOLOGIST accepts contributions for publication from amateurs, students, and professionals, subject to approval by the Editor. Manuscripts should be typed, double spaced and should be in the hands of the Editor the first day of the month preceding publication dates. Photos accompanying such material are welcomed.

FALL FIELD TRIPS

By T. E. Pulley, Chairman

CAYE CAULKER, BELIZE (Formerly British Honduras)

Fri. - Wed., Sept. 27 - Oct. 2

Limited to 20 HCS members. Letter with details and request for deposit will be mailed to you in July.

STONE CITY - BRAZOS RIVER

Sun., Oct. 20

Fossil and fresh water collecting trip. Meet at 10 a.m. on west side of bridge crossing Brazos River. Take Hwy. 6 to Bryan, travel 11 miles west on Hwy. 21 to the Brazos River.

PORT ARANSAS (THANKSGIVING WEEKEND)

Fri. - Sun., Nov. 29 - Dec. 1

Details will be available at the September meeting. Essentially, the plans are comparable to those for the Thanksgiving weekend at this locality last year.

CONFEDERATE REEF (WEST BAY, GALVESTON, TEXAS)

Sat., Dec. 14, with alternate weather date Sun., Dec. 15

We will try again for oystering in West Bay. You are reminded that you will need waders or boots and a fishing license unless you are over 65. You will need cotton gloves, a large bucket or sack for oysters, and an oyster knife.

LITERATURE RECEIVED

Taylor, Dwight W.

1985 Pecosorbis, a new genus of fresh-water snails (Planorbidae) from New Mexico. New Mexico Bureau of Mines and Mineral Resources Circular No. 194. 17 pages, 13 figures (February).

The genus is based on Biomphalaria kansasensis Berry, 1966 (in Malacologia, vol. 4, p. 266) described as a Pliocene fossil from Kansas, and now found living in the Pecos River drainage in New Mexico. It seems to live only in temporary pools; the map of distribution shows several localities along the Pecos and Rio Grande Rivers in Texas, where it has been found as a fossil. Copies of the paper may be obtained from The New Mexico Bureau of Mines and Mineral Resources, Socorro, N. M. 87801.

Richard H. Titgen
Thomas J. Bright

1985 Notes on the Distribution and Ecology of the Western Atlantic Abalone, Haliotis pourtalesii Dall, 1881. (Mollusca: Gastropoda). Northeast Gulf Science, Vol. 7, No. 2, March, 1985. Pages 147-152, Table of distribution records, 3 figures.

A review of the literature and discussion of the loss of the type in the Chicago fire of 1871 opens this article on the study of recent specimens collected in the Western Atlantic. A description of the species and discussion of live animals recently collected follows. Habitat, behavior, and distribution are covered in this short paper. Of especial interest are the two figures of live H. pourtalesii. This semi-annual journal is published by the Marine Environmental Sciences Consortium of Alabama, Dr. Robert L. Shipp, Editor, c/o Dauphin Island Sea Lab, Dauphin Island, AL. 36528.

TEXAS CONCHOLOGIST, Vol. XXI, No. 4, July, 1985

SEARCH AND SEIZURE

By Constance E. Boone

COLLECTING SPINY MUREX

The highlight of my May collecting trip to Egypt was finding many, many Murex "carbonnieri" or "tribulus" one day on a trip to the Great Bitter Lake on the Gulf of Suez.

The Murex I collected is labelled M. tribulus in Radwin and D'Attilio's Murex Shells of the World 1976, with M. carbonnieri as a synonym. Abbott and Dance in Compendium of Seashells picture M. carbonnieri as a separate species.

Dr. Emily H. Vokes saw some of my specimens in May when she came to talk to HCS and informed me that Dr. Winston Ponder of the Australian Museum will give this species a new name in the monograph on Murex Drs. Vokes and Ponder will publish soon.

This species is put in the genus Murex, a division for the spiny Murex in the strictest sense (with three varices, long siphonal canal, a varied amount of spines, the spire never comparable to the canal length, with a broadly ovate, or lenticular to subcircular aperture, according to Radwin and D'Attilio). M. pecten, for instance, is in this genus.

In West Australia I collected some spiny Murex which Dr. Vokes identified as true M. tribulus. These popped up at night on sand bars, but they were not abundant. I never saw them travelling in situ (natural habitat).

To be able to snorkel and gather three or four spiny Murex in one hand and to then quickly bag these and go on to see more specimens immediately was utter joy for the Murex collector that I am.

Our collecting adventure came about purely by accident.

We were on a Kirk Anders' collecting trip to Hurghada on the Red Sea. There we found a very few of the spiny Murex, although other muricids, like ?Siratus virgineus and Chicoreus ramosus were fairly common. I didn't recognize S. virgineus at first because with mud on the specimen I thought I just had a worn specimen of ramosus. Here at Hurghada virgineus was pale gray or white and quite large. The interior of the aperture blushed with lavender. The water here was ice cold to me, and I said as much to Dr. T. E. Pulley on return. He asked if I was snorkeling among coral, and I said I was. He then informed me that it couldn't have been less than 68 to 70 degrees as coral would not grow in colder water than that. So, it wasn't ice cold, but it was certainly cold enough for this human with 98.6 degrees body temperature!

At Hurghada I found the spiny Murex in muddy areas, but a few were found near coral rubble. I collected one eating a white Polinices.

A divemaster was engaged to plan a picnic and collecting day for us to a nearby cove. Somehow the discussion led to the spiny Murex, and he told our leaders that he could arrange for us to go to a place "out of Cairo" where we could find all these Murex we wanted--that they were so plentiful they were hazardous to beachgoers.

It really sounded too good to be true, but it was true!

We drove by bus some 100 miles from Cairo northeast to Fayed on the Gulf of Suez, an area that seemed to have country villas on the sea. The divemaster's family had one there.

The villa we used was right on the sea. Some of the collectors went immediately to the drift line and came up with handfuls of dead and dying Murex "carbonnieri." One collector even found some stuck in the palm tree at the water's edge, presumably washed up there by waves. There were ships offshore heading toward the canal, and waves were formed.

I headed out to snorkel, although the water seemed a little murky, and it was muddy. But at once I saw those Murex travelling along in the muddy sand. They slid along in the mud, the animal holding the shell up off the substrate. The shell was held quite level and parallel to the bottom. Sometimes they were coupled in pairs, sometimes in threes. My heart pounded, and I knew I was in Murex heaven.

I did this in water from 3-4 feet near shore, in the area in front of our villa, ranging to about 200 feet across, I think. There were so many specimens I could easily understand why they were a nuisance to swimmers.

I have learned from the new popular book, Red Sea Shells, 1984 by Doreen Sharabati, that these Murex are supposed to come in to shore in the spring to breed. I was there at the right time! However, I saw no egg cases in the water and observed no juveniles. The water here was a bit warmer than it had been at Hurghada but there were no corals. There were some sea weeds. There were bivalves that might have been food for the Murex, and I collected Polinices. The other muricids I collected were small virgineus, but no ramosus. There was also an exciting find for me of some sinum-like animals that we have under study.

In answering a question posed by an HCS member who wanted to know why one book (Abbott's American Seashells, 1974) used Murex throughout in listing the species, and another book (Abbott's and Dance's Compendium of Seashells, for instance) used different genera in listing species, I tried to explain that malacologists have devised genera (the first part of the two-part name you have for a species) to refine and devise groupings within families or subfamilies. Abbott, 1974 does have separate headings for groupings but chose to use Murex with each specific name. There is still disagreement on the muricid subfamilies and genera. In The Murex Shells of the World Radwin and D'Attilio presented their view of the classification of the Muricidae on pages 15-18. Since that 1976 publication, there have been other views expressed. In "La Conchiglia" magazine of January, 1985, an article titled "Nomenclatural Corrigenda for Radwin and D'Attilio's Murex Shells of the World" by Emily H. Vokes sets out her opinions of some of the identification of the plates. She also says that in the R&A book "some of the generic assignments I find a bit distasteful, but I have not changed them unless there is a very strong evidence for it." Most of her disagreement with assignments in that book were at the specific level. We have this publication in our library. Those members studying muricids should read it.

The regrouping goes on in many families of mollusks. If you are serious about one family, you will try to learn the genera devised by professionals. It isn't wrong to call all muricids Murex, but the use of different genera grows more common, it seems to me. Obviously, even you can see differences in different species. The species from Egypt have different genera, or maybe subgenera. The spiny one is a Murex s.s., (sensu stricto, meaning in the strictest sense). R&A had a question mark in their listing of ?Siratus virgineus because they weren't sure of the generic assignment. Abbott and Dance make it a Chicoreus, as did Vokes in her "Catalogue of the Genus Murex Linne" 1971. However, I am not positive whether Siratus has now been ruled out by Dr. Vokes for virgineus. I note that she makes Siratus a subgenus of Chicoreus in a recent article titled "Comparison of the Muricidae of the Eastern Pacific and Western Atlantic, with Cognate Species" in the November, 1984, issue of the magazine "Shells and Sea Life." This article is complete with two color covers and two black and white plates covering the muricids of the Western Atlantic and Eastern Pacific. Her classification and discussion of "twins or related species = cognate" should interest members working on muricids. One of her notes at the end of the article points out that the upcoming Vokes-Ponder publication on Murex will state there are no true muricids in the genus Murex in the New World. They will all be referred to the subgenus Haustellum. Therefore, eventually, we will list it as Murex (Haustellum) cabritii, for instance.

I confess it is difficult to remember all of the genera and subgenera, or to even pronounce or spell them. I have to go to the books to make my labels—and to write this article! Keeping up with the changes is a problem to all of us. I keep trying, realizing that there might be disagreements. I tend to believe the professional who has spent her life unraveling the secrets of the family Muricidae, Dr. Emily Vokes.

Fig. 1 Pictured are some of the many spiny Murex collected at Fayed, Gulf of Suez, Egypt, in May, 1985, by Constance E. Boone, as well as ?Siratus virgineus.

BELIZE IT OR NOT

By Emily Oakes

On Friday, March 29, 1985, eleven of us met at Houston Intercontinental Airport to board Taca Airlines for Belize, Central America. Our group included Connie Boone, Ruth Goodson, Helen Cornellisson, Mary Ann Curtis, Natalie Howard, Gil and Nadine Hales and Sam Watson, who were friends of Natalie's; our daughter, Nancy McPhaul, Bill Oakes, and me.

Bill and I were anxious to get started, as our last two shelling trips were not very productive, and we knew we would find some species we'd not been able to collect before. Also, we looked forward to the promise of warm, sunny weather, after such a long and tedious winter.

We were an hour late departing, which threw us an hour late in the pick up plans. Natalie had been to Belize twice before, so she knew what we needed to be prepared for. She called herself our "non-leader", but she knew the people and places and was great at handling all the arrangements. We quickly learned to appreciate her knowledge and previous experiences. I'm sure she must have been asked hundreds of questions during that week.

We arrived in Belize City at about 5 p.m. and were rushed through Customs, which was a miracle, and hurried into our waiting taxis which were to take us from the airport to the boat which would take us to Caye Caulker, our ultimate destination. Chocolate, the boatman, was waiting for us with baggage unloaders standing by. It had been Natalie's fear that if we were any later, Chocolate would have to go on back to Caye Caulker without us, and we would have to stay the first night in Belize City. We had to get through the mangrove areas and shallow waters before dark, and the sun was going down very quickly. It is 22 miles from Belize City to Caye Caulker, and it took an hour and a half to get there. It was dark when we finally arrived at our pier. I was very glad to get out of that rough, uncomfortable boat. It was a bouncing, jostling, wet ride. We all felt every minute of it. A young native from our hotel was waiting for us on the pier with a homemade wheelbarrow which took most of our luggage down the pier and up from the water about 100 feet to our hotel, the Tropical Paradise. We unloaded our gear after room assignments, and then went to dinner at a very casual but okay restaurant.

The next morning we were all up early and had breakfast in a person's stilt house with one room turned into a public eating room. When we finished, Natalie set out to find Raul, our boatman, and arranged for us to go out at 1 p.m. He was to take us out every day. We were all gathered with our gear on the pier by 12:30, ready to go. Natalie knew exactly where we wanted to go, so she told Raul the places and he took us there. All week he was so patient and kind. Shellers have been known to be temperamental occasionally, and Raul never hurried us or seemed distressed when we dawdled, which shellers are also inclined to do. The water was clear and not too cold. We found several beautiful Queen Conchs and Chanks right away. We also found *Cyphoma* on the seafan, Vases, *Astraea*, and several *Murex*.

At each place (about 4 different locations each of the first two days) we found good shells. Helen Cornellisson found a lovely carrier! I admired and coveted it, and she gave it to me. She had found live ones at Harbour Island, Eleuthera, Bahamas, and said one was all she needed. I was very excited with this generous gift. Later I found a beach carrier without its cover shells. It was lovely, and a learning experience to see one naked, but I didn't give Helen's back to her. I treasure her precious gift.

We couldn't go out on the reef the first day because it was so windy. The reef is the second largest barrier reef in the world. We didn't know this until about the third or fourth day, and it added something extra to the anticipation of going out to see it.

The first three days the wind was very strong, so we went to Natalie's places and were not disappointed.

Some of the men on Caye Caulker are lobster fishermen 8 months out of the year. We understand that the Red Lobster chain gets some of its lobster from these fishermen. On the other side of the island, which is about 5 miles long and 1/2 mile wide, there is an ice plant and large dock where the catches are brought and loaded on boats to be taken to Belize City and air freighted from there. Queen Conchs are harvested here also; the meat is sold for food. The shells are piled up and sold by the ton.

Every day we walked to the ice plant and got free ice for our ice chests to take out in the boat. It was not lobster season, which was why Raul was available to take us out every day. He told me that his father and grandfather were lobster fishermen. He was born and raised on Caye Caulker. He is 30 years old.

On Monday, the third day, the last place we went was the north end of the island. There were shallow grass beds, and some of us snorkeled and some just walked and looked. We found that there were Apple Murex with yellow apertures, several lovely sea stars, and Sam found a gorgeous Angular Triton. The next morning several of the group went back to this area, and Connie and Mary Ann found Angular Tritons. Natalie found a large Apple Murex egg case. Connie said it was larger than she could reach around and underneath, and there were many of the beautiful Murex on the egg case, most with the yellow apertures. We had opted not to go, and, of course, were sorry. That afternoon we were to go out about 1 p.m., but the wind turned and a storm came in about 2 p.m. that lasted the rest of the day. We all took this opportunity to catch up on rest and start some shell cleaning.

The next day was sunny with the storm all over, but it was quite a bit cooler. Five of us went out that afternoon, and the water was rough and not as clear for snorkeling. Nancy and Bill are certified SCUBA divers and are able to free dive from ten to fifteen feet. The only nice thing found in the deeper water was a Helmet which Nancy got at about 15 feet. We decided that snorkeling was not good that day, so we got Raul to take us over to Caye Chapel (which is about a mile from Caye Caulker). We walked in shallow water, and the driftline proved exciting. The beach there is narrow but has plenty of small treasures

for those with patience to pick them out of the drift. There were many Emerald Nerites, Polinices, ceriths, and Marginella. I found one Wentletrap, the only one found. We stayed here for over an hour, then headed out to the reef. The tide was out, and Raul found a large coral with a hole in the middle. He put a pole in the hole in the coral and sort of staked us out there. It made it very easy to get in the boat. The water was very cold after the storm, but the reef was lovely. There were hundreds of dead Queen Conchs here. The fishermen take them and put a slit at the top to get the animal out quickly. I call this "knocking them in the head." It is very disappointing, indeed, to think you have a real treasure only to get it out of the water and see the slit in the top. There were some live Queen Conchs, many Vases, Chanks, and a few Cyphoma.

The next morning we went back to the reef, and Raul found our same parking place on the same coral. I did not go in that day, because the water was cold, and I had barely gotten warm from the day before. It is still exciting to stay in the boat and see what everyone else is finding. Connie was not going to go in because it was so cold, but could not stand to see the others with their finds and plunged in, too. Almost immediately, she found one of the most beautiful Queen Conchs of the week. It had a more solid lip and was more golden than pink. Bill found the other beautiful Queen that day. It also had a heavier edge and was shocking pink. He is very pleased with it. Nancy found a fresh dead West Indian Fighting Conch which cleaned up lovely and was the only one found. There were more vases, many Milk Conchs and chanks and everyone was being very selective this day and choosing only the finest. Finally, we left here and went back over to Caye Chapel. We again walked the drift line. Bill was looking in about kneedeep water and reached for what he thought was a shell and was stung through his glove by a long spined sea urchin. It was as big as his hat. We quickly put alcohol, then meat tenderizer, then ointment on his three involved fingers. I have since made an emergency kit which includes Adrenalin, syringes, and other possible needs, which I will have with me from now on. There were hundreds of all sizes of bright orange Lucina washed up in the mud. The more experienced shellers said they had never seen so many at one time. There were more marginellas, turrids, Polinices, Emerald Nerites, littorinas, Modulus, and small olivellas. Everybody stooped and bent to gather these. Then we had to get back to get things together to leave at 6 a.m. the next morning. This meant everything had to be packed that night. We brought back four Queen Conchs, which I wrapped lovingly and packed in my tote bag and took on the plane. Each arrived as perfect as we found it.

We had a different driver and a smaller but faster boat on our return to Belize. It only took one hour and was a much easier ride than the ride over. Our flight wasn't until 10 a.m., but Natalie had heard that if you are not there first, even though you have reservations, you can be bumped from your flight. The plane makes two stops before Belize City, and if they fill the seats, too bad for you! Anyway, we were there before 8 a.m. and before anyone else. As it turned out, there was plenty of room on the plane, but it was Good Friday and we didn't want to take a chance on being left there until Monday.

The Tropical Paradise Hotel was nice but not fancy. On Caye Caulker there are no movies or night clubs, and there is no television in the hotel; nor is it air conditioned. Our room slept three, a double bed and a single. Our room had a bathroom and a shower. It cost $12.00 per night for three of us. The drinking water is from a cistern (caught rain water). The tap water smelled mightily of rotten eggs. It was okay for showering, but not for drinking. Not all rooms had hot water. Some of us got a touch of Tourista but were prepared. The night before the storm, the wind died and it became very still. The "no-see-ums" came through the screen, and many of us suffered from those bites. One of the native ladies told me this was usual when there was no wind. She said many times they are worse. There are quite a few places to eat on the island. Many of the people have turned rooms of their houses into public dining rooms. Most of these need reservations as they only cook for the ones who make them. Right next to the Tropical Paradise is a restaurant owned and operated by the man who owns the hotel. The food is good and reasonable, although there is not a large selection. It is American style. He had the only brewed coffee. The other places all used instant coffee. Refills were not free. It is also an ice cream store. The cost was about $1.00 for bacon, eggs, toast, and coffee for breakfast, $2.00 for hamburger and french fries, $3.00 for fried lobster or fish served with potatoes or rice and a vegetable. Fresh squeezed orange juice and fresh bakery items are found at several island homes. Cokes were 40 cents and were in 12 ounce bottles; no cans. Beer was available. Few souvenirs were available on the island.

Bill and I figured we spent about $400.00 each for the whole week, including airfare. We thought it was very reasonable, and we hope we can go again.

The country of Belize celebrates its second year of independence on September 21, 1985. It was formerly British Honduras. Everybody speaks English. It is bounded on the north by Mexico, on the west and south by Guatemala, and separated from Honduras to the south and southeast by another narrow strip of Guatemala. Caye Caulker is part of Belize. About 500 people live on the island. There are two main streets, which are really dirt roads. We saw two vehicles on the island, a land rover and another 4 wheel drive type. Everybody walks for daily routines. The currency is two Belize dollars to one U.S. dollar. They accept no U.S. coins. If you go, take plenty of $1 bills. Change is always made in Belize money. Traveler's checks and plastic money cannot be used. They accept our money but can't change big bills for food, etc.

There is an airstrip planned for completion in about 5 years on Caye Caulker which would promote tourism. Right now it is a "laid back" little tropical island. Some natives are not interested in changing it!

Listed below are the species collected, typical Caribbean fauna. Not all were taken live.

1. Diodora dysoni (Reeve, 1850)
2. Diodora listeri d'Orbigny, 1842

3. Cittarium pica (Linne, 1758)
4. Tegula fasciata (Born, 1778)
5. Tegula excavata (Lamarck, 1822)
6. Astraea phoebia Roding, 1798
7. Astraea tecta americana (Gmelin, 1791)
8. Nerita fulgurans Gmelin, 1791
9. Neritina virginea (Linne, 1758)
10. Smaragdia viridis (Linne, 1758)
11. Littorina ziczac (Linne, 1758)
12. Littorina lineolata d'Orbigny, 1840
13. Littorina angulifera (Lamarck, 1822)
14. Modulus modulus (Linne, 1758)
15. Cerithium sp. (maybe more than one)
16. Epitonium lamellosum (Lamarck, 1822)
17. Crepidula plana Say, 1822
18. Xenophora conchyliophora (Born, 1780)
19. Strombus gigas Linne, 1758
20. Strombus raninus Gmelin, 1791
21. Strombus costatus Gmelin, 1791
22. Strombus pugilis Linne, 1758
23. Trivia pediculus (Linne, 1758)
24. Cyphoma gibbosum (Linne, 1758)
25. Polinices lacteus (Valencinnes, 1832)
26. Natica sp.
27. Natica livida Pfeiffer, 1840
28. Cassis tuberosa (Linne, 1758)
29. Cymatium femorale (Linne, 1758)
30. Cymatium moritinctum caribbean Clench and Turner, 1957
31. Cymatium nicobaricum (Roding, 1798)
32. Tonna maculosa (Dillwyn, 1817)
33. Murex pomum Gmelin, 1791
34. Murex messorious Sowerby, 1841
35. Murex rubidum F. C. Baker, 1897
36. Thais sp.
37. Eupleura sulcidentata Dall, 1890
38. Columbella mercatoria (Linne, 1758)
39. Nassarius albus (Say, 1826)
40. Melongena melongena (Linne, 1758)
41. Leucozonia nassa (Gmelin, 1791)
42. Fasciolaria tulipa (Linne, 1758)
43. Turbinella angulata (Lightfoot, 1786)
44. Vasum muricatum (Born, 1778)
45. Marginella apicina Menke, 1828
46. Turrid, at least four sp.
47. Bulla striata Bruguiere, 1792
48. Melampus bidentatus Say, 1822
49. Haminoea elegans (Gray, 1825)
50. Dentalium sp.
51. Chiton sp., very scarce
52. Arca zebra (Swainson, 1833)
53. Barbatia cancellaria (Lamarck, 1819)
54. Anadara notabilis (Roding, 1798)
55. Glycymeris pectinata (Gmelin, 1791)
56. Modiolus americanus (Leach, 1815)
57. Pinna carnea Gmelin, 1791

58. Atrina rigida (Lightfoot, 1786)
59. Pinctada imbricata Roding, 1798
60. Isognomon alatus (Gmelin, 1791)
61. Isognomon radiatus (Anton, 1839)
62. Lopha frons (Linne, 1758)
63. Codakia orbicularis (Linne, 1758)
64. Lucina pectinada (Gmelin, 1791)
65. Chama macerophylla (Gmelin, 1791)
66. Tellina radiata (Linne, 1758)
67. Tellina listeri Roding, 1798
68. Polymesada maritima (d'Orbigny, 1842)
69. Spirula spirula Linne, 1758

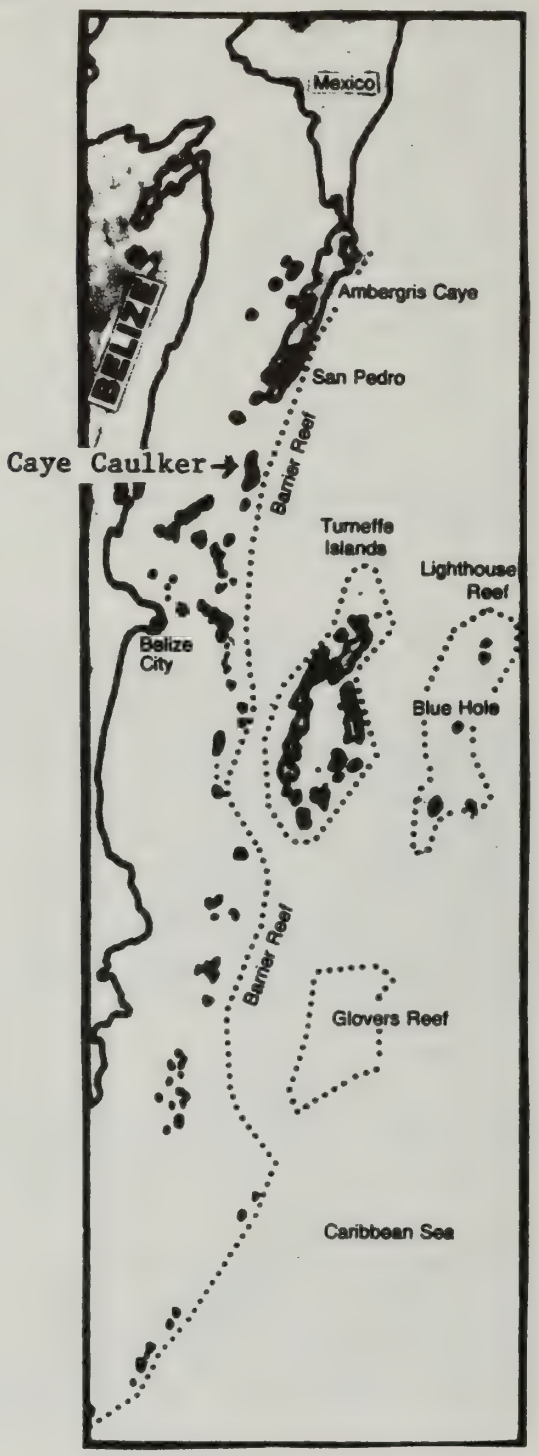

Fig. 1 Caye Caulker, Belize

Fig. 2 Emily Oakes heads for the boat to go shelling. Note she has her "tennies," hat, and long pants along to guard against corals and sun.

Fig. 3 Tropical Paradise Hotel was headquarters for the Houston shellers in March, 1985. Low building to the right back of the palm tree is the restaurant.

FLORIDA SHELLING - PERSEVERANCE PAYS OFF!

By Helen Cornellisson

On May 10, 1985 we started for Florida - Helen Eberspacher, Mildred Elkins, Roberta Campbell and yours truly. Our first stop was Panama City, Florida where we stayed over night. We started early next morning to shell at Port St. Joe. Our first shelling was in the upper bay where many shells were plentiful. So were the sting rays; I counted eight in one school. We spent some time in the park, but found very few shells there (the usual King's Crowns, of course). The second night we stayed in Perry. Starting out early the next day, we drove to Cocoa to look for the scallop dump but when we got there it was closed, declared a health hazard. It was in the process of being filled, no more dumping and no trespassing[1].

After talking with several passers-by, we found a young man who worked on a scallop boat and from him we discovered where the boats unloaded on both sides of Banana River. But operations closed on week ends, and this day was Sunday!

We went exploring, asking questions of everyone we saw. We came to Smith's Seafoods operation, asked the same questions, but got different answers. We finally hit pay dirt. One fellow showed us a pickup truck loaded high with shells headed for the dump. He said that we were welcome to all we wanted. The shells, horse conchs, Murex, moon shells, junonias, whelks and many small shells were very "ripe" but with operculums intact. We started looking and choosing. Shells were stacked so high it was difficult to move the top ones to discover the goodies underneath. We worked at it until we each had a nice pile on the ground. I looked around for a water faucet, but the water was turned off. We needed water to wash off some of the goo. There was lots of water in the river about six or eight feet down from the side of the wall. I found a rope (when in need of something, improvise!) that we tied to our bucket and lowered it into the river. The water wasn't clean but "any port in a storm". We all cleaned the bodies from the large shells. The smaller ones would have to wait.

We returned to our motel. Helen and Mildred opened the boxes they had packed, along with newspaper, for such an occasion. We packed our treasures and loaded them in the carrier on top of the car.

The next morning early we returned to Smith's Seafood operation. One boat was unloading, another standing by waiting its turn. We watched both boats unload. We gathered many more shells as the scallops sailed up the conveyer belt. We thus collected Scotch bonnets, tulips, small helmets, Distorsio, tuns, apple murex, huge moon snails, olives, more horse conchs and Murex fulvescens, and many scallops, of course. I envied the woman working the conveyer belt material to eliminate the trash because she kept a large lion's paw that rolled up

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[1]Emily Oakes, HCS member, has learned that a new dump is being opened and was told shellers could enter when machinery and trucks are not operating.

the belt!

Our next stop was Sanibel Island. We spent one week there. We found five live horse conchs one morning. Since we were out early we found four of the conchs having breakfast. Each had a Busycon in its mouth. Only one fighting Florida conch was found alive, many Busycon were alive, and lots of small beach shells were available. We visited the Shell Factory. It is a tourist trap. We toured Thomas Edison's home, saw light bulbs burning that Edison had made. He died in 1931. I wondered why GE doesn't make bulbs that good now.

After leaving Sanibel we stopped at Florida Supply House in Bradenton, Florida (where one can buy craft shells, supplies, boxes and plastic bags[2]). We went to the fossil pit at Sarasota. We gathered many small fossils. I didn't want any more big shells! The olives looked shiny and bright as we picked them up. I got a cone still patterned. The sun was warm; there was a good stiff breeze, so it wasn't hot. We ate our lunch at the picnic table at the entrance to the fossil pit, then we started for Houston. Two nights were spent at motels on the way home. Helen planned on more stops on the way back, but we were tired and the car was loaded. I don't know where she would have found room for one more shell.

This was my first shelling trip to South Florida, and I had wonderful companions, good food, nice cabins and lots of shells. What a way to live!

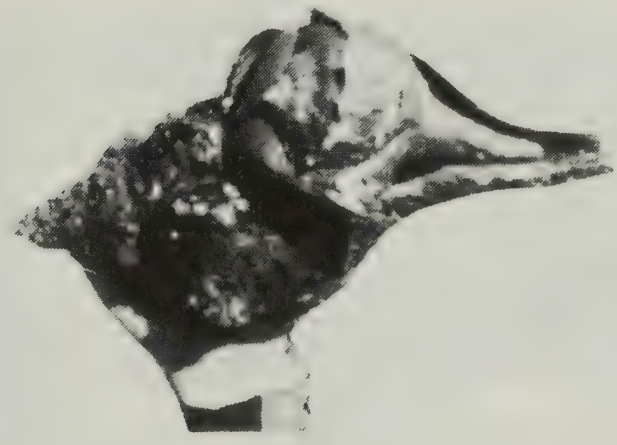

Fig. 1 The biggest horse conch collected at Sanibel holds on to its meal, Busycon perversum. All five Pleuroploca gigantea collected were feeding on whelks.

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[2]A current catalog has been added to our library.

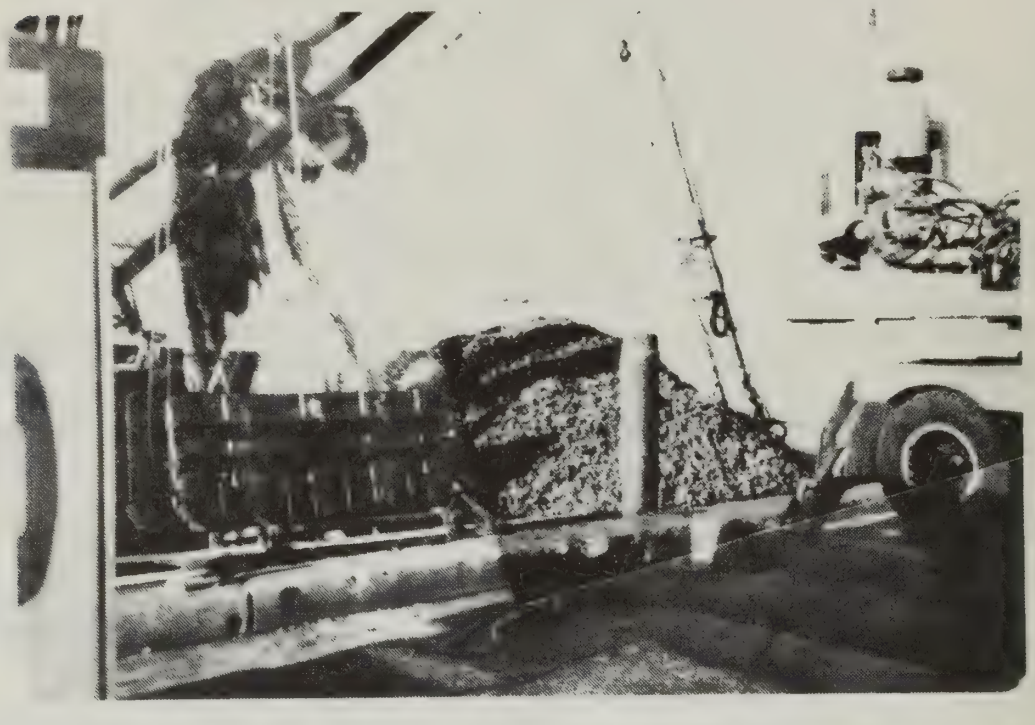

Fig. 2 This scallop boat docked on the Banana River near Cocoa Beach, Florida. Mixed with the dredged scallops are desirable shells sought by eager shellers waiting on shore.

Fig. 3 Helen Cornellisson smiles with happiness as she cleans the smelly shells retrieved from the truck of discarded mollusks thrown from the scallop boats at Cape Canaveral, Florida.

TEXAS CONCHOLOGIST, Vol. XXI, No. 4, July, 1985

NOTES ON RECENT AND FOSSIL NERITIDAE
12. Various information concerning the Olive Nerite+

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In his monograph of the family Neritidae in the northwestern part of the Gulf of Mexico, Odé (1985) mentioned two species belonging to the genus Neritina: the Virgin Nerite or Neritina virginea (Linnaeus, 1758) and the Olive Nerite or Neritina reclivata (Say, 1822). The latter species is indeed usually called N. reclivata in spite of the fact that it has at least two senior synonyms.

Roding (1798) based his Nerita usnea on a figure in Lister's Historia Conchyliorum (1685-1692: plt. 605, fig. 33), which represents indeed this olive green nerite from the Gulf of Mexico and Caribbean Sea. Rosewater (1975) and Mienis (1983) used, therefore, quite correctly, the name Neritina usnea for this species while discussing its presence in the Gatun Locks of the Panama Canal.

A study of the syntypes of Neritina lineolata Lamarck, 1822 in the Museum of Natural History in Geneva revealed that also Lamarck's name is a senior synonym of N. reclivata. It is a few months older.

While usnea and reclivata were based on the conic "Eastern" form of this species, lineolata represents the globose "Western and Southern" form. However, occasionally globose specimens are encountered in predominantly conic populations. This is, for example, the case in a sample from Tampa, Florida (HM 21747-21749). Besides that, entirely globose populations are occurring in "conic-territory", for example at Ojus, Florida, which population was described as Neritina reclivata sphaera Pilsbry, 1931.

At the other hand, conic specimens may occur in mainly globose populations as is the case in a sample from Columbia (HM 7861-7900). From this it is clear that it is almost impossible to divide Neritina usnea in two valid subspecies.

Since Neritina usnea, N. virginea and the three other Western Atlantic nerites: Neritina clenchi Russell, 1940, Neritina piratica Russell, 1940 and Neritina zebra (Bruguiere, 1792), form a close natural group, which differs considerably from Neritina pulligera (Linnaeus, 1767), typespecies of Neritina s.s., the use of the subgeneric name Vitta is here advised.

+No. 11: Donax panamensis, 34: 119-120.

The following synonyms are now known of the Olive Nerite:

Neritina (Vitta) usnea (Roding, 1798)

Nerita usnea Roding, 1798
Neritina lineolata Lamarck, 1822
Nerita reclivata Say, 1822
Neritina microstoma d'Orbigny, 1842
Neritina gravis Morelet, 1849
Neritina floridana Reeve, 1855
Neritina reclivata rotundata von Martens, 1865
Neritina reclivata palmae Dall, 1885
Neritina reclivata sphaera Pilsbry, 1931

The distribution of Neritina usnea does not stop at Panama (Abbott, 1955), but continues along the north coast of South America. In the author's collection are specimens from Columbia (HM 7861-7900) and French Guyana (HM 3851), while it has also been recorded from Venezuela (ten Broek, 1950).

To the Texas records I can add still Aransas Pass, east of Corpus Christi, where living specimens were collected on a rock jetty on June 1970 (HM 24189-24190).

Although its colour is usually olive green, sometimes it is purple (Ode, 1985). I do not know whether these differences in colouration are of any importance. However, in the author's collection is one specimen from Tampa, Florida (HM 21748), which is entirely purple except for the last half of the bodywhorl which is olive-green!

I like to thank Dr. E. Binder (Geneva) for permission to study the types of Lamarck. Thanks are also due to Mr. G. Gordon (Warner Robins, GA) for the donation of the sample from Texas.

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NOTES ON NERITINA RECLIVATA AND SUCCINEA CAMPESTRIS

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In Texas Conchologist XXI (3), April, 1985, Dr. Odé discusses Neritina reclivata and virginea. I should like to offer some comments. These species both occur in the Jacksonville, Florida, area. Reclivata is widespread in the lower reaches of the St. John's River, where it can be found in areas of moderate to extremely low salinity. (In St. Marks, Florida, it is in the Wakulla River near the fishcamp where there is no salt water intrusion, at least from the sea, even at the highest tide). Virginea, on the other hand, occurs in an arm of the Intracoastal Waterway called Salt Run, which forms the northwest shore of Anastasia Island, St. Augustine. Here it is associated with a marine fauna (e.g., Ilyanassa obsoleta, Polinices duplicatus, Mercenaria mercenaria) in contrast to reclivata's company of Rangia cuneata, Littoridinops tenuipes, and Mytilopsis leucophaeata, a clearly estuarine fauna.

I examined shells of both species collected in the localities noted above and found the spiral granulose sculpture just as Dr. Ode described. Each specimen of virginea, however, had a sculpture undifferentiable from reclivata. I went on to examine West Indian lots and found the same sculpture in virginea, although many specimens had the surface effaced. Well-preserved shells of several Indo-Pacific species show similar sculpture, the most conspicuous being the case of N. turrita (Gmelin).

Hugh Porter (The North Carolina Marine & Estuarine Mollusca - an Atlas of Occurrence, University of North Carolina Institute of Marine Sciences, Morehead City, May, 1974, p. 134) extends the range to his state for N. virginea and N. reclivata. Furthermore, he introduces a senior synonym for N. reclivata - Neritina usnea (Roding, 1798). Porter omitted the parentheses--a lapsus. This possible name change warrants study.

One reason I'm so keen on Neritina reclivata; ooops--usnea--is that Thomas Say described it from his 1818 trip to the St. John's River, N.E. Florida Coast, and Georgia Sea Islands. Several fine species were brought to light during that expedition, which was chronicled to some extent in his contemporary letters (see Weiss, H. B. and G. M. Ziegler in Thomas Say, Early American Naturalist, Charles C. Thomas, Baltimore, 1931). I'm sure much more would have been accomplished if it weren't for the threat of Indian attacks.

Another fascinating "local" (for us, that is) species is Succinea campestris Say. The author collected the type material from "Mr. Shaw's garden," where it was feeding on radishes. This notation embodies two important insights. Firstly, Mr. Shaw was an early

occupant of Dungeness*, a manse on the south end of Cumberland Island, Georgia. This place is in ruins today but still commands a view of the salt marshes and dunes which comprise the south end of Cumberland. The sea breeze is usually evident, and salt is in the air. I have never found S. campestris away from the salty air zone. Typically it lives in the dunes on sea oats and other members of that floral zone. I've never found them on radishes, but one usually doesn't find gardens juxtaposed with sand dunes. I guess Say's report was the first of campestris transgressing its natural habitat boundary. Thus Dr. Neck's report (p. 106 in TC, op. otherwise cit.) is slightly less unexpected.

But there is more to the story. Say was a guest of Mr. Shaw (son-in-law of Dungeness' builder, General Nathaniel Green of Revolutionary War fame) between late December, 1817 and January 30, 1818 and possibly again before June, 1818. He may, in fact, have met "Lighthorse Harry" Lee, who died in the same household on March, 1818. Thus, the often-quoted date for the description of S. campestris as 1817 is untenable. A review of publication dates for the Journal of the Academy of Natural Sciences of Philadelphia indicates that Volume 1 was begun in 1817 but that Say's paper on campestris appeared (very shortly after his Philadelphia homecoming) in June, 1818, on page 281 (W. G. Binney, editor, The Complete Writings of Thomas Say on the Conchology of the United States, M. Bailliere, New York, 1858). Pilsbry (Land Mollusca of North America, Vol. 2, part II, p. 826, 1948) apparently picked up "1817" from the front page or binder of the Journal. All subsequent authors have followed his precedent as best as I can tell. Let it now be Succinea campestris Say, 1818!

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*For more historical information, see Vanstory, Burnette Georgia's Land of the Golden Isles, Univ. Georgia Press, Athens, 1956.

MORE RECORDS OF NERITINA RECLIVATA

Merle Kleb reports that she and daughter, Tina Petway, collected several large, live Neritina reclivata again at Caney Creek, 5 miles south of Sargent, Texas, on May 26, 1985. They scooped them from the grasses from the pier of the Petway's beach house.

Tina brought the specimens home in bay water for observation. Merle asked her to clean them and bring them for deposit in the HMNS collections. These were important to show that the colony is still healthy after several years and some severe winter weather. There are not many live colonies reported for Texas. Tina brought only one large one for HMNS. She said she couldn't kill the others. They were returned to this unique colony at Caney Creek!

A lot consisting of 16 specimens of Neritina reclivata from Lake Maracaibo, near Palmarejo, north of Maracaibo, Venezuela, has been catalogued at the Houston Museum of Natural Science. This lot was collected by R. W. Barker in 1946 and has been donated to the museum's malacology collection.

TEXAS CONCHOLOGIST, Vol. XXI, No. 4, July, 1985

MOLLUSCAN DISTRIBUTION IN THE SUBMERGED LANDS OF TEXAS, GALVESTON-HOUSTON AREA[1]

T. R. CALNAN[2] AND T. G. LITTLETON[3]

INTRODUCTION

The State-owned submerged lands of Texas encompass almost 6,000 mi^2 (15,540 km^2). They lie below waters of the bay-estuary-lagoon system and below waters of the Gulf of Mexico, where they extend from the Gulf shoreline to a distance of 10.3 mi (16.6 km) on the inner continental shelf (fig. 1). A detailed inventory of the basic components of these lands was initiated in 1975. Approximately 6,700 surficial bottom samples were collected at regularly spaced intervals across the submerged lands. The sample-collection phase of the study was followed by an analytical phase that included detailed sedimentological, geochemical, and biological analyses. Many of the samples were analyzed to characterize submerged lands in terms of: (1) sediment distribution, (2) selected trace and major element concentrations, and (3) benthic macroinvertebrate (primarily mollusks, polychaetes, and crustaceans) populations. Additionally, the interconnection of submerged lands with adjacent marshes and associated wetlands led to an expansion of the project to include the distribution of wetlands. Maps and reports derived from the study will be published by the Bureau of Economic Geology as a series of seven atlases of the Texas coast, divided into areas (fig. 1) similar to those defined in the Bureau's Environmental Geologic Atlases (Brown, 1972-1980) and in a special report on submerged lands (McGowen and Morton, 1979). Each of the submerged lands atlases will include a text describing the maps of sediment types, sediment geochemistry, benthic macroinvertebrates, and wetlands. The section on benthic macroinvertebrates includes a discussion of the Mollusca, Polychaeta, and Crustacea, and sections on invertebrate distribution as related to sediment and bathymetry. In addition, there are discussions of benthic assemblages and species diversity. A list of all species, numbers of individuals of each species, and species locations are included in an appendix.

The atlas of the Corpus Christi area (White and others, 1983) was the first in the State-owned submerged lands series; the atlas of the Galveston-Houston area will be the second. Reports on molluscan distribution in the Brownsville-Harlingen, Beaumont-Port Arthur, Bay

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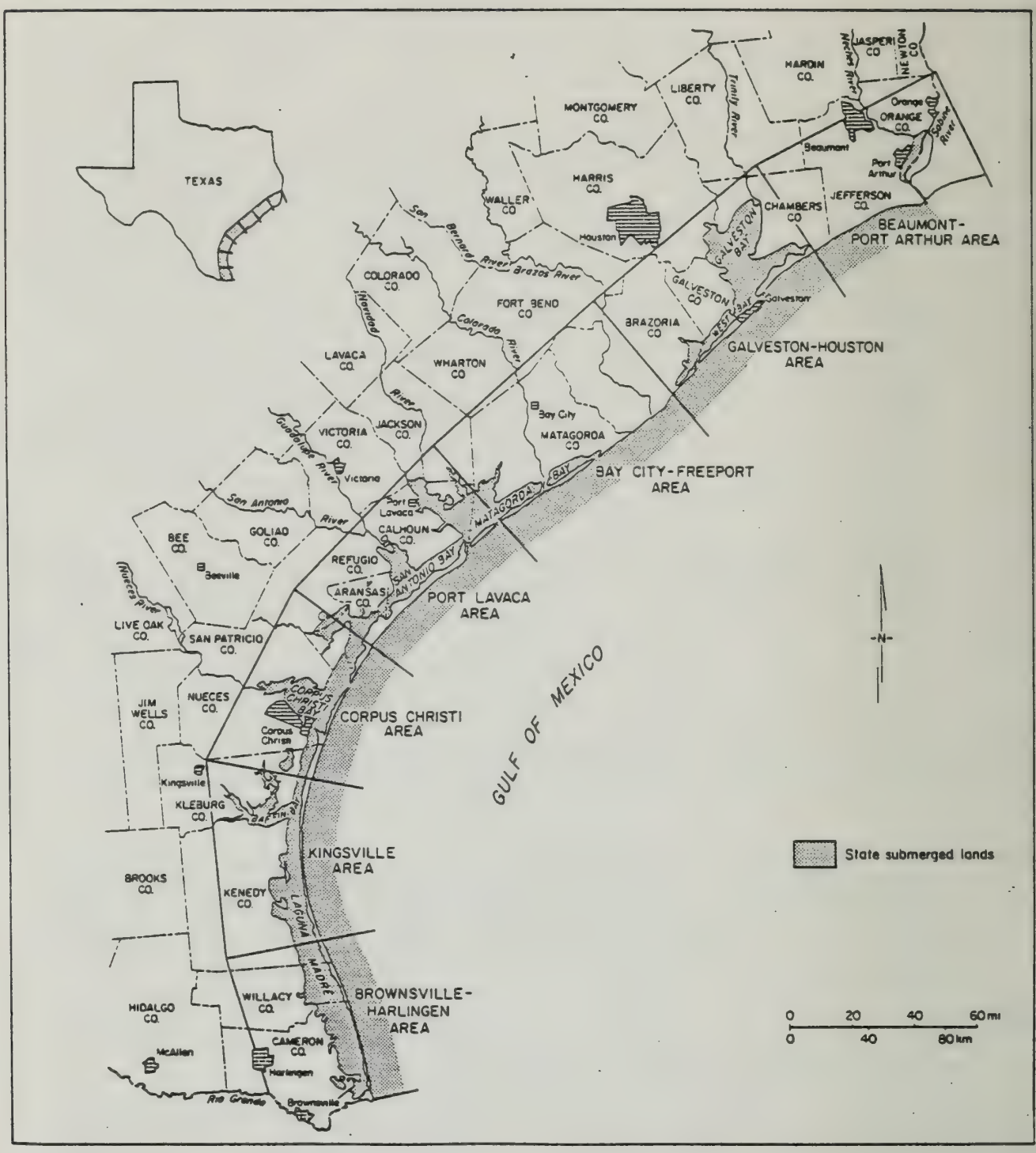

Figure 1. Index map showing seven area maps that cover the submerged coastal lands of Texas (modified from McGowen and Morton, 1979, and Brown and others, 1972-1980).

City-Freeport, Port Lavaca, and Kingsville areas will be included in future issues of the Texas Conchologist.

DATA ACQUISITION AND ANALYSES

Surficial sediment samples analyzed for this study were taken with grab samplers at sites spaced approximately 1 mi (1.6 km) apart in the bay-estuary-lagoon system and on the inner continental shelf to a distance of about 11.2 mi (18 km) seaward of the Gulf shoreline. Ponar clamshell grab samplers, having a capacity of approximately 0.065 ft^3 ($.0018m^3$), were used in the bay system, and Smith-McIntyre samplers, having a capacity of 0.46 ft^3 ($.013m^3$), were used on the shelf. Sediment penetration depths ranged between 1.5 and 5 inches (4 and 10 cm). Of the 1,368 sediment samples collected in the Galveston-Houston area, 263 (fig. 2) were analyzed for benthic macroinvertebrates. Bay-estuary-lagoon samples were primarily collected from July to October, 1976; inner shelf samples were collected in October, 1976, and September, 1977. Other details on data acquisition and analysis can be found in the Corpus Christi atlas (White and others, 1983).

RESULTS

Eighty-six species of live mollusks were collected from the Galveston-Houston study area, including 43 gastropods and 43 bivalves. Although 188 total species (live and dead species) were identified (Appendix A), including 101 gastropods, 86 bivalves, and 1 scaphopod, only those species collected live are considered in this report.

In the bays, Mulinia lateralis is the most abundant species with nearly one-third of the total number of individuals. Tellina versicolor is the most abundant species on the inner shelf. Table 1 lists the most abundant mollusks of each system in the Galveston-Houston area.

Bay-Estuary-Lagoon System

Galveston Bay

Thirty-two mollusk species were collected in Galveston Bay, including 14 gastropod and 18 bivalve species. Acteocina canaliculata and Odostomia impressa are the most abundant gastropod species, although neither species is as numerous as the most abundant bivalve species (Table 1). Acteocina was collected at five stations with sandy sediments. Odostomia occurs at two oyster reef or reef-flank stations.

Mulinia lateralis, by far the most abundant bivalve species, accounts for more than 35 percent of the total bivalve individuals. It is primarily found in sandy substrates.

Numbers of species (fig. 2) and individuals at stations in Galveston Bay are generally low. Stations in lower Galveston Bay have the higher numbers of species and individuals; none of the stations in

upper Galveston Bay have more than four species.

Trinity Bay

Only seven species of mollusks were found in Trinity Bay. Most of the seven species, such as Texadina sphinctostoma, T. barretti, and Rangia flexuosa, generally occur in the upper reaches of estuaries, where salinities average between 5 and 10 parts per thousand (ppt). Waters become fresher (salinity less than 0.5 ppt) during periods of high river flow or more saline (above 15 ppt) in periods of low fresh-water inflow (Hopkins and others, 1973).

The only three gastropod species collected in Trinity Bay are almost equally abundant (Table 1). Texadina barretti is the most abundant, accounting for almost 38 percent of the total gastropod individuals. All three gastropod species prefer muddy sediments.

Macoma mitchelli is the most abundant bivalve in Trinity Bay. Although Macoma was collected in both sandy and muddy sediments, it was most often found in muds. The two other abundant bivalves, Mulinia lateralis and Rangia flexuosa, prefer sandy sediments. Rangia cuneata, reported by other authors as a dominant mollusk in Trinity Bay (Hopkins and others, 1973), is not found living in any of the Galveston bays; however, dead shell occurs in all the bays and on the inner shelf.

East Bay

Nine species and 133 individuals were collected in East Bay. Brachidontes exustus, the most abundant mollusk, occurs only at one station. Other stations have two species or fewer; nineteen of the 29 stations have no live mollusks.

West Bay (including Chocolate, Christmas, and Bastrop Bays)

In West Bay samples, 1,330 individual mollusks were found representing 18 gastropod and 24 bivalve species. Bivalves constitute 85 percent of the total number of molluscan individuals. Mulinia lateralis is by far the most abundant and ubiquitous bivalve with 43 percent of the bivalve individuals and more than 36 percent of all molluscan individuals. Also, Mulinia occurs at about 86 percent of the West Bay stations. The three most abundant bivalves account for more than 80 percent of all bivalve individuals (Table 1). Acteocina canaliculata, the most abundant gastropod, makes up more than 66 percent of the total gastropod individuals.

Two West Bay stations have the most species (15) and individuals (163) of any stations in the Galveston-Houston map area. Both stations are on muddy sand in nearly 7 ft (2.1 m) of water.

The only station with seagrasses is in Christmas Bay. Gastropod species that typically occur in marine grassflats, such as Bittium

varium and Cerithium lutosum (White and others, 1983) were not collected at the grassflat station.

Clear Lake, Houston Ship Channel

Mulinia lateralis is the only species found living in Clear Lake. No live mollusks were found in the Houston Ship Channel.

Inner Shelf

Fifty-three species of mollusks (838 individuals) were found living on the inner shelf, including 30 gastropod and 23 bivalve species. Four species of gastropods, Nassarius acutus, Vitrinella floridana, Natica pusilla, and Parvanachis obesa, account for more than 67 percent of the total number of gastropod individuals. Nassarius acutus is the most abundant gastropod with about 20 percent of the total. Vitrinella floridana occurs primarily in substrates of sandy mud, with no individuals living in sandy substrates. Natica pusilla and N. acutus are generally found in muddy sands to sands.

Of the 355 total bivalve individuals, more than 60 percent are specimens of Nuculana concentrica or Tellina versicolor. Tellina versicolor is generally found in sandy substrates, whereas N. concentrica occurs in muds.

Numbers of species at inner shelf stations are generally low (fig. 2). Stations with more than four species generally occur from 1 to 3 mi (1.6 to 4.8 km) offshore and in water depths of less than 42 ft (12.8 m). The station with the highest number of species (11 species) is 1 mi (1.6 km) offshore and has a sandy substrate.

ACKNOWLEDGMENTS

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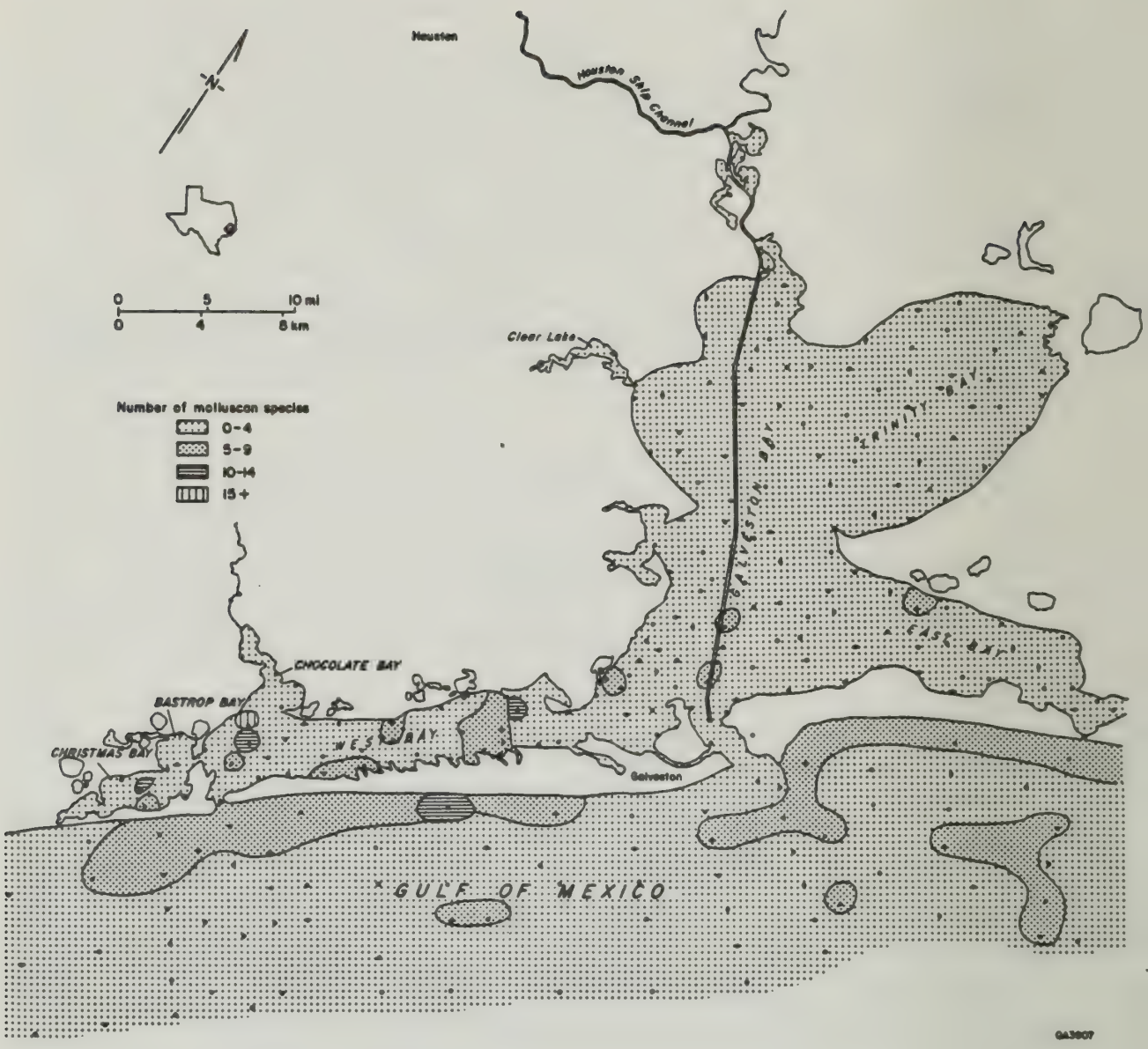

Figure 2. Map showing number of molluscan species and each sample location in the submerged lands of the Galveston-Houston area.

Table 1. Most abundant molluscan species, Galveston-Houston area.

GALVESTON BAY	Number of	Percent of all
Gastropoda	individuals	(71) gastropod individuals
Acteocina canaliculata	13	18.3
Odostomia impressa	10	14.1
Turbonilla cf. *T. interrupta*	9	12.7
Nassarius acutus	7	9.8
Texadina barretti	7	9.8
Texadina sphinctostoma	7	9.8
	Number of	Percent of all
Bivalvia	individuals	(202) bivalve individuals
Mulinia lateralis	72	35.6
Petricola pholadiformis	26	12.9
Mysella planulata	21	10.4
Tellina texana	20	9.9
TRINITY BAY	Number of	Percent of all
Gastropoda	individuals	(40) gastropod individuals
Texadina barretti	15	37.5
Probythinella louisianae	13	32.5
Texadina sphinctostoma	12	30.0
	Number of	Percent of all
Bivalvia	individuals	(32) bivalve individuals
Macoma mitchelli	13	40.6
Mulinia lateralis	8	25.0
Rangia flexuosa	7	21.9
EAST BAY	Number of	Percent of all
Gastropoda	individuals	(15) gastropod individuals
Texadina barretti	7	46.7
Texadina sphinctostoma	7	46.7
	Number of	Percent of all
Bivalvia	individuals	(118) bivalve individuals
Brachidontes exustus	86	72.9
Mulinia lateralis	12	10.2
Macoma mitchelli	12	10.2
WEST BAY	Number of	Percent of all
Gastropoda	individuals	(204) gastropod individuals
Acteocina canaliculata	135	66.2
Acteon punctostriatus	20	9.8
	Number of	Percent of all
Bivalvia	individuals	(1,127) bivalve individuals
Mulinia lateralis	483	42.8
Lyonsia hyalina floridana	252	22.4
Mysella planulata	173	15.4

Table 1. (Cont.)

CLEAR LAKE, HOUSTON SHIP CHANNEL, SAN JACINTO RIVER	Number of individuals	Percent of all (1) individuals
Bivalvia		
Mulinia lateralis	1	100.0

INNER SHELF	Number of individuals	Percent of all (483) gastropod individuals
Gastropoda		
Nassarius acutus	98	20.4
Natica pusilla	82	17.0
Parvanachis obesa	73	15.2
Vitrinella floridana	71	14.7

	Number of individuals	Percent of all (356) bivalve individuals
Bivalvia		
Tellina versicolor	118	33.1
Nuculana concentrica	99	27.8
Abra aequalis	33	9.3

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Appendix A: Distribution of Benthic Macroinvertebrates in the Galveston-Houston area.

G = Galveston Bay
T = Trinity Bay
E = East Bay
W = West Bay
CL = Clear Lake, Houston Ship Channel, and San Jacinto River
S = Inner Shelf
D = Dead Only

Distribution of Molluscan Species

	G	T	E	W	CL	S	Total
Phylum Mollusca							
Class Gastropoda Cuvier, 1797							
Family Fissurellidae Fleming, 1822							
Diodora cayenensis (Lamarck, 1822)						D	
Lucapinella limatula (Reeve, 1850)						D	
Family Hydrobiidae Stimpson, 1865							
Hydrobia sp.	D	D	D				
Family Littoridinidae Thiele, 1929							
Texadina barretti (Morrison, 1965)	7	15	7	6	D		35
Texadina sphinctostoma (Abbott and Ladd, 1951)	7	12	7	D	D	D	26
Family Stenothyridae Fischer, 1885							
Probythinella louisianae (Morrison, 1965)		13				D	13
Family Vitrinellidae Bush, 1897							
Vitrinella floridana Pilsbry and McGinty, 1946	D		D	D		71	71
Cyclostremiscus pentagonus (Gabb, 1873)	D			D		43	43
Cyclostremiscus suppressus (Dall, 1889)	D			D			
Anticlimax pilsbryi McGinty, 1945						D	
Solariorbis blakei Rehder, 1944	D						

	G	T	E	W	CL	S	Total
Solariorbis infracarinata Gabb, 1881						2	2
Solariorbis cf. *S. mooreana* (Vanatta, 1903)						D	
Teinostoma biscaynense Pilsbry and McGinty, 1945	D			D		2	2
Teinostoma lerema Pilsbry and McGinty, 1945				D			
Teinostoma parvicallum Pilsbry and McGinty, 1945						D	
Teinostoma sp.				D			
Family Caecidae Gray, 1850							
Caecum johnsoni Winkley, 1908	D			D		6	6
Caecum nitidum Stimpson, 1851	D						
Caecum pulchellum Stimpson, 1851	D			1			1
Family Turritellidae Clark, 1851							
Vermicularia fargoi Olsson, 1951			D				
Family Architectonicidae Gray, 1850							
Architectonica nobilis Roding, 1798						D	
Family Modulidae Fischer, 1884							
Modulus modulus (Linne, 1758)						D	
Family Cerithiidae Fleming, 1822							
Bittium varium (Pfeiffer, 1840)	D		D	D		D	
Alabina cerithidioides Dall, 1881						D	
Cerithiopsis emersoni (C. B. Adams, 1838)						D	
Cerithiopsis greeni (C. B. Adams, 1839)				D		D	
Seila adamsi (H. C. Lea, 1845)	D			D		D	
Litiopa melanostoma Rang, 1829						D	
Family Triphoridae Gray, 1847							
Triphora nigrocincta (C. B. Adams, 1839)				D		D	
Family Epitoniidae S. S. Berry, 1910							
Epitonium albidum (Orbigny, 1842)					D		
Epitonium angulatum (Say, 1830)	D					D	
Epitonium apiculatum (Dall, 1889)	D		D			4	4
Epitonium humphreysi (Kiener, 1838)			D				
Epitonium multistriatum (Say, 1826)	1			D		1	2

	G	T	E	W	CL	S	Total
Epitonium novangliae (Couthouy, 1838)						D	
Epitonium rupicola (Kurtz, 1860)	D					D	
Family Eulimidae Risso, 1826							
Eulima bilineatus (Alder, 1848)						7	7
Eulima hemphilli Dall, 1884						D	
Balcis arcuata (C. B. Adams, 1850)						D	
Balcis jamaicensis (C. B. Adams, 1845)						D	
Balcis sp.						D	
Niso aeglees Bush, 1885						D	
Family Aclididae G. O. Sars, 1878							
Henrya goldmani Bartsch, 1947						D	
Family Calyptraeidae Blainville, 1824							
Crepidula convexa Say, 1822	D		D	D		1	1
Crepidula fornicata (Linne, 1758)	D		D	D		D	
Crepidula plana Say, 1822	4	D	D	3		D	7
Family Naticidae Gray, 1840							
Natica pusilla Say, 1822	1		D	D		82	83
Polinices duplicatus (Say, 1822)	4		D	2		7	13
Sinum perspectivum (Say, 1831)						D	
Family Muricidae da Costa, 1776							
Thais haemastoma (Linne, 1767)	D					D	
Family Columbellidae Swainson, 1840							
Costoanachis cf. *C. avara* (Say, 1822)						D	
Costoanachis lafresnayi (Fischer and Bernardi, 1856)						D	
Cosmioconcha calliglypta (Dall and Simpson, 1901)						D	
Suturoglypta iontha (Ravenel, 1861)						D	
Parvanachis obesa (C. B. Adams, 1845)	3		D	1		73	77
Parvanachis ostreicola (Melvill, 1881)	D			D		1	1
Mitrella lunata (Say, 1826)	D			D		D	
Family Buccinidae Rafinesque, 1815							
Cantharus cancellarius (Conrad, 1846)						D	

	G	T	E	W	CL	S	Total
Family Melongenidae Gill, 1867							
Busycon perversum (Linne, 1758)						D	
Busycon spiratum (Lamarck, 1816)						D	
Family Nassariidae Iredale, 1916							
Nassarius acutus (Say, 1822)	7		D	D		98	105
Nassarius vibex (Say, 1822)	D			1			1
Family Olividae Latreille, 1825							
Oliva sayana Ravenel, 1834						D	
Olivella dealbata (Reeve, 1850)						6	6
Olivella minuta (Link, 1807)						4	4
Family Terebridae H. and A. Adams, 1854							
Terebra concava Say, 1827						D	
Terebra protexta Conrad, 1845						2	2
Family Turridae Swainson, 1840							
Kurtziella rubella (Kurtz and Stimpson, 1851)						D	
Cryoturris cf. C. cerinella (Dall, 1889)						D	
Kurtziella fargoi (McGinty, 1955)						2	2
Cryoturris serga (Dall, 1881)	D					D	
Cryoturris adamsi (E. A. Smith, 1884)	D					2	2
Nannodiella vespuciana (Orbigny, 1842)						D	
Pyrgocythara plicosa (C. B. Adams, 1850)	D		D	D			
Turrid sp.						D	
Family Pyramidellidae Gray, 1840							
Pyramidella crenulata (Holmes, 1859)	D					1	1
Odostomia dianthophila Wells and Wells, 1961						D	
Odostomia gibbosa Bush, 1909	D	D	D	D		1	1
Odostomia impressa (Say, 1821)	10		1	1			12
Odostomia seminuda (C. B. Adams, 1837)	D			2		D	2
Sayella cf. S. livida Rehder, 1935	D			D			
Eulimastoma cf. E. canaliculata (C.B. Adams, 1850)						D	
Eulimastoma engonia (Bush, 1885)	D		D	6		D	6

	G	T	E	W	CL	S	Total
Eulimastoma harbisonae Bartsch, 1955	D		D	1		D	1
Eulimastoma weberi (Morrison, 1965)	3	D	D	1	D	4	8
Turbonilla (*Chemnitzia*) sp. A	D			D		1	1
Turbonilla (*Chemnitzia*) sp. B						D	
Turbonilla (*Chemnitzia*) sp. F	D			D			
Turbonilla elegans (Orbigny, 1842)						D	
Turbonilla speira	1			1		9	11
Turbonilla cf. *T. interrupta* (Totten, 1835)	9		D	19		6	34
Turbonilla (*Pyrgiscus*) sp. B	1			2		24	27
Turbonilla (*Pyrgiscus*) sp. C						D	
Turbonilla (*Pyrgiscus*) sp. F				1		2	3
Turbonilla cedrosa Dall, 1884				1			1
Peristichia toreta Dall, 1889						D	
Cyclostremella humilis Bush, 1897	D			D		D	
Family Acteonidae Orbigny, 1842							
Acteon punctostriatus (C. B. Adams, 1840)	D			20		2	22
Family Acteocinidae Pilsbry, 1921							
Acteocina canaliculata (Say, 1822)	13	D	D	135		D	148
Family Cylichnidae A. Adams, 1850							
Cylichnella bidentata (Orbigny, 1841)	D			D		D	
Family Retusidae Thiele, 1926							
Volvulella persimilis (Morch, 1875)						1	1
Volvulella texasiana Harry, 1967						18	18
Family Cuvieridae Gray, 1840							
Creseis acicula (Rang, 1828)						D	
Cavolina longirostris (Blainville, 1821)						D	
Class Bivalvia Linne, 1758							
Family Nuculidae Gray, 1824							
Nucula proxima Say, 1822						D	

	G	T	E	W	CL	S	Total
Family Nuculanidae Meek, 1864							
Nuculana acuta (Conrad, 1831)	D			5		8	13
Nuculana concentrica (Say, 1824)	D			1		96	97
Family Arcidae Lamarck, 1809							
Anadara brasiliana (Lamarck, 1819)						1	1
Anadara transversa (Say, 1822)	D		D	D		5	5
Lunarca ovalis (Bruguiere, 1789)	D			D		2	2
Family Noetiidae Stewart, 1930							
Noetia ponderosa (Say, 1822)	D					D	
Family Mytilidae Rafinesque, 1815							
Brachidontes exustus (Linne, 1758)	4	D	86	D		D	90
Ischadium recurvum (Rafinesque, 1820)	10			D	D		10
Gregariella coralliophaga (Gmelin, 1791)						D	
Amygdalum papyrium (Conrad, 1846)	4			3			7
Family Pectinidae Rafinesque, 1815							
Argopecten gibbus (Linne, 1758)						D	
Argopecten irradians amplicostatus Dall, 1898	D			D		D	
Family Plicatulidae Watson, 1930							
Plicatula gibbosa Lamarck, 1801						D	
Family Anomiidae Rafinesque, 1815							
Anomia simplex Orbigny, 1842	D			D		D	
Family Limidae Rafinesque, 1815							
Lima cf. *L. locklini* McGinty, 1955						D	
Family Ostreidae Rafinesque, 1815							
Ostrea equestris Say, 1834	D	D	D	D	D	D	
Crassostrea virginica (Gmelin, 1791)	2	D	D	D	D	D	2
Family Lucinidae Fleming, 1828							
Linga amiantus (Dall, 1901)	D			1		17	18
Parvilucina multilineata (Tuomey and Holmes, 1857)	D					1	1
Family Ungulinidae H. and A. Adams, 1857							
Diplodonta semiaspera (Philippi, 1836)	D			D		D	

	G	T	E	W	CL	S	Total
Diplodonta cf. *D. soror* C. B. Adams, 1852				D		1	1
Family Chamidae Lamarck, 1809							
Chama congregata Conrad, 1833						D	
Chama macerophylla (Gmelin, 1791)						D	
Arcinella cornuta Conrad, 1866						D	
Pseudochama radians (Lamarck, 1819)						D	
Family Kelliidae Forbes and Hanley, 1848							
Aligena texasiana Harry, 1969	D			48		D	48
Family Montacutidae Clark, 1855							
Mysella planulata (Stimpson, 1857)	21		2	173		1	197
Family Sportellidae Dall, 1899							
Ensitellops sp.	D			D		D	
Family Crassatellidae Ferussac, 1822							
Crassinella lunulata (Conrad, 1834)	1	D	D	D		13	14
Family Cardiidae Oken, 1818							
Trachycardium muricatum (Linne, 1758)	D			D		D	
Laevicardium mortoni (Conrad, 1830)	D			4		D	4
Dinocardium robustum (Lightfoot, 1786)						D	
Family Mactridae Lamarck, 1809							
Mactra fragilis Gmelin, 1791	D					D	
Mulinia lateralis (Say, 1822)	72	8	12	482	1	8	583
Rangia cuneata (Sowerby, 1831)	D	D	D	D	D	D	
Rangia flexuosa (Conrad, 1839)	8	7	5	D		D	20
Spisula solidissima similis (Say, 1822)			D				
Raeta plicatella (Lamarck, 1818)						D	
Family Solenidae Lamarck, 1809							
Solen viridis Say, 1821						2	2
Ensis minor Dall, 1900				33		D	33
Family Tellinidae Blainville, 1814							
Tellina aequistriata Say, 1824						D	
Tellina alternata Say, 1822						D	

	G	T	E	W	CL	S	Total
Tellina iris Say, 1822	6					1	7
Tellina texana Dall, 1900	20	4	1	19		D	44
Tellina versicolor DeKay, 1843	D					118	118
Tellina sp.						7	7
Tellidora cristata (Recluz, 1842)						D	
Strigilla mirabilis (Philippi, 1841)						D	
Macoma brevifrons (Say, 1834)						D	
Macoma mitchelli Dall, 1895	16	13	12	9			50
Macoma tageliformis Dall, 1900						D	
Macoma tenta (Say, 1834)	D			D		2	2
Family Donacidae Fleming, 1828							
Donax texasianus Philippi, 1847	D					D	
Donax variabilis Say, 1822	D			D		D	
Family Semelidae Stoliczka, 1870							
Semele bellastriata (Conrad, 1837)	D					D	
Semele nuculoides (Conrad, 1841)						D	
Semele proficua (Pulteney, 1799)	D			D		D	
Semele purpurascens (Gmelin, 1790)	D					D	
Semele sp.						D	
Cumingia tellinoides (Conrad, 1831)	D			2			2
Abra aequalis (Say, 1822)	2		D	4		38	44
Family Solecurtidae Orbigny, 1846							
Tagelus divisus (Spengler, 1794)	D			4		D	4
Tagelus plebeius (Lightfoot, 1786)	1	D	D	D			1
Family Dreissenidae Gray, 1840							
Mytilopsis leucophaeata (Conrad, 1831)	D	D	D	D	D	D	
Family Veneridae Rafinesque, 1815							
Mercenaria campechiensis (Gmelin, 1791)	D			1		D	1
Chione cancellata (Linne, 1767)	1			1		D	2
Chione clenchi Pulley, 1952						D	
Chione grus (Holmes, 1858)						D	

	G	T	E	W	CL	S	Total
Chione intapurpurea (Conrad, 1849)						D	
Anomalocardia auberiana (Orbigny, 1842)				D		D	
Gouldia cerina (C. B. Adams, 1845)						D	
Agriopoma texasiana (Dall, 1892)						D	
Dosinia discus (Reeve, 1850)	D			1		5	6
Cyclinella tenuis (Recluz, 1852)				D		1	1
Gemma cf. *G. purpurea* (Lea, 1842)						D	
Family Petricolidae Deshayes, 1831							
Petricola pholadiformis (Lamarck, 1818)	26		D	D		10	36
Rupellaria typica (Jones, 1844)	D						
Family Myidae Lamarck, 1809							
Paramya subovata (Conrad, 1845)				1		D	1
Family Corbulidae Lamarck, 1818							
Corbula caribaea Orbigny, 1842	D			1		D	1
Corbula contracta Say, 1822	D			D		12	12
Corbula dietziana C. B. Adams, 1852	D			D		D	
Varicorbula operculata (Philippi, 1848)						D	
Family Pholadidae Lamarck, 1809							
Cyrtopleura costata (Linne, 1758)	D					D	
Diplothyra smithii Tryon, 1862	2		D	7			9
Family Lyonsiidae Fischer, 1887							
Lyonsia hyalina floridana Conrad, 1849	5			252		D	257
Family Pandoridae Rafinesque, 1815							
Pandora trilineata Say, 1822	1			8		1	10
Family Periplomatidae Dall, 1895							
Periploma margaritaceum (Lamarck, 1801)	D		D	46		5	51
Periploma orbiculare Guppy, 1878				20			20
Class Scaphopoda Bronn, 1862							
Family Dentaliidae Gray, 1834							
Dentalium texasianum Philippi, 1848	D			D		D	

TURBONILLA WRIGHTSVILLENSIS ALSO IN TEXAS

In an 1981 paper Dr. Eric N. Powell of the Department of Oceanography, Texas A&M University, named a new species of Turbonilla from North Carolina, with additional records listed from Texas.

Turbonilla wrightsvillensis Powell, 1981 was described in "Three Turbonilla (Pyramidellidae, Gastropoda) of North Carolina, with Comments on Pyramidellid Systematics" in The Journal of the Elisha Mitchell Scientific Society 97 (1), 1981, pp 37-54.

Dr. Powell discussed this species as one of the largest pyrgiscans, shells with both axial and spiral sculpture patterns, on the East Coast. He had collected it most often from a muddy and sand bottom, in large numbers actually, in about 1 meter depth along Banks Channel, Wrightsville Beach, North Carolina.

The paper included records of dead shells from Corpus Christi, Texas, and live material from Buccaneer field in 21 meters, 50 kilometers south of Galveston, Texas. These were loaned to the author by Dr. J. Holland of the University of Texas and Dr. D. Harper of Texas A&M--Moody College, respectively.

The growth form of T. wrightsvillensis is said to be reminiscent of T. punicea. Comparison is made to T. interrupta Totten, 1835, and Dr. Powell remarks that this new species has undoubtedly been identified as T. interrupta a number of times.

An adult of this new species is said to have 13-14 whorls, have a larval shell of about two whorls, is low spired with only the first whorl exposed above the teleoconch whorl. It falls into the five-groove spiral sculpture pattern. Specimens we have from Dr. Powell are tan or brownish.

Three syntypes of T. wrightsvillensis have been placed in USNM, and a series of three has been placed in ANSP. These include both young and adult specimens which often look dissimiliar enough to be thought to be different species without careful study.

Dr. Powell (pers. comm.) says that the Texas specimens discussed are probably housed at TAMU-Galveston (Harper's specimens) and UT, Port Aransas, (Holland's). He states that the Bureau of Economic Geology at the University of Texas, Austin, also has some specimens of this species in its collection.

Dr. Powell has been kind enough to send two of the North Carolina specimens to HMNS. This will assist Dr. Helmer Ode in his examination of specimens in the Northwest Gulf Survey housed at the Houston Museum of Natural Science. Since this survey has offshore material from some of the localities listed of this new species in Texas, the HMNS collections probably will have some of the material.

Summary by C. Boone

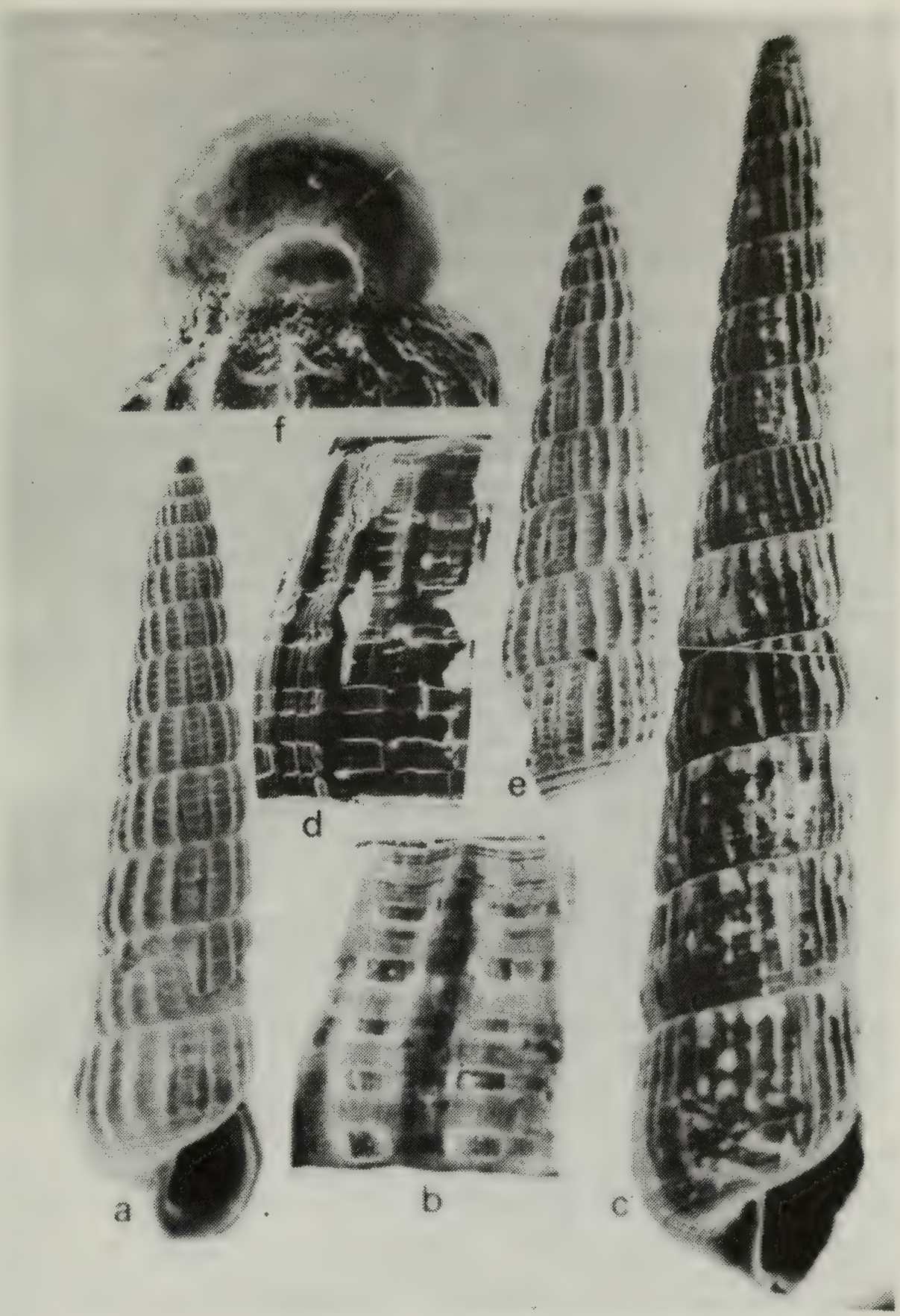

Fig. 1 Turbonilla wrightsvillensis, a, e, c -- entire shell; b, d, closeup of penultimate whorl of 4 e, c, respectively; f, larval shell of e. Scale bar equals a, 0.88 mm.; b, 0.14 mm.; c, 0.95 mm.; d, 0.32 mm.; e, 0.78 mm.; f, 74μm Produced from a slide provided by Dr. Eric N. Powell.

TEXAS CONCHOLOGIST, Vol. XXI, No. 4, July, 1985

MELANOIDES TUBERCULATA (THIARIDAE) IN EXTREME SOUTHERN TEXAS

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ABSTRACT

Melanoides tuberculata is reported from Brownsville, Cameron County, at the southern tip of Texas. Origin of the population may involve release of aquarium snails, but the existence of an upstream nursery with ponds could be implicated.

The Malaysian live-bearing snail, Melanoides tuberculata (Muller, 1774) is native to subtropical and tropical areas of northern and eastern Africa and southern Asia from Morocco and Madagascar to Indonesia (Pilsbry and Bequaert, 1927:253; Pace, 1973; Brown, 1980) but has become established in numerous portions of the southern United States (Murray, 1964, 1971; Clench, 1969; Russo, 1974; Roessler, et al., 1977). Populations in Texas (Fullington, 1979) are restricted to spring-run streams associated with the Balcones Escarpment. M. tuberculata is able to survive in these habitats because of near-constant water temperatures which successfully buffer the otherwise fatal effect of cold winter temperatures. Some bodies of water in southern Texas may be warm enough but water chemistry and food supplies may not be suitable.

FIELD OBSERVATIONS

As part of a review of the freshwater and terrestrial snails of the Lower Rio Grande Valley of Texas, field sampling recovered shells of Melanoides tuberculata in Brownsville, Cameron Co., Texas. Shells were first recovered on 22 June 1984 from bottom drag samples of the Town Resaca at Boca Chica Boulevard (Texas Highway 4) (resacas are abandoned river channels of the Rio Grande). Water depth was approximately 1.2 m; a strong sulfur smell was evident when bottom sediments were disturbed. No shells were recovered on 26 September 1984 but additional shells were collected on 21 October 1984.

No living animals were recovered, but all shells were in reasonably fresh condition. The largest specimen measured 29.9 mm. in length and 10.4 mm. in width while the smallest shell measured 3.4 mm. in length and 116 mm. in width. Shells were characterized by prominent transverse ribs which give the shell surface a wrinkled appearance. These wrinkles exhibit a more intense expression on the dorsal half of each whorl. Intensity of wrinkles decreases with age so that body whorls on larger shells have almost no wrinkles.

Associated mollusks form a locally diverse fauna for this geographical area. Bivalve fauna was composed of two unionids, Anodonta imbecilis

Say, 1829, and Cyrtonaias tampicoensis (Lea, 1838), and three sphaeriacean clams, Corbicula fluminea (Muller, 1774), Sphaerium partumeium (Say, 1822), Sphaerium transversum (Say, 1829). The pulmonate fauna included Gundlachia radiata (Guilding, 1828), Stagnicola bulimoides techella (Haldeman, 1867), Physella virgata (Gould, 1855), Biomphalaria obstructa (Morelet, 1849), and Drepanotrema kermatoides (d'Orbigny, 1835). The only other prosobranch snail recovered was Pyrgophorus coronatus (Pfieffer, 1849). Aquatic snails were found on submerged branches and palm leaves or on floating aquatic plants (water hyacinth, Eichhornia crassipes, and water lettuce, Pistia stratiotes).

DISCUSSION

Origin of this extreme southern Texas population of Melanoides tuberculata is unknown at this time. The most likely explanation is a local release of aquarium snails. A survey of aquarium outlets in the Brownsville area in September 1983 revealed no M. tuberculata. However, M. tuberculata were observed in such outlets during the 1960's.

Existence of the wrinkled phenotype of M. tuberculata at Las Moras Creek, Rio Grande drainage (observed in collection at Trinity University), brings into question the possibility of a long-distance downstream transport of living snails. However, such a trek would total several hundred kilometers of Las Moras Creek in addition to the Rio Grande. Snails would have to withstand sluggish river waters in a hot, semi-arid region including Falcon Reservoir. Additionally, a short distance through irrigation canals would be required to reach the Town Resaca. Such a colonization route would appear to be very unlikely. Variation in shell morphology between Florida populations has been reported (Clench, 1969; Roessler, et al., 1977).

Recovery of only empty shells may indicate that the collection site acts as a "trap" for downstream drift of snail shells which leave the suitable habitat. However, no snails or empty shells of M. tuberculata have been found upstream in Town Resaca. A plant nursery with ponds upstream from the collection site was examined, but no snails were observed. Occurrence of shells of variable size indicates that suitable habitat for establishment and reproduction of M. tuberculata exists (or existed) nearby. M. tuberculata is very resistant to low oxygen levels and should be able to survive the sluggish, turbid waters of Town Resaca. M. tuberculata is known from a great variety of environments (Pace, 1973; Roessler, et al., 1977; Brown, 1980).

The recovered shells may be the remains of a viable population of M. tuberculata which was killed by the unusual cold wave of December 1983. In most winters Brownsville does not experience temperatures as low as -2° (28°C), and many winters pass with no freezing temperatures. However, a temperature of about -6.5°C (20°F) was recorded at Brownsville on 25 December 1983. Even more significant was the occurrence of subfreezing temperatures for 54 consecutive hours; temperatures were below -3.3°C (26°F) for 27 hours. No records of water temperatures are available for Town Resaca but water temperatures undoubtedly fell below the critical temperature of M. tuberculata.

Subsequent investigations of this area will be made to determine if any living Melanoides tuberculata remain in this area.

Acknowledgements

George W. Bomar of Texas Department of Water Resources provided temperature data. Harold D. Murray allowed inspection of specimens from Las Moras Creek.

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DUES TIME, DUES TIME, DUES TIME!!!

With the October issue, we will begin Vol. XXII of Texas Conchologist. This last year we have increased pages in our quarterly, and we have had some exciting papers. We anticipate continued growth. You will not want to miss an issue. If you have not paid your dues, send them now to Treasurer Valerie Middaugh, 2701 North Blvd., #1, Houston, Texas 77011. HCS begins meeting in August. You will want your newsletters and information on field trips also. Our dues have not increased. You get full value for the modest fee of $9.00 single, $10.00 family, $6.00 student, and $10.00 subscription price for institutions. Overseas correspondents must add postage of $5.00 seamail or $8.00 airmail.

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