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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.

TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

A POT OF 'GREEN'

By Jan Hobbs

Ordinarily I am not one to go chasing after a pot of gold at the end of the rainbow. However, from time to time I do make exceptions; this is an account of one. My husband, Lonnie, and I were invited to accompany my parents on a vacation to the beautiful state of Hawaii in April, 1985. Lonnie has talked of wanting to see the islands for a long time, so we just couldn't pass up the opportunity. I began to read all I could about the history, geography, tourist attractions, and of course, the shell fauna of our destination.

In an old National Geographic I came upon mention of a sight that intrigued me. The more I thought about it the more I became determined to see it. The author mentioned a laborious trek on the Big Island of Hawaii to see a beach of green sand. Now we have all heard of the beaches of black sand, and Lonnie and I have seen beaches from tan to sugar white, but green?

I read page after page of guide books looking for the specific location, because the magazine article described it in general terms. Exactly how to get there eluded me. Then in a new issue of the Hawaiian Shell News was an article about a gentleman on the Big Island who invited visitors to view his extensive shell collection. Feeling confident that here was someone who would know what I sought, I wrote to him. Alas, he had never even heard of such a place, but he was so kind and helpful that he investigated and sent to me a copy of the directions to this "pot of gold". Without his help, I expect we would never have seen it. (Our visit with him is another whole story.)

With only two days to spend on the Big Island, we had to "make tracks". One of those days I just had to see the famous volcano Kilauea, but the second was reserved strictly for searching for the green sand. There were two choices: the first was to hike two or more miles in the sun and heat with no shade to be found; the second was to rent a four-wheel-drive jeep. We were not opposed to walking, but because of the time and distance restrictions, the jeep seemed the wisest choice. We were able to rent one, and at 5 a.m. we were off on one of the finest adventures of our vacation.

Our destination lay at the southern tip of the island, and we had spent the night on the other side at Hilo. A steady rain made us question the wisdom of our journey, but once we crested Kilauea, the day was clear and beautiful. We had little difficulty finding the famous Ka Lae, the southernmost point in the United States, but from there the going got rough. There is certainly no way one could make the trip without a jeep (other than walking), and most of the time I could walk as fast as the jeep could drive. At times I chose to walk to rest my body from the jolting. The "path" crossed at least two old lava flows. Driving across the lava reminded me of climbing a rough mountain full of boulders, except this lay basically horizontal. Back of the sea lay the unexpected dry barrenness characteristic of the leeward side of the islands we saw. Driving was so slow and so rough we questioned the validity of our odometer reading. The distance was fairly crucial, as the directions said it was easy to miss the green

sand if one wasn't careful.

The coastline was a continuous mass of lava meeting the sea, so we regularly walked down to check for signs of green sand. At last, there it lay before us. "Beach" is not really an accurate term for what we found, so we will continue to wonder if we really found the right place, but considering the harshness of the trail and shortness of time, we decided to settle for what we found. The "sand" lay in pockets in the lava. The color was an avocado green, and the composition was really green crystals, not sand. But what an interesting sight to see pockets of the green stuff lying against the black lava.

The lava in the area was spotted with green crystals embedded in it. Erosion by the sea had broken the crystals free and deposited them in masses upon the shoreline. Surprisingly, there was little of the black lava ground up in it, so I could only surmise that the crystals were more durable than the black substance we think of as lava.

We sat and enjoyed the rugged beauty and tranquility of this place. There was no other sign of human activity or noise. The vast blue waves curled in to provide a most peaceful setting.

Before long, I had to start searching for a mollusk or two. We cared little if the spray got too close or our clothes got a little dirty, for the search was on. There lodged in a crevice was a giant Cypraea that Lonnie managed to work loose. It was scarred and battered, so we left him in what we hoped was a safe place to continue his existence. I turned over any loose rocks I could manage, but there were not very many. Finally I was rewarded with the first Cypraea I had ever found. There in a depression on the underside of the lava rock were two Cypraea caputserpentis, all shiny and beautiful. One was noticeably larger than the other. (This was the pattern of subsequent finds of the cowries: usually two together and one larger than the other.) There was very little drift in the area, but an occasional deposit of broken shells yielded a few small specimens that were new and lovely to us.

We stayed as long as we dared, but our scheduled flight out of Hilo was the last of the day, and we didn't want to miss it. The return drive included a stretch of road construction, so the jeep and everything inside was layered with dust. We arrived at the airport with only a few minutes to spare, looking windblown, bedraggled, and dirty, but you should have seen the smiles on our faces! That day was perhaps the most memorable of our shelling experiences and one we will cherish. Our thanks are to Rocky Chibana, without whose help we might never have found the "pot of green" at the end of my rainbow.

VACATIONING IN THE DUMP AND THE PIT

By Lucy Clampit and Emily Oakes

Ever dream of spending your vacation at a dump? Or in a pit? Try it. You'll like it. Quite a few HCS members did this summer.

At the end of May, Jerry and Lucy Clampit went to Orlando, Florida to visit members Dave and Lucille Green. Port Canaveral, home of the famous scallop dump, is only an hour drive from Orlando.

Emily and Bill Oakes and Freya and Donald Oates journeyed to Orlando and Canaveral in August. Dave and Lucille Green accompanied them to the dump and the river dock area. They made two trips there, en route to Sanibel and en route home, with a weekend visit to the Sarasota fossil pit.

Lucy said the dump was closed to collectors and guarded during the day, so their first stop was at the boat docks. The crew members on the scallop boats consider most shells to be junk. Sometimes they save the big shells or throw them on the dock. Some gave them shells; others sold shells to them for "beer and cigarette" money.

Lucy said they were able to obtain very large helmet shells, horse conchs and lightning whelks. Dave purchased over a dozen junonias from one boat. They were also able to get tuns, Murex, and two dark brown olives. One man had a large cowrie which he refused to sell.

Their high point at the docks was being able to get on a scallop boat and pick out shells before the catch was taken to the processing plant. While the boat was trawling, a net was torn, and the boat had to return for repairs with only a partial load of scallops.

Emily reports they were unable to get on boats or on the docks where scallops were unloaded.

Lucy and her team went to the old dump first which consists of mountains of old scallop shells. The biggest find was several arrowhead sand dollars.

The guard leaves the "new dump" about 5:30, so that's when the Houston members went there, except that Emily says the area was open on Sunday and other collectors were there. This dump is a landfill. All HCS members had a GREAT time collecting. Buckets filled up rapidly as they tried to avoid getting under the sea gulls that were disturbed. Emily says this smelly mess isn't for everyone. There are flies and maggots and mosquitos. Bill says he won't go back. They wore masks lined with Vicks their second trip!

When they returned to Houston, Lucy and Jerry had at least 32 species of shells. Here is their list of the identified shells from the boats and dump:

GASTROPODS

Architectonica nobilis
Natica canrena
Phalium granulatum
Cassis madagascariensis spinella
Distorsio clathrata
Murex fulvescens
Fasciolaria lilium hunteria
Pleuroploca gigantea
Busycon perversum
Oliva sayana
Conus delessertii
Polinices duplicatus
Strombus alatus
Cypraecassis testiculus (old shell)
Tonna galea
Distorsio constricta macgintyi
Murex pomum
Fasciolaria tulipa
Scaphella junonia
Busycon spiratum
Oliva sayana? (dark brown)

PELECYPODS

Pecten raveneli
Arcinella cornuta
Macrocallista maculata
Glycymeris undata
Argopecten gibbus
Chione latilirata
Arca zebra
Laevicardium laevigatum

There are a few others, including a Murex, that Lucy has yet to identify to her satisfaction. She has lumped all of the olives, even the dark brown ones, under Oliva sayana, but she feels they need more study.

On previous trips Dave and Lucille have collected other species including Trivia, a small cowrie, Maculated Baby's Ear, and some unidentified bivalves. Dave has obtained more junonias, a Lion's Paw, and a large cowrie (probably Cypraea cervus) from the boats. He and Lucille went two days in a row in late August (met up with Emily and Bill the second day) and reported they got 300 Phalium granulatum one day.

Emily relates that they bought only a few shells as few boats had shells or were going out in August. They had an exciting time trying to retrieve a "huge" horse conch in the river but never made it. Also there was a Busycon on the wall, which Emily says was right-handed, which they couldn't get. The drop off, due to low tide which allowed them to see the shells, was some eight feet. They did find several horse conchs and busycons at another place on the river.

They all highly recommend collecting at Port Canaveral. After only ONE AFTERNOON of collecting, Lucy and Jerry brought back 4 large boxes of shells on the plane in addition to some in their luggage! The others have garage-fuls of smelly shells they brought back in the Oakes' new van!

Lucy recommends when you go to the dump, you wear old shoes and garden gloves and take a small hand rake in addition to your usual buckets and bags. They also recommend old clothes and a WIDE BRIM hat for sea gull droppings!

If you go in the cooler months, the ODOR might not be so bad, and there will be more boats in port. The boats come and go constantly from the docks, but by late spring they have harvested most of

Florida's scallops, and many move to ports farther up the coast. When you visit the boats be sure and take a lot of small bills. It's similar to shopping in Mexico - you bargain for the shells.

Give Lucy or Emily a call when you start planning your trip, and they can give you some more tips. Remember that Helen Cornellisson wrote about her experiences (Vol. XXI, No. 4), and she has ideas to help you "be ready for the dump and the pit."

The March, 1985 issue of Hawaiian Shell News has an article with additional information.

Emily's party went on to Sanibel for a week's shelling. She reports "no shells at Sanibel" but admits she got about 100 epitoniums near the Lighthouse and that Freya and Donald collected Busycon perversum at Blind Pass.

They were joined by Nancy McPhaul, Marsha McDugle, and Joyce Crumley during the week at Sanibel and to go to the Sarasota fossil pit. They had to pay $50.00 to get in because the Visitors' Supervisor does not work except by appointment in July and August. It was "beastly hot," Emily says, but everybody got as many fossils as they wanted to carry home, and fossils are not smelly!

Now comes the cleanup and the task of identifying all the spoils of these particular kinds of collecting. Most of the shells would all go to waste, remember. There can't be any guilt attached to being as gluttonous as you care to be in a dump and a pit!

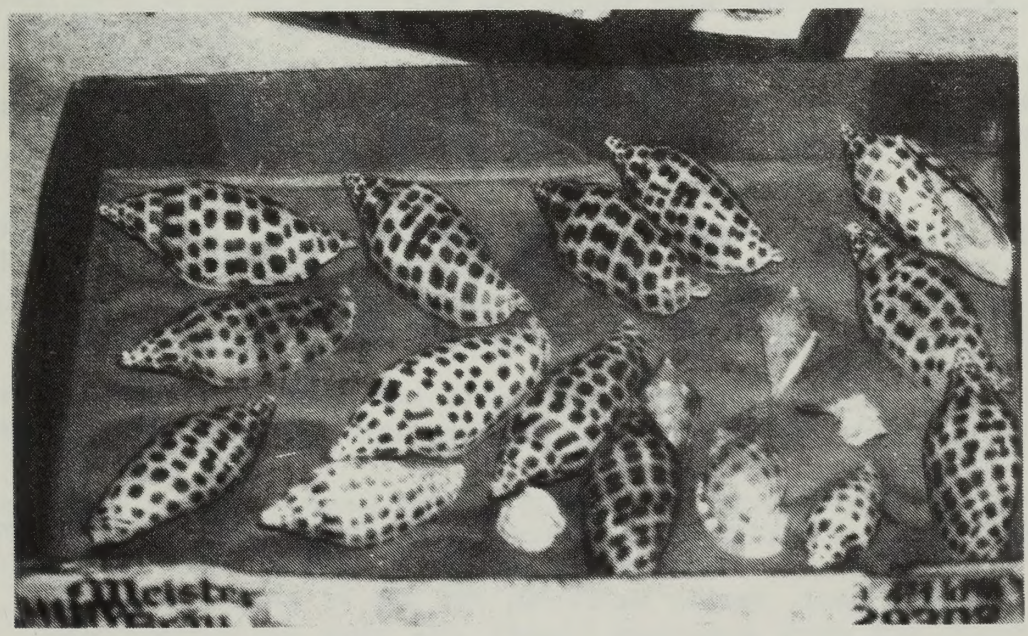

Fig. 1 These Scaphella junonia were purchased from the scallop boats off east Florida and are part of the "loot" brought home by Lucy Clampit and Dave Green.

TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

REFERENCES TO HELP IDENTIFY FOSSIL MOLLUSCA FROM SOUTHERN FLORIDA

By Paul E. Drez

Several of our club members have visited some of the fossil pits during their travels through central and southern Florida. For many, this is their first experience at collecting fossil mollusca and after the long trip back to Houston, the weary traveler is next faced with the problem of identifying his/her "treasures."

Because of my familiarity with the molluscan faunas of this area, Connie Boone asked if I would put together a short list of references that a member might use for correctly identifying the fossils. I have listed below the publications that I have found to be the most useful in my own work. This list is by no means comprehensive, but it is only meant to be a starting point for identification of mollusca from the extremely rich faunas of the Floridian peninsula. The publications are meant to help with the identification of fossils from the three formations that are most commonly collected: lower to middle Pliocene Pinecrest (pits near Sarasota), upper Pliocene to lower Pleistocene Caloosahatchee (Mule Pen Quarry) and Pleistocene Bermont (Belle Glade Pit). The Bermont has also been referred to in the literature as Unit A, "Glades" and unnamed post-Caloosahatchee formation.

You will notice that many of the publications are "old" and out of print. Some of these should be in the club's library or available in local libraries (e.g. Rice University or University of Houston). The most recent comprehensive publication, Olsson and Harbison, 1953, has been out of print for many years, but has been reprinted (see footnote 2). This is a <u>must</u> publication for anyone interested in the Caloosahatchee or Pinecrest faunas. One must remember that much more work is needed on the Caloosahatchee and Pinecrest faunas, and that there are many undescribed species, especially in the Pinecrest.

[1]Dall, W. H., 1890-1903, Contributions to the Tertiary Fauna of Florida with special reference to the Miocene Silex beds of Tampa and the Pliocene beds of the Caloosahatchee River: Wagner Free Inst. Sci., Trans., v. 3, pts. 1-6, 1654 p., 60 pls.

(Good general reference on fossil mollusca from the Tertiary of Florida and other formations in the Gulf and Atlantic Coastal Plains).

[4]DuBar, J. R., 1958, Stratigraphy and paleontology of the late Neogene strata of the Caloosahatchee River area of southern Florida: Florida Geol. Survey Bull. 40, 267 p., 12 pls., 49 figs.

(Review of geology and stratigraphy of southern Florida plus illustration of many species of common fossil mollusca).

[1]Gardner, J., 1943[1944]-1948, Mollusca from the Miocene and lower Pliocene of Virginia and North Carolina: U. S. Geol. Survey Prof. Paper 199, 310 p., 38 pls.

(Discusses several species that also occur in the Tertiary of Florida).

[5]Gertman, R. L., 1969, Cenozoic Typhinae (Mollusca: Gastropoda) of the western Atlantic region: Tulane Studies Geol. Paleont., v. 7, no. 3-4, p. 143-191, 8 pls.

[3]Heilprin, A., 1887, Exploration of the west coast of Florida and in the Okeechobee Wilderness: Wagner Free Inst. Sci., Trans., v. 1, 134 p., 19 pls.

(Interesting original reference for many Caloosahatchee and Pinecrest species; most species are reviewed in more recent publications).

[5]Hoerle, S. E., 1970, Mollusca of the "Glades" unit of southern Florida-pt. II, List of molluscan species from the Belle Glade rock pit, Palm Beach County, Florida: Tulane Studies Geol. Paleont., v. 8, no. 2, p. 56-68.

(A comprehensive list of mollusca from a classic Bermont (Unit A) formation locality, including references for each species).

[1]Mansfield, W. C., 1930, Miocene gastropods and scaphopods of the Choctawhatchee formation of Florida: Florida Geol. Survey Bull. 3, 185 p., 21 pls.

(Description of a northern Floridian fauna that occurs in the upper part of Jackson Bluff which has many species in common with the more southern faunas).

[1]Mansfield, W. C., 1932, Miocene pelecypods of the Choctawhatchee formation of Florida: Florida Geol. Survey Bull. 8, 240 p., 23 pls.

(Description of pelecypods from the Jackson Bluff area).

[1]Mansfield, W. C., 1935, New Miocene gastropods and scaphopods from Alaqua Creek valley, Florida: Florida Geol. Survey Bull. 12, 64 p., 5 pls.

(Additional species described from the Choctawhatchee).

[1]Olsson, A. A., 1967, Some Tertiary mollusks from south Florida and the Caribbean: Paleontological Research Institution, 61 p., 9 pls.

(Description of many new fossil mollusca from the Pinecrest formation and other stratigraphic beds).

[2]Olsson, A. A. and A. Harbison, 1953, Pliocene Mollusca of southern Florida with special reference to those from North Saint Petersburg. Special chapters on Turridae by W. C. Fargo and Vitrinellidae and fresh-water mollusks by H. A. Pilsbry: Acad. Nat. Sci. Philadelphia Mon. 8, 457 p., 65 pls.

(Best general reference for Caloosahatchee formation; also contains many Pinecrest species).

[1]Olsson, A. A. and R. E. Petit, 1964, Some Neogene Mollusca from Florida and the Carolinas: Bull. Amer. Paleontology, v. 47, no. 217, 71 p., 7 pls.

(Describes several new species from Caloosahatchee and Pinecrest plus a short discussion of the geology and stratigraphy of southern Florida. The Pinecrest formation was first designated in this publication).

[6]Toumey, M., and F. S. Holmes, Pleiocene Fossils of South Carolina: 152 p., 30 pls. Charleston, South Carolina.

(Another interesting original reference which includes many species that occur in the Tertiary of Florida).

[1]Tucker, H. and D. Wilson, 1932, Some new or otherwise interesting fossils from the Florida Tertiary: Bull. Amer. Paleontology, v. 18, no. 65, 24 p., 5 pls.

[1]Tucker, H. and D. Wilson, 1933, A second contribution to the Neogene paleontology of southern Florida: Bull. Amer. Paleontology, v. 18, no. 66, 20 p., 4 pls.

[5]Vokes, E. H., 1963-1984. Tulane Studies Geol. Paleont.

(Several papers discuss and/or describe many species of Muricidae from the Tertiary of Florida).

[5]Vokes, E. H., 1964, The genus Turbinella (Mollusca, Gastropoda) in the new world: Tulane Studies Geol. Paleont., v. 2, no. 2, p. 39-68, 3 pls.

[5]Vokes, E. H., 1966, The genus Vasum (Mollusca: Gastropoda) in the new world: Tulane Studies Geol. Paleont., v. 5, no. 1, p. 1-36, 6 pls.

[5]Vokes, H. E., 1969, The anadarid subgenus Caloosarca in the western Atlantic region: Tulane Studies Geol. Paleont., v. 7, no. 1, p. 1-40, 6 pls.

(Discusses and/or describes several species of arcidae pelecypods from the tertiary of Florida).

[5]Vokes, H. E., 1969, Observations on the genus Miltha (Mollusca: Bivalvia) with notes on the type and the Florida Neogene species: Tulane Studies Geol. Paleont., v. 7, no. 3-4, p. 93-126, 7 pls.

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[1]These publications are out of print and have not been reprinted. Many of these publications can be consulted in university or club libraries, and occasionally occur on old book lists and would be available for purchase.

[2]This out of print publication was reprinted in 1979 and is available from American Malacologists, Inc., P. O. Box 2255, Melbourne, FL 32902.

[3]This out of print publication was reprinted in 1964 and is available from Paleontological Research Institution, 1259 Trumansburg Road, Ithaca, NY 14850.

[4]This publication is available from the Florida Bureau of Geology, 903 W. Tennessee Street, Tallahassee, FL 32304.

[5]Articles from Tulane Studies in Geology and Paleontology can be consulted in many university libraries.

[6]This out of print publication was reprinted in 1974 and is available from Paleontological Research Institution, 1259 Trumansburg Road, Ithaca, NY 14850.

PUBLICATION NOTE

The Northeast Florida Marine Mollusk Checklist, an annotated summary of recent marine mollusks collected by members of the Jacksonville Shell Club from Northeast Florida waters, has been published by that club. It is authored by Dr. Harry Lee and Ms. June Dawley. The report is comprised of 46 pages with a list of 437 species, with legend of the collections in which the cited material can be found. It is in typescript, and xerographic copies with binder may be obtained from Ms. Dawley at 11732 Sands Avenue, Jacksonville, Florida 32207 for $5.00 postpaid. Additions have already been made to this list and published in the Jacksonville Shell Club's newsletter "The Shell-o-Gram" Vol. 26, No. 5, Sept.-October, 1985. (We receive this newsletter for the HCS library.)

SEARCH AND SEIZURE

By Constance E. Boone

MORE ON THE SPINY MUREX FROM THE RED SEA

It is necessary to continue my discussion of the Murex s.s. I collected at Fayed, Great Bitter Lakes, Gulf of Suez, Egypt, Africa, because I have received much more information from Dr. Emily H. Vokes. (See Texas Conchologist Vol. XXI(4), July 1985)

To begin with, Murex carbonnieri and the Murex specimens I collected at Fayed are indeed separate species, according to Dr. Vokes, and the latter will be given a name in the upcoming Ponder-Vokes monograph on Murex s.s. We hope this will be published soon.

M. carbonnieri occurs in the southern part of the Red Sea. The Murex s.s. sp. I collected at Fayed occurs in the northern end of the Red Sea (Gulf of Suez) and has also been found in the Mediterranean.

Both will be completely discussed in the Ponder-Vokes publication, but I give you the pertinent characteristics of these two muricids and publish figures provided by Dr. Vokes. (Figures published in the E. H. Vokes paper in Annals of the Natal Museum, Vol. 23(2) 1978 "Muricidae (Mollusca: Gastropoda) from the eastern coast of Africa.")

M. carbonnieri (Jousseaume, 1881) gets to be 120 mm. in height and has a protoconch varying from two and one-half to three convex volutions, terminating at a sharp crescentic varix. The siphonal canal has five moderately long primary spines on the adult, usually six on juveniles, alternating with much small adaperturally directed secondary spinelets. The anterior third of the lip projects as a small labral tooth. The siphonal canal is long. (Figure 1)

The spiny Murex I found at Fayed gets to be up to 100 mm. in height and has a protoconch of one and three-quarters bulbous volutions, ending at a small crescentic varix. The siphonal canal has five relatively short coarse spines, and essentially there is no labral tooth. The siphonal canal is relatively short and stout. The shell is coarser than M. carbonnieri and according to Vokes in her African paper "There is beading on the major spiral cords that is akin to that of its nearest relative M. carbonnieri." (Figure 2)

In her African paper, Dr. Vokes discussed the species I collected at Fayed as different from M. carbonnieri and listed it as Murex (Murex) sp. aff. M. ternispina Lamarck. My Fayed species is illustrated in Doreen Sharabati's Red Sea Shells (1984) as Murex cf. tribulus Linnaeus, 1758. Other illustrations of the Fayed spiny Murex, according to Dr. Vokes, are Fig. 47, Plate 4, in Ruth Fair's The Murex Book, listed as Murex sp., Red Sea; in Kiener, Coq. Viv., plate 8, figure 1 as "ternispina", and also in Reeve, Conch. Iconica 3, Murex, figure 82.

M. carbonnieri is illustrated in Dr. Vokes' African paper and also in Ruth Fair's book. In fact, Figure 15 in Fair's book is the type of this species. Abbott's and Dance's Compendium of Seashells illus-

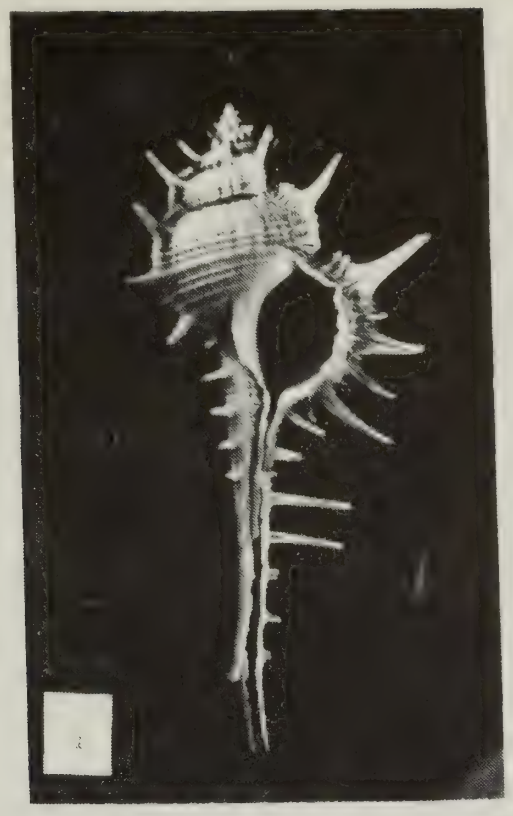

Figure 1 Murex (Murex) carbonnieri, an endemic of the southern part of the Red Sea.

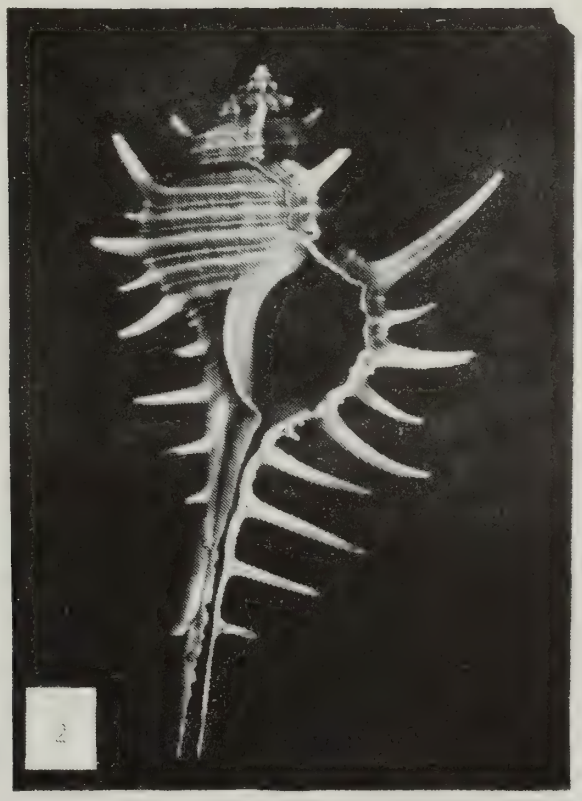

Figure 2 Murex (Murex) sp. to be given a name in the upcoming Ponder-Vokes publication, found in the upper part of the Red Sea and the Mediterranean. This is the kind of Murex C. Boone collected at Fayed, Great Bitter Lakes, Gulf of Suez, Egypt.

trates this species correctly.

In TC, July, 1985, I stated that the spiny Murex I collected at Fayed "is labelled M. tribulus in Radwin's and D'Attilio's Murex Shells of the World, 1976, with M. carbonnieri as a synonym." This was not written correctly as this implied that the figures of M. tribulus in that book represent M. carbonnieri and even my Murex species from Fayed. According to Dr. Vokes, the illustrations provided in that book are actually as follows: Fig. 8, plate 10, listed as M. tribulus is actually M. nigrispinosus, and Fig. 9, plate 10, listed as M. tribulus is actually M. aduncospinosus. Neither is the same as either of the Red Sea shells I am discussing. Neither M. carbonnieri or the Fayed spiny Murex are illustrated in Radwin's and D'Attilio's book. That book put M. carbonnieri in synonymy with M. tribulus on page 72 as well as M. nigrispinosus and M. aduncospinosus.

In another issue I will provide more information from Dr. Vokes on the much confused M. tribulus, a spiny Murex which she says does not occur in East Africa or in the Red Sea. I will also be able to share other corrections of muricid illustrations in publications we use.

NOTES FROM OUR PROFESSIONAL MEMBERS

Dr. John W. Tunnell Jr., professor of biology and director of the Center for Coastal Studies at Corpus Christi State University, Corpus Christi, Texas, has accepted a Fulbright Scholar Award to teach and research at a marine institute in Merida, Yucatan, Mexico, from August 27, 1985, to mid August, 1986. His address there will be Centro de Investigacion y de Estudios, Advanzados del Instituto Politechnico Nacional, Unidad Merida, Carretera Antigua a Progresso Km. 6, Apartado Postal 73 "Cordemex", 97310 Merida, Yucatan, Mexico.

Ms. Jane E. Deisler has accepted the post of Curator of Science of the Corpus Christi Museum, 1900 N. Chaparral, Corpus Christi, Texas 78401. Her responsibilities will include curation of the natural sciences collections, development of science-oriented education programs, design of science exhibits, and research and publications based on the holdings. The museum has cataloged 8,544 lots of mollusks. Most are Gulf of Mexico marines, but there is a moderately good collection of freshwater mussels and of south Texas land snails. Ms. Deisler plans to build the land snail, introduced mollusks and slug collections since these are her interests.

TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

PHILINE APERTA (LINNAEUS, 1767) FROM THE GREAT BITTER LAKE, SUEZ CANAL, EGYPT.

HAROLD W. HARRY AND CONSTANCE E. BOONE

The opisthobranch snails reported here were found by the junior author in May, 1958, on the shore of the Bitter Lake in the Isthmus of Suez, Egypt. The locality was visited to collect the spiny Murex which was abundant there, and the circumstances of collecting and nomenclatural problem of the Murex were discussed earlier in the Texas Conchologist (Boone, 1985). Six of the opisthobranch snails were found buried at the end of wide shuffle trails on the sandy bottom, just beyond the water's edge. Partially dry, stranded specimens were found farther up the beach, at the drift (high tide) line, and two of the fresher of these were collected. These fleshy snails have the general appearance and habits of the naticid, Sigaretus perspectivus, which occurs in shallow, sandy areas at Galveston. While alive, the firm flesh of both snails is white, and completely covers the shell.

The Egyptian specimens of Philine aperta (Linnaeus, 1767) were placed in alcohol soon after they were collected. The largest preserved specimen was 40 mm. long when contracted (Fig. 1). Seen from above, the snails are elongate oval, distinctly flattened dorso-ventrally (Figs. 1, 2), with a constriction slightly in front of the midpoint of the length.

A wedge-shaped head shield, or cephalaspid disc, forms a middle part in front, extending backward above the shell sac a short distance. It is flanked on each side by a triangular parapodial lobe, which is a dorsal extension of the foot (Figs. 1, 2, 3).

The parapodial lobes are separated from the cephalaspid disc by deep grooves, which continue onto the ventral surface at the front end, toward the midline. They do not quite meet ventrally, and slightly forward of their ends is the small, puckered mouth. No eyes nor tentacles were evident, nor did we find a sensory area in the grooves near the mouth, the so-called "rhinophore" (O'Donoghue, 1929).

The hind half of the animal is an inflated but compressed mass, covered by the tough mantle, which completely incloses the shell. We did not find a shell pore, said to be present on the dorsal surface. Along both sides of the shell sac the tissue extends as a distinct mantle lamella, and these taper out and disappear at the hind margins of the parapodial lobes. At the hind end these two lamellae extend beyond the shell, where they are split transversely, forming dorsal and ventral lamellae across the animal, with a moderately deep pocket between them. The dorsal posterior lamella is cleft in the midline for a short way, and the ventral lamella has a deep cleft near its right side, extending forward the full length of the shell sac. This forms the opening of the mantle cavity proper, which is in the last part of the shell aperture (Fig. 3). Inside the mantle cavity is a long, tapered, triangular gill, but this was not studied in detail.

Shells were removed from several specimens by cutting the shell sac open dorsally in the midline and carefully working the fragile shell free of the sac and the visceral mass inside the shell. Other shells were digested from the partially dried specimens in half strength chlorox (bleaching solution).

The shell is entirely white, very fragile, easily broken while still in the shell sac, but two larger ones were removed nearly complete. The largest is 23 mm. high (Fig. 6), subglobose, but with the apical (hind) margin of the aperture extending well above the apex of the shell in a rounded curve. The apex is distinctly sunken, and closed, meaning that the earlier whorls are not evident. Figure 4 shows how the shell is depressed dorso-ventrally, not being evenly inflated as in shells of Bulla and Scaphander. The smaller shell, only 18 mm. high, is shown in figure 5. Even within this slight change in size there is a distinct change in form, the profile being oval but tapering behind in the smaller shell, so that it is somewhat pear shaped (pyriform). No spiral sculpture is present. Transverse undulating sculpture is formed by vague, low ridges and shallow depressions, more closely spaced on the older (earlier) parts of the shell.

The organs of the body cavity of the head and foot (i.e., the cephalopedal hemocoel) were examined by cutting with fine iris scissors along the midline of the cephalaspid disc dorsally, and turning the sides outward (Fig. 7). The cavity is spacious, having at its front end the pyriform, muscular buccal mass, and the spindle-shaped gizzard behind. Circling the buccal mass at its front end is the nerve ring, which was not investigated in detail. Fastening the mass to the body wall are a few muscular strands, extending forward and backward; on retracting, these move the mass forward or pull it back, according to their position. From the upper part of the hind end of the buccal mass there extend a pair of short, knobby salivary glands. Underlying the mass is a tangled tubular clump, the male reproductive organ, which was not studied in detail nor included in the drawing.

When the buccal mass is cut free in front and behind, and from the muscles attaching it to the body wall, it can be opened by cutting along the midline on top, revealing the interior. There is no cuticular lining, called a jaw, at the front end (most snails with a radula have such a jaw). Within the muscles forming the thick, bulbous hind part is the radula. This extends downward and backward from the mass as a short radular sac, at the end of which new teeth are formed. The front end of the radula, shown partly dissected from the mass in Fig. 8, has only a single pair of teeth in each row. There are no median (rachidin) tooth, nor any flanking ones (marginals). The teeth which are present are "laterals"; each is fang-shaped, very long, curved, tapering to an acute tip; along the inner side of each tooth, near its base, the sharp blade has numerous minute, saw-tooth denticles, but these are not shown in the figure.

Snails with fang-like radular teeth are generally predaceous carnivores, and Philine is no exception. They are said to swallow small clams, snails and other animals they encounter in the sand (Hurst, 1965). Immediately behind the buccal mass the thin walled esophagus expands into a crushing gizzard. The gizzard contains three elongate,

thick, calcareous plates, evidently used for crushing the shelled prey on which this snail feeds.

The margins of the plates are connected by thick bands of transverse muscle tissue, which on contraction pulls the surface of the plates together. The single, smaller plate is ventral, the other two dorso-lateral. Each plate has a small, flattened inner surface, the one used for crushing, and from this surface the plate slopes outward to the margin. Covering the slope in this species, on each plate there is a circular band or collar of dark cuticular material (Fig. 9). The outer surface of each plate is gently concave, and there are on each two small, shallow pits about midway the length (Fig. 10).

In its general development, the history of names in the Philinidae is similar to that of other molluscs. The first species to be named in a fashion acceptable by the principles of binomial nomenclature was called Bulla aperta by Linnaeus, in 1767, in the twelfth edition of the Systema Naturae. He cited the locality as being South Africa. Linnaeus had proposed the genus Bulla in the tenth edition of the Systema Naturae, in 1758. At that time he included in the genus 23 species, but later workers have recognized this as an heterogeneous group, and erected nearly as many genera to contain them. The genus Bulla was retained for the group which are commonly known as bubble shells.

Four years later, in 1772, Ascanius described a snail from northern Europe as Philine quadripartita, thus introducing the generic name Philine. Many later authors have been unable to find any significant differences between the two nominal species, worthy of separate names, and so the species of northern Europe is usually called Philine aperta (Linnaeus, 1767), with the author's name in parentheses to indicate he originally named the species in a different genus.

In 1865 Crosse and Fischer described a large Philine from southern Australia as Bullaea angasi. The description, in a few lines of Latin, does not clearly differentiate it from species previously named, notably P. aperta. In the same year Vaillant wrote about molluscs found at the Bay of Suez, and he recorded that he found Bullaea angasi Crosse and Fischer, 1865, there. But four years later Issel (1869), with only a single shell before him, named the species from Suez Philine vaillanti. His description, in a few lines of Latin, again does not specify any significant differences from P. angasi nor P. aperta.

In 1929 O'Donoghue wrote about the population at Suez, describing its radula and gizzard plates for the first time, and accepted the name P. vaillanti, without showing convincingly any differences between this and previously named species. Pruvot-Fol (1954) also studied the species from Suez, and concluded that it is P. aperta, and that this species occurs in Europe, South Africa, Ceylon and South Australia as well. In studying the species from Egypt, we have found that there is variation in the shape of the shell correlated with size; the lateral lamellae of the shell sac seem not to have previously noted, if indeed they are present in other populations, nor have the cuticular collars of the gizzard plates. But perhaps these characters were overlooked

in specimens studied by others.

There is a widespread tacit assumption that if two animals are found, separated by great distances, they are by this fact alone worthy of separate names; of course, authors of names who follow this principle, and there are many, even today, may state that the two nominal species "are different", but they almost always leave to others the task of discovering and recording what the particular differences are.

Such action totally ignores an important principle of science, that "it is vain to do with more what can be done with less", or, "entities should not be multiplied beyond necessity". First enunciated in the early 1300's, this is known as Occam's Razor, because it urges us to cut away the excessive verbiage, to get at the simplest explanation of the world about us. Of course, if names are merely to indicate an object, and are mutually understood to do so by all concerned, Occam's Razor can be ignored; names can multiply for every trivial difference of color, form or distance of occurrence. But binomial names can and should do much more: that is, indicate the relationship as well as the diversity of organisms.

About a hundred trivial names have been proposed, which apply to snails nearly everyone would recognize as belonging to the family Philinidae; although about 17 generic names have been proposed, there is a tendency to place all of the species in the genus Philine, pending more study of the nominal species on a comparative basis (Thompson, 1976). The species are chiefly found in cooler latitudes, and most occur from a few to many meters depth. P. aperta is among the largest in size, most species having shells less than 10 mm. high. All other species seem to have spiral sculpture, of a peculiar beaded sort, which varies among species. Other variable characters are: the shells of some species have a brown spiral band; the shell apex may show several whorls; the shape of the aperture varies; the radula may have a central tooth, and one to six pairs of marginals, beside the single pair of laterals; the gizzard plates vary in size and form, or are absent. These variables are correlated to a certain extent, but the correlation is poorly known.

From a limited area, usually only 4 to 8 species have been recorded. And if one studies what little is known about them, it is evident that there is much similarity in species of one area to some, but perhaps not all, species of another area of comparable climate and latitude, although the areas may be separated by pronounced isolation barriers (usually geographical). Perhaps the similar species of the two areas represent the same or analogous species. In the future this may be the basis for recognizing genera, so that they will reflect natural relationship, i.e., evolution within the group, more precisely.

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Explanation of the figures

1. Philine aperta, right side of preserved animal.

2. P. aperta, dorsal view of preserved animal.

3. P. aperta, ventral view of preserved animal.

4. P. aperta, shell, apical view of specimen in Fig. 6.

5. P. aperta, shell, 18 mm. high.

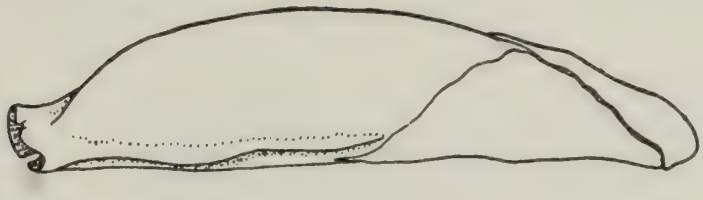
6. P. aperta, shell, 23 mm. high.

7. P. aperta, cephalopedal hemocoel opened, as explained in text.

8. P. aperta, radular mechanism removed from buccal mass, and muscles cut from above, to reveal radula.

9. P. aperta, gizzard plates separated, medial view. The cuticular collar on each plate is shown by the hatched areas.

10. P. aperta, lateral view of left lateral gizzard plate, to show the two holes (present on all plates).



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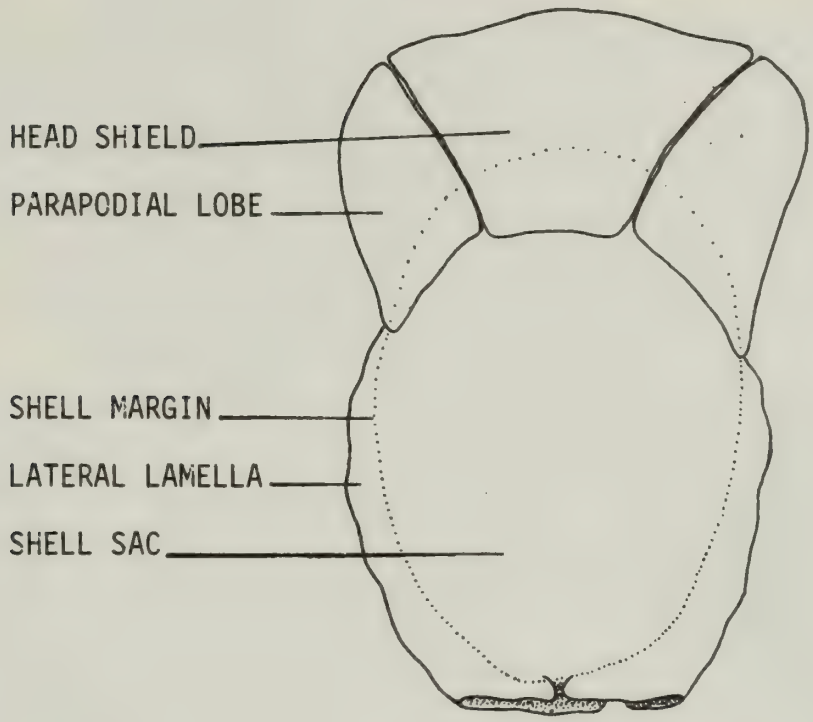
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SHELL MARGIN
LATERAL LAMELLA
SHELL SAC

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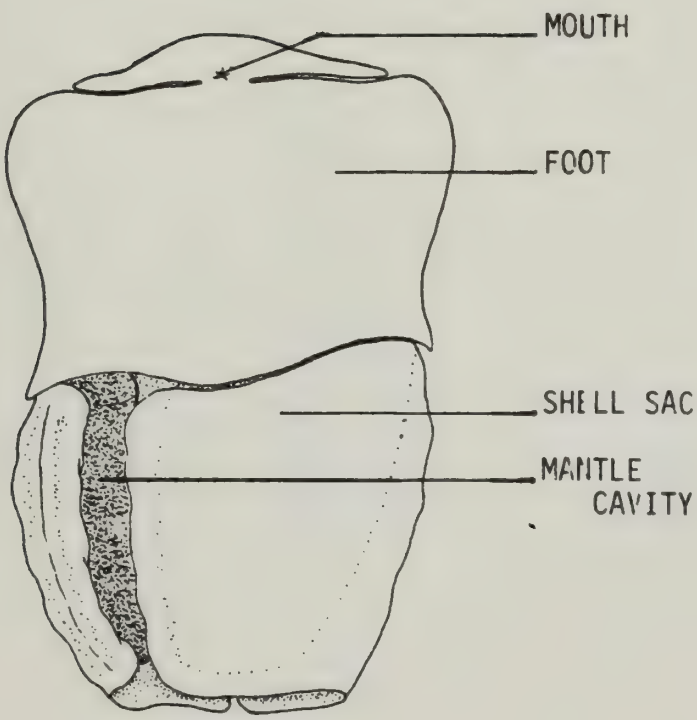
MOUTH
FOOT
SHELL SAC
MANTLE
CAVITY

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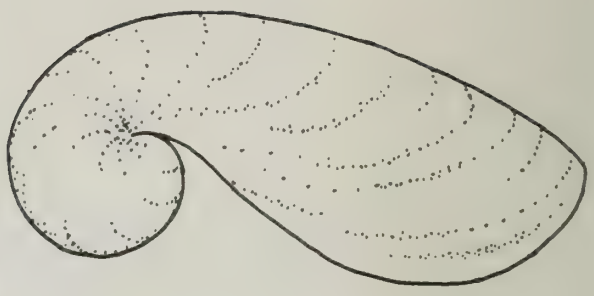

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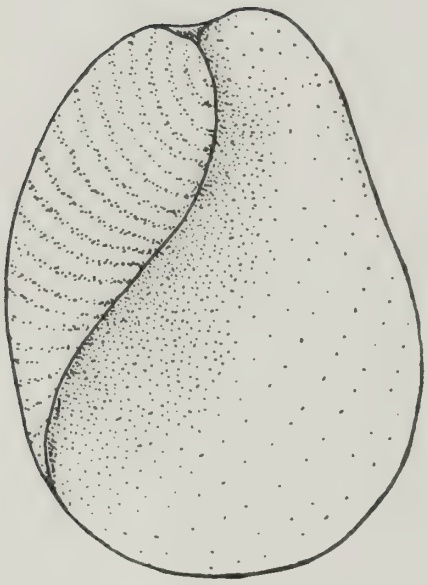

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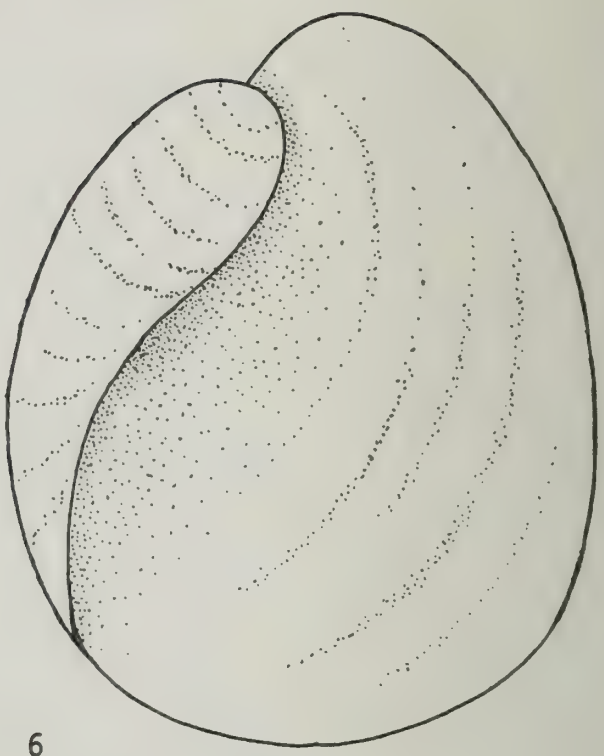

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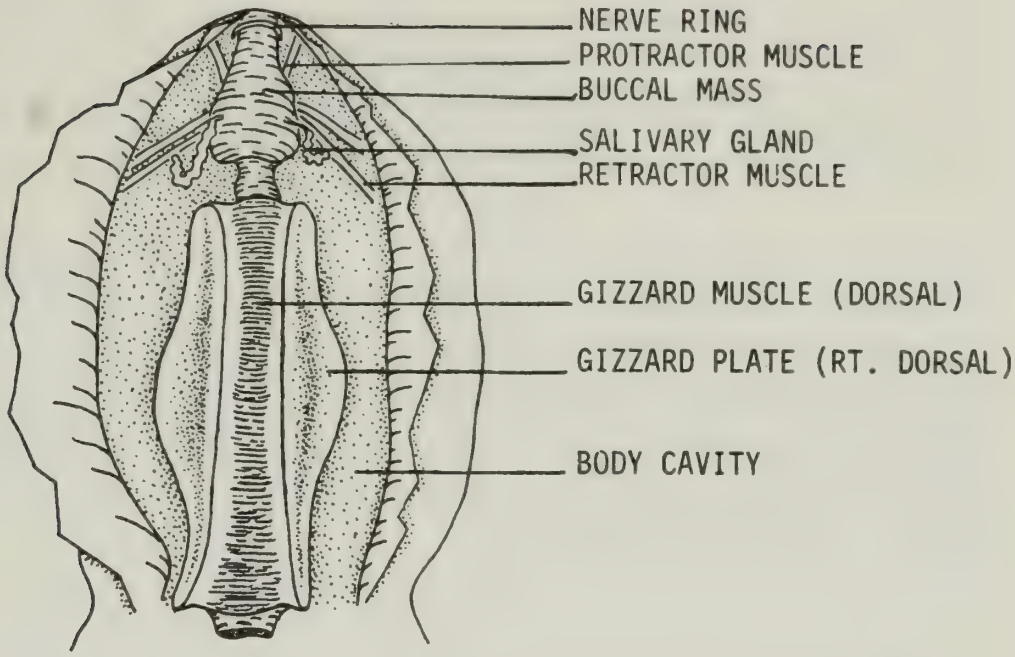
NERVE RING
PROTRACTOR MUSCLE
BUCCAL MASS
SALIVARY GLAND
RETRACTOR MUSCLE
GIZZARD MUSCLE (DORSAL)
GIZZARD PLATE (RT. DORSAL)
BODY CAVITY

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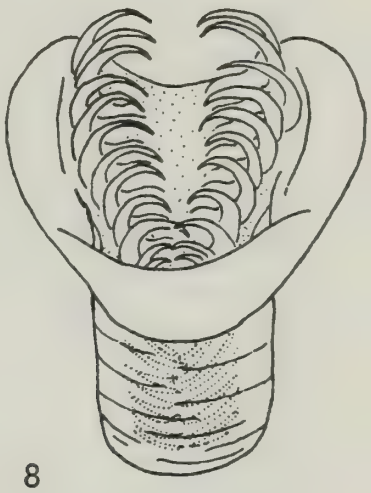

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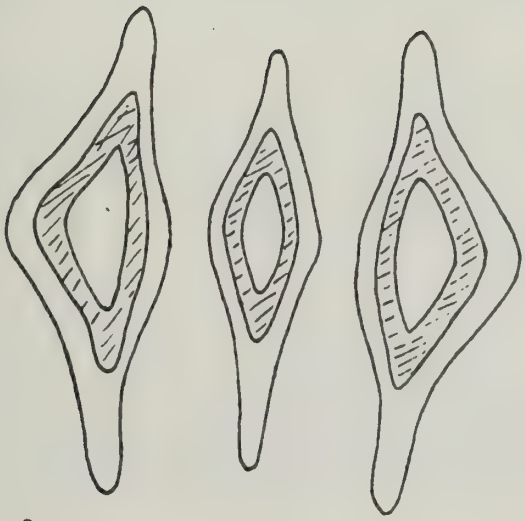

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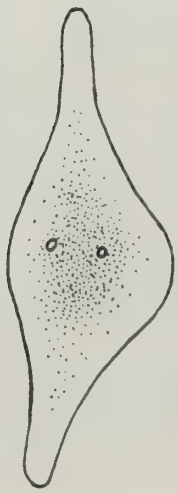

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TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

FRESHWATER BIVALVES OF ELMENDORF LAKE, SAN ANTONIO, BEXAR CO., TEXAS

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INTRODUCTION

As part of a survey of the freshwater bivalves of Texas, a series of urban impoundments have been sampled to determine what portion of the native fauna, in addition to an introduced species, can survive in such habitats. Sampling of a small reservoir in San Antonio revealed a very low-diversity fauna which had an interesting distribution pattern within the impoundment.

STUDY SITE AND METHODS

Elmendorf Lake is a small impoundment (17.4 surface acres, or 7.04 surface hectares) located on Apache Creek and its tributary, Zarzamora Creek, of the San Antonio River drainage. The reservoir is located within San Antonio approximately 3 miles (4.8 kilometers) west of the downtown district.

The shallow water areas of Elmendorf Lake were sampled by dragging a garden rake along the bottom. Each drag was made from as far as the rake could be extended to the shoreline. A series of seven sampling stations (Table 1) were established and sampled with a variable number of rake drags.

RESULTS

Survey of Elmendorf Lake revealed only three species of bivalves (see Table 1). Three freshwater snails - *Physella virgata* (Gould, 1855), *Planorbella trivolvis* (Say, 1817), and *Biomphalaria obstructa* (Morelet, 1849) - were collected from Elmendorf Lake.

Anodonta imbecilis Say, 1829, was encountered at only a single site where it was common. All living specimens recovered were small (largest was 33.4 mm. in shell length), but shell fragments of larger specimens were also encountered. Young shells were yellowish with very fine rays of a light green color. Older shells were light brown. Rays on the posterior ridge are present but faint.

Toxolasma texasensis (Lea, 1857) is the most abundant bivalve in Elmendorf Lake but was found at only two of the seven sampling stations. Shells of this species in Elmendorf Lake are somewhat compressed compared to most *T. texasensis* in central and southern Texas. Periostracum is a dark brown color with a silky appearance in smaller individuals. Nacre is whitish with only limited iridescence.

Two slightly differently shaped valves present in this population are assumed to represent sexual dimorphism. Degree of this putative sexual dimorphism is less than in populations in the creeks draining into Baffin Bay in southern Texas (Neck, in press a). The largest presumed female shell measures 57.2 mm. in length; largest presumed male shell measures 54.9 mm. in length. This population is probably referable to compressus Simpson, 1900, which is probably merely a regional genetic variant which is present in the San Antonio River drainage including Medina Lake (Neck, in press b). This taxon does not appear to merit subspecific rank.

Corbicula fluminea Muller, 1774, is an introduced clam native to parts of eastern China. Now present over most of Texas and much of the United States (Britton 1982; McMahon 1982), C. fluminea is very rare in Elmendorf Lake. Only a single live specimen was collected, although a few other individual valves were collected. Most shells are small; the largest measures only 27.7 mm. in length. Periostracum is honey brown in color at the beaks, becoming progressively darker brown toward the ventral margin. This population is referable to the "white form."

DISCUSSION

The freshwater bivalve fauna of Elmendorf Lake is revealed to be a very low diversity and low density fauna. Living individuals were found only at two sites, both of which were bridges. The third bridge site (N. General McMullen Blvd.) is at the very upper end of the reservoir; this area contained very little water, much urban refuse, and was characterized by a very strong organic smell.

Restriction of freshwater bivalves in Elmendorf Lake to sites underneath bridges could result from several factors: 1) shade from bridge reduces thermal stress, particularly in shallow waters, via reduction of solar insolation; 2) shade from bridge limits, indeed eliminates, growth of emergent aquatic plants, e.g. Ludwigia, which could reduce movement of clams; 3) placement by fisherman for future use as bait at preferred fishing spots; 4) shade from bridge reduces water temperatures which concentrates fish containing parasitic glochidia which eventually drop to sediment in these localities; 5) rocks in substrate under bridges (for stabilization of bridge structure) prevent accumulation of deep silt which is generally inimicable to bivalve survival.

Several of the above five factors can probably be eliminated. Restriction of clams from non bridge habitats is not likely to be due to exclusion by thick aquatic vegetation. The collection site behind K-Mart was shaded by black willows, Salix nigra, and supported no Ludwigia. Neither were there any clams at this site. No indication that factor three is valid has been forthcoming.

No experiments or detailed field measurements have been performed to determine the relative importance of the remaining three factors. However, experience with other populations of freshwater bivalves leads me to believe that all three may be operative in Elmendorf Lake. Initially, populations underneath bridges are probably high due to concentration of host fish (factor 4); mortality rates of bivalves are

probably reduced in these habitats due to cooler water temperatures (factor 1) and greater physical support from the mixed clay/silt/rock substrate (factor 5).

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Table 1

Distribution of freshwater bivalves in Elmendorf Lake in San Antonio, Bexar County, Texas.

Locality	Rake drags	A. i.*	T. t.*	C. f.*
Cove in city pond	5	0	0	0
NW 24th St. bridge	12	0	18	1
Lake bend	8	0	0	0
Commerce St. bridge	11	8	34	0
Picnic area	7	0	0	0
Behind K-Mart	8	0	0	0
N. General McMullen Blvd. bridge	4	0	0	0

*A. i. = Anodonta imbecilis; T. t. = Toxolasma texasensis; C. f. = Corbicula fluminea.

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MOLLUSCAN DISTRIBUTION IN THE SUBMERGED LANDS OF TEXAS, BROWNSVILLE-HARLINGEN AREA[1]

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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, including 1,193 samples in the Brownsville-Harlingen area, were collected at regularly spaced intervals across the submerged lands. The Brownsville-Harlingen area, as defined in figure 2, encompasses a long narrow lagoon system composed principally of Laguna Madre and small South Bay, separated from the Gulf of Mexico and the inner shelf by a modern barrier-island complex composed primarily of Padre Island.

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

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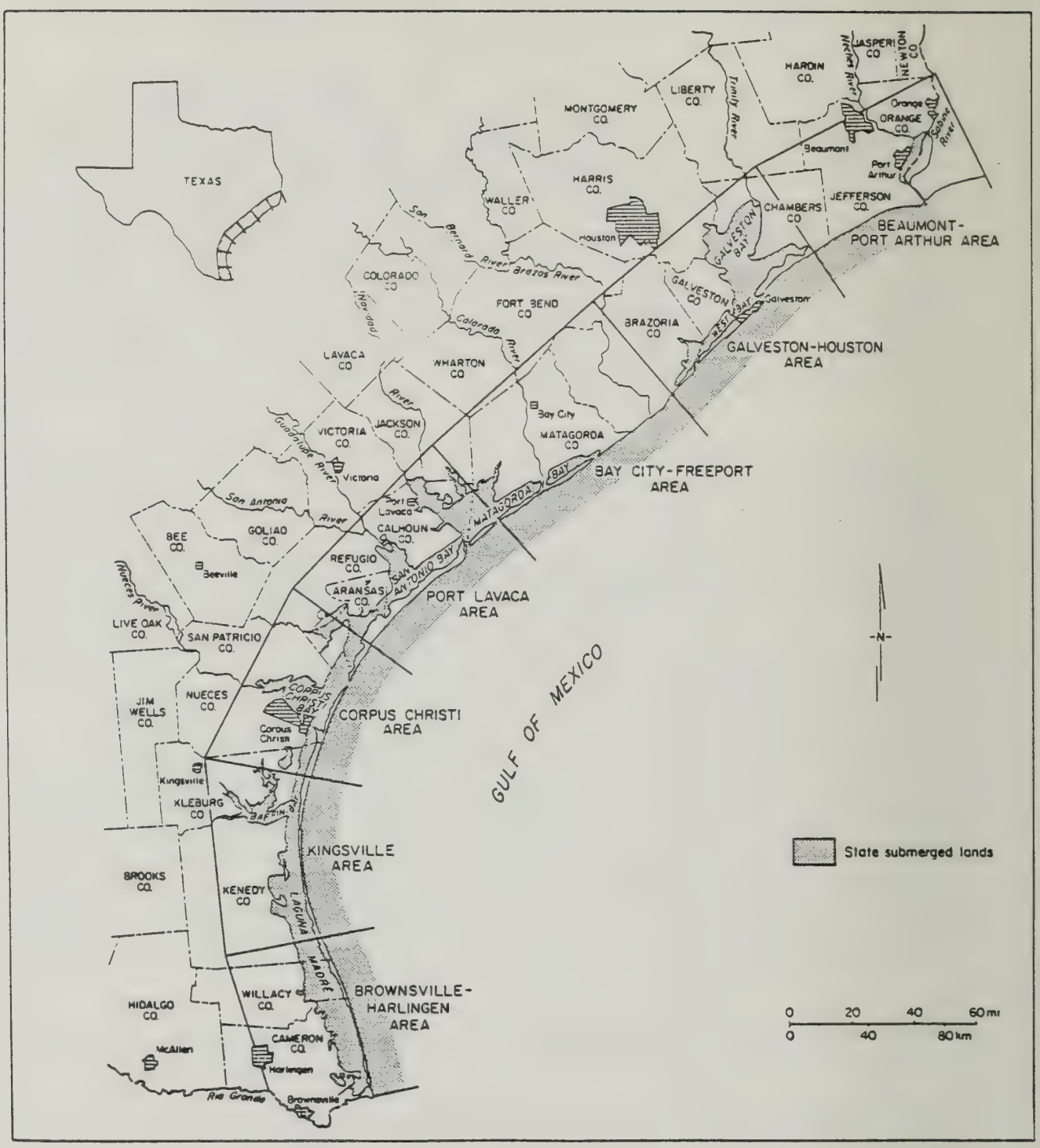

Figure 1. Index map showing seven area maps that cover the submerged coastal lands of Texas (modified from McGowen and Morton, 1979, and Brown and others, 1972-1980).

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. Atlases of the Galveston-Houston and Brownsville-Harlingen areas are in press. Reports on molluscan distribution in the Beaumont-Port Arthur, Bay 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-lagoon system and on the inner continental shelf to a distance of about 11.2 mi (18 km) seaward of the Gulf shoreline. Ponar clam-shell 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 3 inches (4 and 7 cm). Of the 1,193 sediment samples collected in the Brownsville-Harlingen area, 216 (fig. 2) were analyzed for benthic macroinvertebrates. Bay-lagoon samples were collected primarily from February to April, 1977; inner shelf samples were collected in April, 1976. Other details on data acquisition and analysis can be found in the Corpus Christi atlas (White and others, 1983).

RESULTS

One hundred thirty-two species of live mollusks were collected from the Brownsville-Harlingen study area, including 64 gastropods, 64 bivalves, the polyplacophoran Ischnochiton papillosus, and 3 scaphopods. Although 304 total species (live and dead species) were identified (Appendix A), including 183 gastropods, 117 bivalves, the polyplacophoran Ischnochiton papillosus, and 3 scaphopods, only those collected live are considered in this report.

Almost equal numbers of gastropod and bivalve species were collected on the shelf (48 gastropods, 44 bivalves) and Laguna Madre (25 gastropods, 31 bivalves), but the bivalves accounted for 75.7 percent of the 2,074 molluscan individuals collected on the shelf and 69.7 percent of the 3,191 molluscan individuals collected in Laguna Madre. In South Bay, the gastropod species (9) are only half as numerous as the bivalves (18), but the numbers of individuals are nearly the same (50 gastropods, 57 bivalves).

Many of the benthic species are restricted to a particular environment. For example, 36 of the 64 gastropod species and 29 of the 64 bivalve species were found only on the inner shelf, whereas 16 gastropod species and 20 bivalve species occurred only in the bay-lagoon system. The most abundant mollusks found in each system are listed in Table 1.

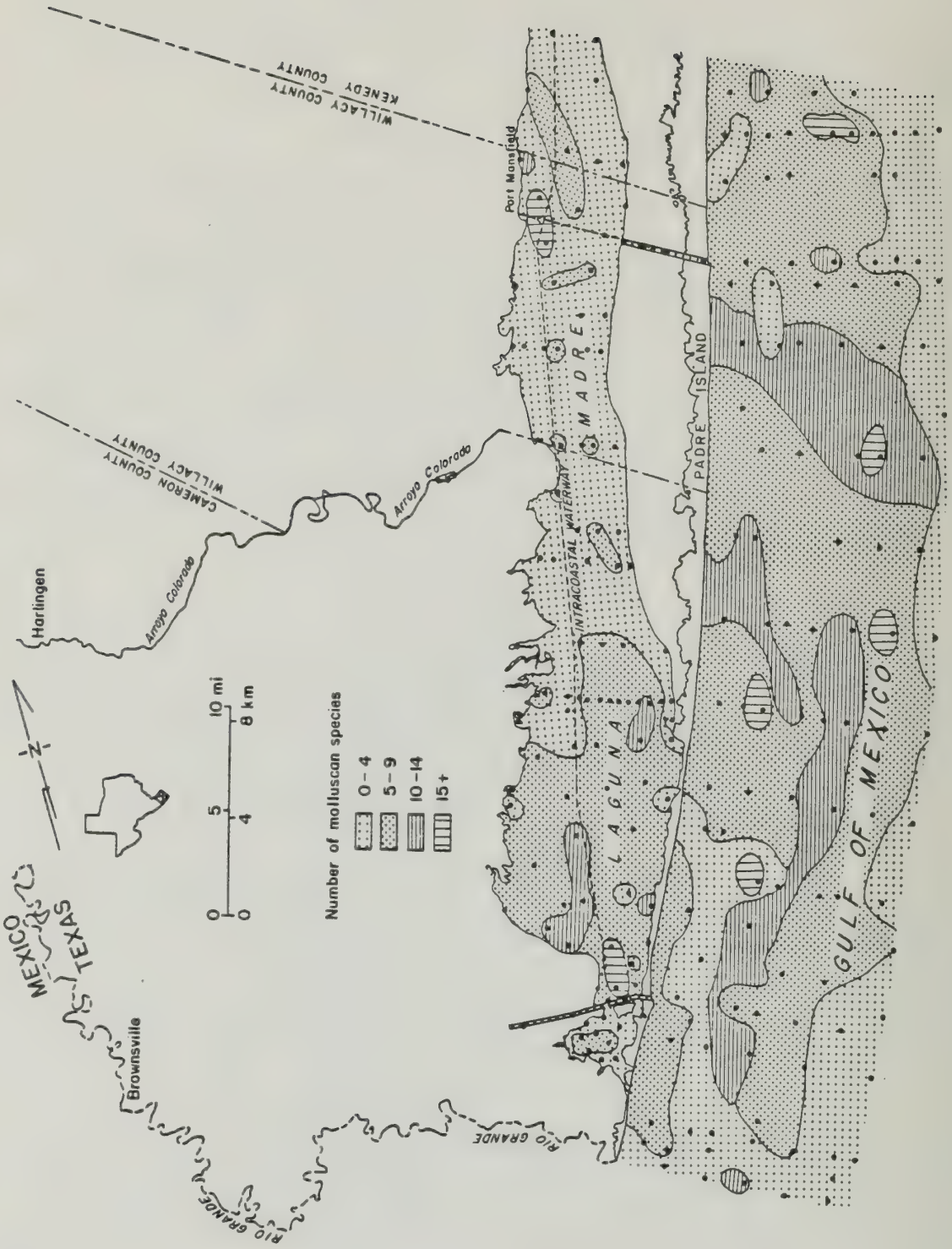

Figure 2. Map showing number of molluscan species and each sample location in the submerged lands of the Brownsville-Harlingen area.

Bay-Lagoon System

Lower Laguna Madre

Fifty-seven species of mollusks were collected in Laguna Madre. These include 25 gastropods, 31 bivalves, and the polyplacophoran Ischnochiton papillosus. A total of 3,191 individuals were found, of which 962 are gastropods, 2,224 are bivalves, and 5 are polyplacophorans.

The gastropod Caecum pulchellum, is more numerous (542 individuals) than any other mollusk species in the study area. Representing 56.3 percent of the gastropod individuals collected in Laguna Madre and 38.6 percent of all gastropod individuals, it is found primarily in sediments of 80 to 100 percent sand. Bittium varium and Crepidula convexa, the next most abundant gastropods collected in Laguna Madre, account for 11.9 percent and 10.8 percent of the gastropod individuals. They are found primarily in areas with medium to heavy stands of seagrasses.

Lyonsia hyalina floridana, Mulinia lateralis, and Nuculana acuta, the most abundant bivalves, respectively account for 15.3 percent, 14.4 percent, and 13.5 percent of the bivalve individuals. Lyonsia is generally found associated with seagrasses in sediments of 60 to 80 percent sand. Mulinia and Nuculana occur most commonly in more open areas where Nuculana occurs in sediments of 60 to 80 percent sand, and Mulinia in sediments of 40 to 100 percent sand.

Tellina tampaensis, Abra aequalis, Mysella planulata, Tagelus plebeius, and Ensis minor, although composing a smaller percentage of individuals than Lyonsia, Mulinia, and Nuculana, are nevertheless rather abundant. Tellina, Abra, Mysella, and Tagelus are generally found in open-bay areas in sediments of 60 to 80 percent sand. Ensis occurs most characteristically in areas of light stands of seagrasses and in bay margins in sediments of 80 to 100 percent sand.

South Bay

Twenty-six species of mollusks were collected in South Bay. These include 9 gastropods, 16 bivalves, and Ischnochiton papillosus. A total of 108 individuals were counted, including 50 gastropods, 57 bivalves, and 1 polyplacophoran.

Odostomia impressa is the most abundant gastropod found in South Bay, accounting for 32 percent of the gastropod individuals. It is present on clumps of the oyster Crassostrea virginica. Other relatively abundant gastropod species are Bittium varium, Crepidula convexa, and C. plana. Bittium and C. convexa occur predominantly in areas of seagrass, whereas Crepidula plana is most abundant on shell fragments in grassy areas.

Macoma tenta is the most common bivalve, constituting 35.1 percent of the 57 bivalve individuals found in South Bay. It typically occurs in sediments of 40 to 60 percent sand.

Arroyo Colorado

No molluscan species were found in the one Arroyo Colorado sample.

Inner Shelf

Ninety-five species of mollusks were collected on the inner shelf, of which 48 are gastropods, 44 are bivalves, and 3 are scaphopods. Bivalves account for 75.7 percent of the 2,074 individuals counted.

Natica pusilla, the most abundant gastropod collected on the inner shelf, is represented by 128 individuals, or 32.7 percent of the 392 gastropod individuals. The next most abundant species are Terebra protexta, represented by 40 individuals (10.2 percent) and Vitrinella floridana by 33 individuals (8.4 percent). Natica is associated with sediments of 80 to 100 percent sand, Terebra occurs in sediments of 60 to 100 percent sand, and Vitrinella is found most commonly in sediments of 40 to 80 percent sand.

Linga amiantus and Abra aequalis with 259 individuals each, are the most abundant bivalves on the shelf. The next most abundant are Diplodonta cf. D. soror and Tellina versicolor, numbering 189 (12 percent) and 135 (8.6 percent) individuals, respectively. Linga and Diplodonta occur primarily in sediments of 60 to 80 percent sand, whereas Abra and Tellina are usually found in sediments of 80 to 100 percent sand.

Of the 112 scaphopod individuals, Cadulus carolinensis accounts for 45.6 percent, Dentalium texasianum 31.2 percent, and D. eboreum 23.2 percent. Cadulus and D. texasianum are found in sediments of 60 to 100 percent sand and D. eboreum in sediments of 80 to 100 percent sand.

Table 1. Most abundant molluscan species, Brownsville-Harlingen area.

Lower Laguna Madre	Number of individuals	Percent of all (962) gastropod individuals
Gastropoda		
Caecum pulchellum	542	56.3
Bittium varium	114	11.9
Crepidula convexa	104	10.8
		Percent of all (2,224) bivalve individuals
Bivalvia		
Lyonsia hyalina floridana	340	15.3
Mulinia lateralis	321	14.4
Nuculana acuta	300	13.5
Tellina tampaensis	205	9.2
Abra aequalis	169	7.6
Mysella planulata	141	6.3
Tagelus plebeius	106	4.8
Ensis minor	105	4.7
South Bay		Percent of all (50) gastropod individuals
Gastropoda		
Odostomia impressa	16	32.0
Bittium varium	9	18.0
Crepidula convexa	8	16.0
Crepidula plana	8	16.0
		Percent of all (57) bivalve individuals
Bivalvia		
Macoma tenta	20	35.1
Inner Shelf		Percent of all (392) gastropod individuals
Gastropoda		
Natica pusilla	128	32.7
Terebra protexta	40	10.2
Vitrinella floridana	33	8.4
		Percent of all (1,570) bivalve individuals
Bivalvia		
Linga amiantus	259	16.5
Abra aequalis	259	16.5
Diplodonta cf. *D. soror*	189	12.0
Tellina versicolor	135	8.6
		Percent of all (112) scaphopod individuals
Scaphopoda		
Cadulus carolinensis	51	45.6
Dentalium texasianum	35	31.2
Dentalium eboreum	26	23.2

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APPENDIX A: DISTRIBUTION OF BENTHIC MACROINVERTEBRATES IN THE BROWNSVILLE-HARLINGEN AREA

Distribution of Molluscan Species

L = Lower Laguna Madre, Z = South Bay, S = Inner Shelf, D = Dead
*Includes Arroyo Colorado, Brownsville Ship Channel, Port Mansfield Channel, Intracoastal Waterway

Phylum Mollusca	L	Z	S
Class Polyplacophora Blainville, 1816			
Family Ischnochitonidae Dall, 1889			
Ischnochiton papillosus (C. B. Adams, 1845)	5	1	
Class Gastropoda Cuvier, 1797			
Family Fissurellidae Fleming, 1822			
Diodora cayenensis (Lamarck, 1822)	1	D	D
Diodora listeri (Orbigny, 1842)			D
Lucapinella limatula (Reeve, 1850)	D		D
Family Trochidae Rafinesque, 1815			
Calliostoma cf. *C. bairdii oregon* Clench and Turner, 1960			D
Calliostoma jujubinum (Gmelin, 1791)			D
Tegula fasciata (Born, 1778)			D
Family Phasianellidae Swainson, 1840			
Tricolia affinis cruenta Robertson, 1958	D		D
Family Neritidae Rafinesque, 1815			
Neritina reclivata (Say, 1822)	D		D
Neritina virginea (Linne, 1758)	1	D	D
Smaragdia viridis viridemaris Maury, 1917	D	D	
Family Littorinidae Gray, 1840			
Littorina lineolata Orbigny, 1840	D		
Littorina ziczac (Gmelin, 1791)			D
Family Rissoidae Gray, 1847			
Alvania auberiana (Orbigny, 1842)			D
Family Rissoinidae Stimpson, 1865			
Rissoina catesbyana Orbigny, 1842	D		
Rissoina decussata (Montagu, 1803)			D
Rissoina multicostata (C. B. Adams, 1850)			D
Zebina browniana (Orbigny, 1842)	D		
Family Assimineidae Fleming, 1828			
Assiminea succinea (Pfeiffer, 1840)	D		
Family Littoridinidae Thiele, 1929			
Texadina barretti (Morrison, 1965)	1		D
Texadina sphinctostoma (Abbott and Ladd, 1951)	D		D
cf. *Littoridinops* sp.	D		
Family Stenothyridae Fischer, 1885			
Probythinella louisianae (Morrison, 1965)	D		D
Family Truncatellidae Gray, 1840			
Truncatella caribaeensis Reeve, 1842	D		
Family Vitrinellidae Bush, 1897			
Vitrinella floridana Pilsbry and McGinty, 1946	12	D	33
Cyclostremiscus cf. *C. beaui* (Fischer, 1857)			D
Cyclostremiscus cf. *C. jeannae* (Pilsbry and McGinty, 1945)			D

Phylum Mollusca	L	Z	S
Cyclostremiscus pentagonus (Gabb, 1873)			1
Cyclostremiscus suppressus (Dall, 1889)	D		D
Cyclostremiscus sp. A			1
Cyclostremiscus sp. B			D
Episcynia inornata (Orbigny, 1842)			1
Parviturboides interruptus (C. B. Adams, 1850)			D
Solariorbis infracarinata Gabb, 1881			3
Solariorbis cf. S. mooreana Vanatta, 1904			D
Teinostoma biscaynense Pilsbry and McGinty, 1945	D	D	D
Teinostoma parvicallum Pilsbry and McGinty, 1945			4
Anticlimax pilsbryi McGinty, 1945	D		D
Aorotrema cf. A. pontogenes (Schwengel and McGinty, 1942)			1
Family Tornidae Sacco, 1896			
Cochliolepis parasitica Stimpson, 1858			D
Cochliolepis striata Dall, 1889	D		
Family Caecidae Gray, 1850			
Caecum bipartitum Folin, 1870			D
Caecum cooperi S. Smith, 1860			10
Caecum johnsoni Winkley, 1908			D
Caecum nitidum Stimpson, 1851	D		D
Caecum pulchellum Stimpson, 1851	542	2	1
Family Turritellidae Clarke, 1851			
Vermicularia fargoi Olsson, 1951	D		D
Family Architectonidae Gray, 1850			
Architectonica nobilis Roding, 1798			D
Heliacus bisulcatus (Orbigny, 1842)			1
Philippia sp.			D
Family Modulidae Fischer, 1884			
Modulus modulus (Linne, 1758)	D		D
Family Potamididae H. and A. Adams, 1854			
Cerithidea pliculosa (Menke, 1829)	D	D	D
Family Cerithiidae Fleming, 1822			
Cerithium cf. C. atratum (Born, 1778)	D		
Cerithium lutosum Menke, 1828	D		D
Cerithiopsis emersoni (C. B. Adams, 1838)	D		D
Cerithiopsis greeni (C. B. Adams, 1839)	D		D
Bitium varium (Pfeiffer, 1840)	114	9	D
Seila adamsi (H. C. Lea, 1845)	D		D
Alaba incerta (Orbigny, 1842)	D		D
Alabina cerithidioides (Dall, 1889)	D		D
Litiopa melanostoma Rang, 1829			D
Family Triphoridae Gray, 1847			
Triphora nigrocincta (C. B. Adams, 1839)	D	D	D
Family Epitoniidae S. S. Berry, 1910			
Epitonium angulatum (Say, 1830)			D
Epitonium apiculatum (Dall, 1889)	2	D	D
Epitonium humphreysi (Kiener, 1838)			D
Epitonium multistriatum (Say, 1826)	D		D
Epitonium novangliae (Couthouy, 1838)	D		3
Epitonium rupicola (Kurtz, 1860)	2		D
Epitonium sericifilum (Dall, 1889)			D
Amaea mitchelli (Dall, 1896)			D

Phylum Mollusca	L	Z	S
Family Eulimidae Risso, 1826			
Eulima bilineatus (Alder, 1848)			7
Eulima hemphilli (Dall, 1884)			5
Balcis arcuata (C. B. Adams, 1850)			D
Balcis jamaicensis (C. B. Adams, 1845)	D	D	2
Niso aeglees Bush, 1885			2
Family Aclididae G. O. Sars, 1878			
Aclis sp. A			D
Aclis sp. B			D
Henrya goldmani Bartsch, 1947	D	D	
Family Calyptraeidae Blainville, 1824			
Crepidula convexa Say, 1822	104	8	1
Crepidula fornicata (Linne, 1758)	D	D	D
Crepidula plana Say, 1822	D	8	D
Family Strombidae Rafinesque, 1815			
Strombus alatus Gmelin, 1791			D
Family Ovulidae Gray, 1853			
Simnalena marferula Cate, 1973			D
Simnalena uniplicata (Sowerby, 1848)			D
Family Atlantidae Wiegmann and Ruthe, 1832			
Atlanta brunnea Gray, 1840			D
Family Naticidae Gray, 1840			
Natica canrena (Linne, 1758)			D
Natica pusilla Say, 1822	3		128
Polinices duplicatus (Say, 1822)	6		7
Sigatica semisulcata (Gray, 1839)			D
Sinum perspectivum (Say, 1831)			2
Family Cymatiidae Iredale, 1913			
Cymatium cingulatum (Lamarck, 1822)			D
Family Tonnidae Peile, 1926			
Tonna galea (Linne, 1758)			D
Family Muricidae da Costa, 1776			
Murex sp.			D
Thais haemastoma (Linne, 1767)		D	
Family Columbellidae Swainson, 1815			
Costoanachis cf. C. avara (Say, 1821)	22	4	
Costoanachis lafresnayi (Fischer and Bernardi, 1856)			D
Cosmioconcha calliglypta (Dall and Simpson, 1901)			D
Parvanachis obesa (C. B. Adams, 1845)	D		7
Parvanachis ostreicola (Melvill, 1881)	6		D
Suturoglypta iontha (Ravenel, 1861)			D
Mitrella lunata (Say, 1826)	32	D	D
Family Buccinidae Rafinesque, 1815			
Cantharus cancellarius (Conrad, 1846)			10
Family Melongenidae Gill, 1867			
Busycon perversum (Linne, 1758)			D
Busycon spiratum (Lamarck, 1816)			D
Family Nassariidae Iredale, 1916			
Nassarius acutus (Say, 1822)	D		9
Nassarius albus (Say, 1826)			D
Nassarius vibex (Say, 1822)			D
Family Fasciolariidae Gray, 1853			
Fasciolaria lilium G. Fischer, 1807			D

Phylum Mollusca	L	Z	S
Family Olividae Latreille, 1825			
Oliva sayana Ravenel, 1834			9
Olivella dealbata (Reeve, 1850)			D
Olivella minuta (Link, 1807)			D
Family Cancellariidae Forbes and Hanley, 1853			
Trigonostoma rugosum (Lamarck, 1822)			D
Family Marginellidae Fleming, 1828			
Prunum apicina (Menke, 1828)	D		
Family Terebridae H. and A. Adams, 1854			
Terebra concava Say, 1827			1
Terebra dislocata (Say, 1822)			D
Terebra protexta Conrad, 1845			40
Family Turridae Swainson, 1840			
Agathotoma metria (Dall, 1903)			D
cf. Bellaspira sp.			D
Pyrgospira tampaensis (Bartsch and Rehder, 1939)			D
Cryoturris adamsi (E. A. Smith, 1884)			D
Cryoturris cf. cerinella (Dall, 1889)			2
Cryoturris serga (Dall, 1881)			D
cf. Drillia acurugata (Dall, 1890)			D
Glyphostoma epicasta Bartsch, 1934			D
Ithycythara lanceolata (C. B. Adams, 1850)			D
Kurtziella dorvilliae (Reeve, 1845)			D
Kurtziella fargoi (McGinty, 1955)			1
Kurtziella rubella (Kurtz and Stimpson, 1851)			D
Nannodiella oxia (Bush, 1885)			2
Nannodiella vespuciana (Orbigny, 1842)			D
Splendrillia woodringi (Bartsch, 1934)			D
Pilbryspira albocinta (C. B. Adams, 1845)			D
Pyrgocythara plicosa (C. B. Adams, 1850)	D	D	D
Pyrgospira ostrearum (Stearns, 1872)			D
Family Pyramidellidae Gray, 1840			
Pyramidella crenulata (Holmes, 1859)	D		3
Eulimastoma cf. E. canaliculata (C. B. Adams, 1850)	2		D
Eulimastoma engonia (Bush, 1885)	D	D	1
Eulimastoma harbisonae Bartsch, 1955	6		D
Eulimastoma weberi (Morrison, 1965)	D		D
Odostomia bushiana Bartsch, 1909	D		D
Odostomia dianthophila Wells and Wells, 1961	D		D
Odostomia gibbosa Bush, 1909	3		1
Odostomia impressa (Say, 1821)	D	15	D
Odostomia seminuda (C. B. Adams, 1837)	D		5
Odostomia (cf. Pyrgulina) sp.			D
Peristichia toreta Dall, 1889			D
Sayella crosseana (Dall, 1885)	17	D	D
Sayella livida Rehder, 1935	8	D	D
Turbonilla (cf. Turbonilla) sp. A			4
Turbonilla (cf. Mormula) sp. A			D
Turbonilla (Chemnitzia) sp. A			3
Turbonilla (Chemnitzia) sp. B			D
Turbonilla (Chemnitzia) sp. C			D
Turbonilla (Chemnitzia) sp. D			7
Turbonilla (Chemnitzia) sp. F	2	D	3
Turbonilla unilirata Bush, 1899			D

Phylum Mollusca	L	Z	S
Turbonilla elegans (Orbigny, 1842)			D
Turbonilla speira Ravenel, 1859			D
Turbonilla (Pyrgiscus) sp. B	D		3
Turbonilla (Pyrgiscus) sp. C			D
Turbonilla (Pyrgiscus) sp. D	26	1	14
Turbonilla (Pyrgiscus) sp. F			1
Turbonilla (Pyrgiscus) sp. I			2
Turbonilla (Pyrgiscus) sp. J			D
Turbonilla (Pyrgiscus) sp. K			D
Turbonilla (Strioturbonilla) sp. A			1
Turbonilla (Strioturbonilla) sp. D			18
Family Acteonidae Orbigny, 1842			
Acteon punctostriatus (C. B. Adams, 1840)	6	1	15
Ringicula semistriata Orbigny, 1842			D
Family Acteocinidae Pilsbry, 1921			
Acteocina canaliculata (Say, 1822)	38	D	8
Family Cylichnidae A. Adams, 1850			
Cylichnella bidentata (Orbigny, 1841)	5		2
Family Bullidae Rafinesque, 1815			
Bulla striata Bruguiere, 1792	1	1	D
Family Haminoeidae Pilsbry, 1895			
Haminoea antillarum (Orbigny, 1841)	D	D	
Haminoea succinea (Conrad, 1846)	D		D
Atys riiseana Morch, 1875			D
Family Retusidae Thiele, 1926			
Pyrunculus caelatus (Bush, 1885)			1
Volvulella persimilis (Morch, 1875)			5
Volvulella texasiana Harry, 1967			D
Family Cuvieridae Gray, 1840			
Cavolina longirostris (Blainville, 1821)			D
Cavolina uncinata (Rang, 1829)			D
Creseis acicula (Rang, 1828)			1
Family Siphonariidae Gray, 1840			
Siphonaria pectinata (Linne, 1758)			D
Class Bivalvia Linne, 1758			
Family Nuculidae Gray, 1824			
Nucula proxima Say, 1822			55
Family Nuculanidae Meek, 1864			
Nuculana acuta (Conrad, 1831)	300	3	14
Nuculana concentrica (Say, 1834)	D		10
Family Arcidae Lamarck, 1809			
Arca imbricata Bruguiere, 1789			D
Anadara brasiliana (Lamarck, 1819)	D		D
Anadara chemnitzii (Philippi, 1851)			D
Anadara transversa (Say, 1822)	79	4	62
Barbatia domingensis (Lamarck, 1819)			D
Lunarca ovalis (Bruguiere, 1789)	D	D	1
Family Noetiidae Stewart, 1930			
Noetia ponderosa (Say, 1822)	D		1

Phylum Mollusca	L	Z	S
Family Mytilidae Rafinesque, 1815			
Amygdalum papyrium (Conrad, 1846)	28	1	D
Brachidontes exustus (Linne, 1758)	6	2	D
Ischadium recurvum (Rafinesque, 1820)	D		D
Modiolus americanus (Leach, 1815)			2
Musculus lateralis (Say, 1822)			2
Lioberus castaneus (Say, 1822)			3
Family Pinnidae Leach, 1819			
Atrina serrata (Sowerby, 1825)			1
Family Pectinidae Rafinesque, 1815			
Pecten raveneli Dall, 1898			D
Aequipecten muscosus (Wood, 1828)			D
Argopecten gibbus (Linne, 1758)			D
Argopecten irradians amplicostatus Dall, 1898		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	1	D
Crassostrea virginica (Gmelin, 1791)	D	2	D
Family Lucinidae Fleming, 1828			
Lucina pectinata (Gmelin, 1791)	8	4	
Anodontia alba Link, 1807			D
Divaricella quadrisulcata (Orbigny, 1842)			D
Linga amiantus (Dall, 1901)	6		259
Parvilucina multilineata (Tuomey and Holmes, 1857)	31		132
Pseudomiltha floridana (Conrad, 1833)			D
Family Ungulinidae H. and A. Adams, 1857			
Diplodonta semiaspera (Philippi, 1836)	D		1
Diplodonta cf. D. soror C. B. Adams, 1852			189
Family Chamidae Lamarck, 1809			
Chama congregata Conrad, 1833			1
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	19	1	9
Family Montacutidae Clark, 1855			
Mysella planulata (Stimpson, 1857)	141	D	193
Pythinella cuneata (Verrill and Bush, 1898)			1
Family Sportellidae Dall, 1899			
Ensitellops sp.	D		D
Family Carditidae Fleming, 1820			
Carditamera floridana Conrad, 1838	D		D
Family Crassatellidae Ferussac, 1822			
Crassinella lunulata (Conrad, 1834)	5		14
Family Cardiidae Oken, 1818			
Dinocardium robustum (Lightfoot, 1786)	D		D
Laevicardium laevigatum (Linne, 1758)			D
Laevicardium mortoni (Conrad, 1830)	79	1	D
Trachycardium muricatum (Linne, 1758)	D		D

Phylum Mollusca	L	Z	S
Family Mactridae Lamarck, 1809			
Mactra fragilis Gmelin, 1791	1	D	D
Anatina anatina (Spengler, 1802)			1
Mulinia lateralis (Say, 1822)	321	4	3
Raeta plicatella (Lamarck, 1818)	D		D
Rangia cuneata (Sowerby, 1831)	D		D
Rangia flexuosa (Conrad, 1839)			D
Family Mesodesmatidae Gray, 1839			
Ervilia concentrica (Holmes, 1860)		D	D
Family Solenidae Lamarck, 1809			
Solen viridis Say, 1821			6
Ensis minor Dall, 1900	105		2
Family Tellinidae Blainville, 1814			
Tellina aequistriata Say, 1824			1
Tellina alternata Say, 1822	D	D	6
Tellina iris Say, 1822			11
Tellina lineata Turton, 1819	D		
Tellina squamifera Deshayes, 1855			D
Tellina tampaensis Conrad, 1866	205		
Tellina texana Dall, 1900	59	D	D
Tellina versicolor DeKay, 1843	6		135
Tellidora cristata (Recluz, 1842)	D		D
Strigilla mirabilis (Philippi, 1841)			62
Macoma brevifrons (Say, 1834)	D		
Macoma constricta (Bruguiere, 1792)		D	
Macoma tageliformis Dall, 1900			1
Macoma tenta (Say, 1834)	39	20	D
Family Donacidae Fleming, 1828			
Donax texasianus Philippi, 1847			D
Donax variabilis Say, 1822	D		D
Family Semelidae Schumacher, 1817			
Semele bellastriata (Conrad, 1837)			D
Semele nuculoides (Conrad, 1841)			D
Semele proficua (Pulteney, 1799)			D
Abra aequalis (Say, 1822)	169	6	259
Cumingia tellinoides (Conrad, 1831)	62	D	D
Family Solecurtidae Orbigny, 1846			
Solecurtis cumingianus Dunker, 1861			D
Tagelus divisus (Spengler, 1794)	2	D	D
Tagelus plebeius (Lightfoot, 1786)	106	D	
Family Dreissenidae Gray, 1840			
Mytilopsis leucophaeata (Conrad, 1831)	D		
Family Trapeziidae Lamy, 1920			
Coralliophaga coralliophaga (Gmelin, 1791)	D		
Family Corbiculidae Gray, 1847			
Polymesoda maritima (Orbigny, 1842)	11	D	D
Family Veneridae Rafinesque, 1815			
Agriopoma texasiana (Dall, 1892)	2		D
Anomalocardia auberiana (Orbigny, 1842)	26	D	D
Callista eucymata (Dall, 1890)			1
Chione cancellata (Linne, 1767)	60	3	D
Chione clenchi Pulley, 1952			3
Chione grus (Holmes, 1858)	D		3
Chione intapurpurea (Conrad, 1849)			D

	L	Z	S
Phylum Mollusca			
Cyclinella tenuis (Recluz, 1852)	2	D	4
Dosinia elegans Conrad, 1846			D
Dosinia discus (Reeve, 1850)	D		5
Gouldia cerina (C. B. Adams, 1845)			2
Mercenaria campechiensis (Gmelin, 1791)	2		D
Pitar sp.			D
Family Petricolidae Deshayes, 1831			
Petricola pholadiformis (Lamarck, 1818)	D		D
Family Corbulidae Lamarck, 1818			
Corbula caribaea Orbigny, 1842		D	17
Corbula contracta Say, 1822	D	1	67
Corbula dietziana C. B. Adams, 1852			3
Varicorbula operculata (Philippi, 1848)	D		D
Family Gastrochaenidae Gray, 1840			
Gastrochaena hians (Gmelin, 1791)			1
Family Hiatellidae Gray, 1824			
Hiatella arctica (Linne, 1767)		1	
Family Pholadidae Lamarck, 1809			
Pholas campechiensis Gmelin, 1791	D		D
Barnea truncata (Say, 1822)	D		D
Cyrtopleura costata (Linne, 1758)	1		D
Diplothyra smithii Tryon, 1862			D
Martesia cuneiformis (Say, 1822)			D
Family Lyonsiidae Fischer, 1887			
Lyonsia hyalina floridana Conrad, 1849	340	3	4
Family Pandoridae Rafinesque, 1815			
Pandora bushiana Dall, 1886			2
Pandora trilineata Say, 1822	D		1
Family Periplomatidae Dall, 1895			
Periploma margaritaceum (Lamarck, 1801)	3		20
Periploma orbiculare Guppy, 1878			D
Periploma sp.			D
Family Cuspidariidae Dall, 1886			
Cardiomya ornatissima (Orbigny, 1842)			D
Family Verticordiidae Stoliczka, 1871			
Verticordia ornata (Orbigny, 1842)			D
Class Scaphopoda Bronn, 1862			
Family Dentaliidae Gray, 1834			
Dentalium eboreum Conrad, 1846			26
Dentalium texasianum Philippi, 1848	D		35
Family Siphonodentaliidae Simroth, 1894			
Cadulus carolinensis Bush, 1885	D		51

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TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

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Texas CONCHOLOGIST

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SYNOPSIS OF SUPRASPECIFIC CLASSIFICATION OF LIVING OYSTERS PUBLISHED

Harry, H. W. 1985. Synopsis of the supraspecific classification of living oysters (Bivalvia: Gryphaeidae and Ostreidae) Veliger 28 (2): 121-158.

This paper extends the classification of the living species of oysters beyond that proposed by Stenzel (1971) in order to indicate their diversity and relationships more precisely, according to the author. Recent members of the superfamily Ostreacea are subdivided into two families, four subfamilies, ten tribes (all new) and 24 genera and subgenera (12 new). Illustrations are provided of the shells of type species of the new genera and subgenera, as well as of significant anatomical features. Two junior homonyms are renamed at the species level.

This important paper continues the work by Dr. Harry on the living oysters, starting with his 1981 paper on "Nominal species of living oysters proposed during the last fifty years" Veliger 24 (1): 39-45. Since that time Dr. Harry has worked on collections in several museums and examined the animals of most of the living oysters. Several HCS members were helpful in providing dry, preserved or living specimens of oysters from worldwide field trips. The work will continue as Dr. Harry examines other museum material and does more field work.

Three genera are named for persons known to club members, as follows: Myrakeena angelica (Rochebrune, 1895), named for A. Myra Keen; Teskeyostrea weberi (Olsson, 1951), named for Margaret C. Teskey; and Booneostrea cucullina (Deshayes, 1836), named for Constance E. Boone.

The HCS library maintains a subscription to The Veliger, and the volume number mentioned above is available to members.

****

HCS MEMBERS WIN AT BRAZORIA FAIR

Three HCS members received blue ribbon awards for their displays in the Brazoria County Fair Sea and Shore Exhibit, October, 1985.

Bea Sanchez won a blue ribbon and a trophy for her large display of varied marine life. Harold and Freida White came away with a blue ribbon and a special award trophy for their cases of West Australian shells. Jan Hobbs, a newcomer to the world of displaying, received two blue ribbons, one for a world-wide non-self-collected exhibit and one for a growth series of Busycon and Dinocardium.

Only Brazoria County residents can enter this annual competition.

TEXAS CONCHOLOGIST, Vol. XXII, No. 2, January, 1986

WORLD RECORD SIZED UMBRACULUM FOUND IN GULF

BY JIM KEELER

A world record sized Umbraculum umbraculum (Lightfoot, 1796) was brought up in shrimp nets off Cape St. George Island, Florida West Coast, in late 1984 by Captain James Silva's vessel "The Norther." The shell, 11.1 cm. long x 9.00 cm. wide, was given to The Apalachicola National Estuarine Sanctuary by David Hill and now resides in the Sanctuary Local Marine Mollusk Collection in Apalachicola.

Official confirmation of the identification and size of the shell was made by Dr. Fred Thompson of the Florida State Museum in Gainesville, Florida.

The largest Umbraculum umbraculum previously recorded is the 10.3 cm. long specimen from Mauritius (Indian Ocean) registered in 1977 and now in the Delaware Museum of Natural History.

The registry of this new record was made to Robert J. L. Wagner, editor of Standard Catalog of Shells which includes and updates records of the largest sized shells found throughout the world.

[The Editor remarks that this species is listed in Compendium of Seashells, 1982, page 280, as occurring in the Indo-Pacific and the Caribbean and said to be rare. There the animal is measured to be 4 inches for the 10 cm. shell (a limpet-like shell which sits on top of the large animal). See also American Seashells 1974, pages 346, 347, and Neville Coleman's What Shell Is That? 1975, pages 101, 102 (Australia). At press time, we have not been able to find out if the species from the Panamic Province is still considered a different species. Having collected a specimen at night by lantern at Venado Island off the West Coast of Panama, my memory is that the animal there was reddish and was smoother and jelly-like. It is listed in Myra Keen's Seashells of Tropical West America 1971 as Umbraculum ovale (Carpenter, 1856). The only animal I have seen of Umbraculum umbraculum was a preserved one brought in by a Freeport shrimper and shown to us in the early 1970s by Mildred Tate at a club meeting. In those days, shrimpers working off Port Isabel, Texas, did bring in specimens with some regularity, and the late Betty Allen used to have the shells for sale in her shop. I am not aware of anatomical studies of Gulf specimens. The shell brought in off Cape St. George Island was empty.]

INFORMATION SOUGHT ABOUT EARLY TEXAS CONCHOLOGISTS

There is regrettably little information recorded in the molluscan literature about two early Texas conchologists, J. A. Singley and J. D. Mitchell, who published papers on Texas mollusks in the 1890s.

J. A. Singley may have lived at one time at Giddings, Texas, according to a reprint with his signature and address that is in the molluscan library at the Houston Museum of Natural Science. Abbott listed him in American Malacologists as one of the persons about whom he could find no information.

Andrews' book Shells and Shores of Texas, 1977, lists papers by Singley as follows:

1893 Contributions to the natural history of Texas: Part 1, Texas Mollusca, In Fourth Annual Rep. Geol. Surv. Texas, 1892, Austin: Ben Jones and Co.

1894 List of Mollusca collected in Texas in 1891. In Fishes of Texas and Rio Grande Basin, ed. B. W. Evermann and W. C. Kendall, pp. 123-125. Bull. U.S. Fish Comm., Vol. 12 for 1892. Washington, D.C.

Paul McGee published a brief note on Singley and Mitchell in Texas Conchologist 7(2):14.

Perhaps someone with a talent and interest in genealogical research who reads this will undertake to seek more information about Singley and write his biography.

We know a little more about Mitchell, the first native born conchologist. He was from pioneering families in Texas and grew up near Port Lavaca, later moving to Victoria, Texas. He published several pamphlets on mollusks and papers on mollusks and Texas sea life in journals. He is not mentioned in Abbott's American Malacologists. However, an article concerning his life and contributions to the knowledge of Texas mollusks was published in Texas Conchologist 3(4). It was a summary of the information gathered by Michael N. Boone (son of Constance E. Boone) for a junior high school history project and which was published in Texas Junior Historian.

Several species of mollusks from Texas were named for Mr. Mitchell by William H. Dall of the Smithsonian Institution, including Amaea mitchelli.

A review of the story in TC, with update of information and with notes from pamphlets published by Mr. Mitchell, will appear in a later issue of Texas Conchologist. We will appreciate any information you can add to what is known about Mr. Mitchell.

H. W. Harry and C. Boone

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SEARCH AND SEIZURE

By Constance E. Boone

Dendostrea frons FOUND ON MANGROVE ROOTS

One important collection made on the HCS trip to Caye Caulker, Belize September 28 - October 2, 1985, confirms that Dendostrea frons (Linne, 1758) can be found on mangrove roots.

This oyster has popularly been named Leafy Oyster, Coon Oyster (said to be a favorite food of raccoons) or Frons Oyster. The new Common Names List devised by the American Malacological Union lists this species as "frond oyster".

Through the years, molluscan literature has stated variously that this species could be found on mangroves, on gorgonians, on wood pilings, on trees, and even on stone. At Marathon I found a number of specimens on live Spondylus brought up by divers.

On my very first trip to the Florida Keys, after a hurricane had swept across the narrow strip and left much debris, I collected specimens on sea fans and sea whip. A few years later, at Marathon, I asked fellow collectors where I could go to get the Frons Oyster off of mangroves and was told in no uncertain terms that this oyster did not live on mangroves. Abbott's American Seashells, 1974, states on page 457 that this species does not grow on mangroves.

It has sometimes been reported in drift on Texas beaches or by divers working wrecks or rigs.

In the collections at the Houston Museum of Natural Science, there are several lots of this species. One is on some kind of woody twig, not gorgonian, that came from Rockport, Texas, and was in Dr. T. E. Pulley's personal collection. He had gotten this lot from the Rockport marine lab. There are several lots that show the specimens on gorgonian stems, from several Caribbean localities. There is one lot, collected by S. Mann and given to the museum by Fanny Miron, that was taken in the Belize area. The specimens seem to be on mangrove bark.

Therefore, it was with interest that we collected live specimens of Dendostrea frons from red mangrove roots at Caye Caulker. Dr. Pulley snorkeled over to the mangroves on shore near the grassy area on the north side of the island near the cut. There he retrieved several specimens and called this to my attention. I also collected some live specimens, being careful to have some of the root material on the specimens and collected one specimen with the root as seen in the illustration accompanying this article.

The oysters were not common on the mangrove roots, but we only examined a few of the trees since the mosquitos were so fierce there. If you haven't heard, we were "eaten alive" by these pests, as well as "no-see-ums" on this trip.

Specimens were brought home in alcohol and examined by Dr. Harold W. Harry who has confirmed that they were D. frons and on mangrove roots.

They have been deposited in the Houston Museum of Natural Science.

Fig. 1 Dr. T. E. Pulley chats with HCS member Peggy Jehn before going out in the boat at Caye Caulker, Belize.

Photo by Helen Cornellisson

In March, 1985, Natalie Howard had alerted me to the fact that Dendostrea frons was alive on the wire traps extending from shore at Caye Chapel, an island south of Caye Caulker. We collected a few more there in September, 1985.

Evidence seems established now that this oyster settles as spat on several kinds of substrates and can grow to adults if the salinity of waters is conducive to growth.

It so happens that none of us did get this oyster on gorgonians on our trips to Caye Caulker.

Dr. Harry has provided the following notes:

"This small lophine oyster has long been known as the tree or leafy oyster, because its shell shape is like an oval leaf. Living in the Western Atlantic, it is named Dendostrea frons (Linne, 1758). It has clasper spines on the left valve which in some museum specimens seem to have grown around what appear to be black twigs several inches long and about 1/4 inch in diameter, which were thought to be pieces of mangrove roots."

"Careful inspection shows that most of these museum specimens are actually attached to the black core of a sea whip, which is a gorgonian coral closely related to the sea fans. However, a few museum specimens actually are attached to wooden twigs which have reached the sea, although they are not necessarily mangrove."

"There are two major types of mangroves: 1) Red mangroves which have prop roots extending from the trunk which are from 1/2 to several inches thick and are dark reddish-brown; 2) Black mangroves which have no prop roots but have numerous upright, pliable, black pneumatophores (air carriers) that grow up from the mud around the tree. They are several inches long but rarely more than 1/4 inch thick."

"There are several species of oysters that occur on mangrove roots, but all of them live elsewhere as well. Dendostrea is rarely found on them. However, it is unwise to say that it never lives on mangrove."

"On the September field trip to Caye Caulker off Belize, several specimens of D. frons were found attached to prop roots of red mangrove, one of which is shown in the accompanying figure. The shell is 30 mm. high."

Fig. 2 Dendostrea frons on red mangrove root collected by Constance E. Boone at Caye Caulker, Belize.

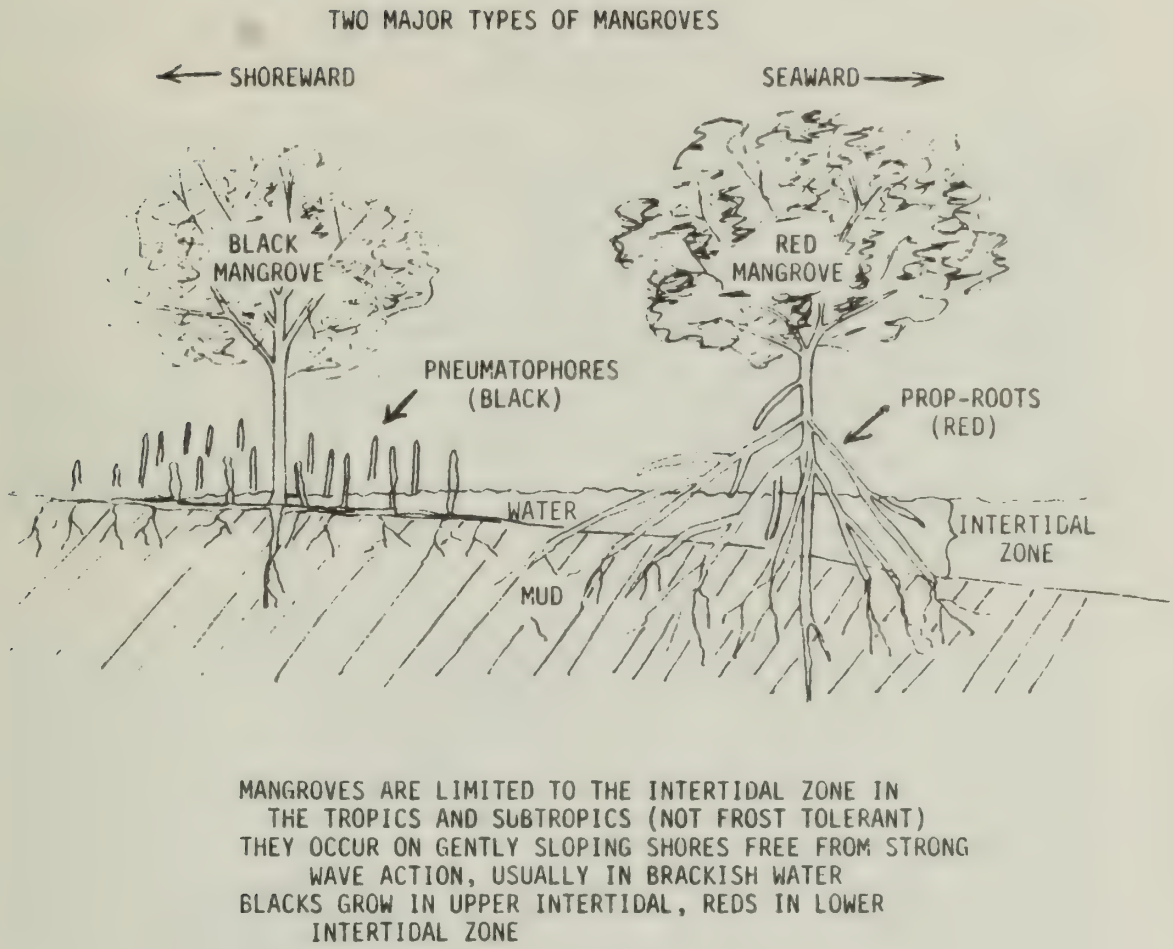

Fig. 3 Information on red mangrove and black mangrove.

Illustrations by H. W. Harry

TEXAS CONCHOLOGIST, Vol. XXII, No. 2, January, 1986

MOLLUSCAN DISTRIBUTION IN THE SUBMERGED LANDS OF TEXAS, BEAUMONT-PORT ARTHUR 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 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, including 574 samples in the Beaumont-Port Arthur area, were collected at regularly spaced intervals across the submerged lands. Results of this project are being published in a series of atlases that includes data on sediments, geochemistry of sediments, all benthic macroinvertebrates, and wetlands (White and others, 1983; White and others, 1985; White and others, in press; White and others, in preparation a; White and others, in preparation b; White and others, in preparation c; White and others, in preparation d).

The Beaumont-Port Arthur area, as defined in figure 2, includes a relatively small bay-estuary-lagoon system--Sabine Lake--partially separated from the Gulf of Mexico and the inner shelf by a modern strandplain-chenier system (Fisher and others, 1973). Tidal exchange between marine and estuarine systems occurs through a long, narrow tidal inlet, Sabine Pass, that has been extensively modified for navigation purposes. The pass connects to Sabine Lake but also to the Port Arthur-Sabine Neches canal network that outlines the south and west margins of Sabine Lake and is separated from the lake by spoil disposed along the channels. Two major rivers, Neches and Sabine, discharge into Sabine Lake, but a major part of the flow from the Neches River is diverted along the Sabine-Neches Canal. Extensive marshlands and natural coastal lakes occur along the Gulfward part of the map area. High Island, the site of one of several salt domes in the area, rises more than 20 ft (5 m) above the marsh in the southwest corner of the map sheet. Major cities in the map area include Beaumont and Port Arthur. Extensive industrial complexes are located along the Sabine-Neches Canal, and Neches River. Much more detail on the urban, industrial, and agricultural setting of the Beaumont-Port Arthur area is provided by Fisher and others (1973).

---

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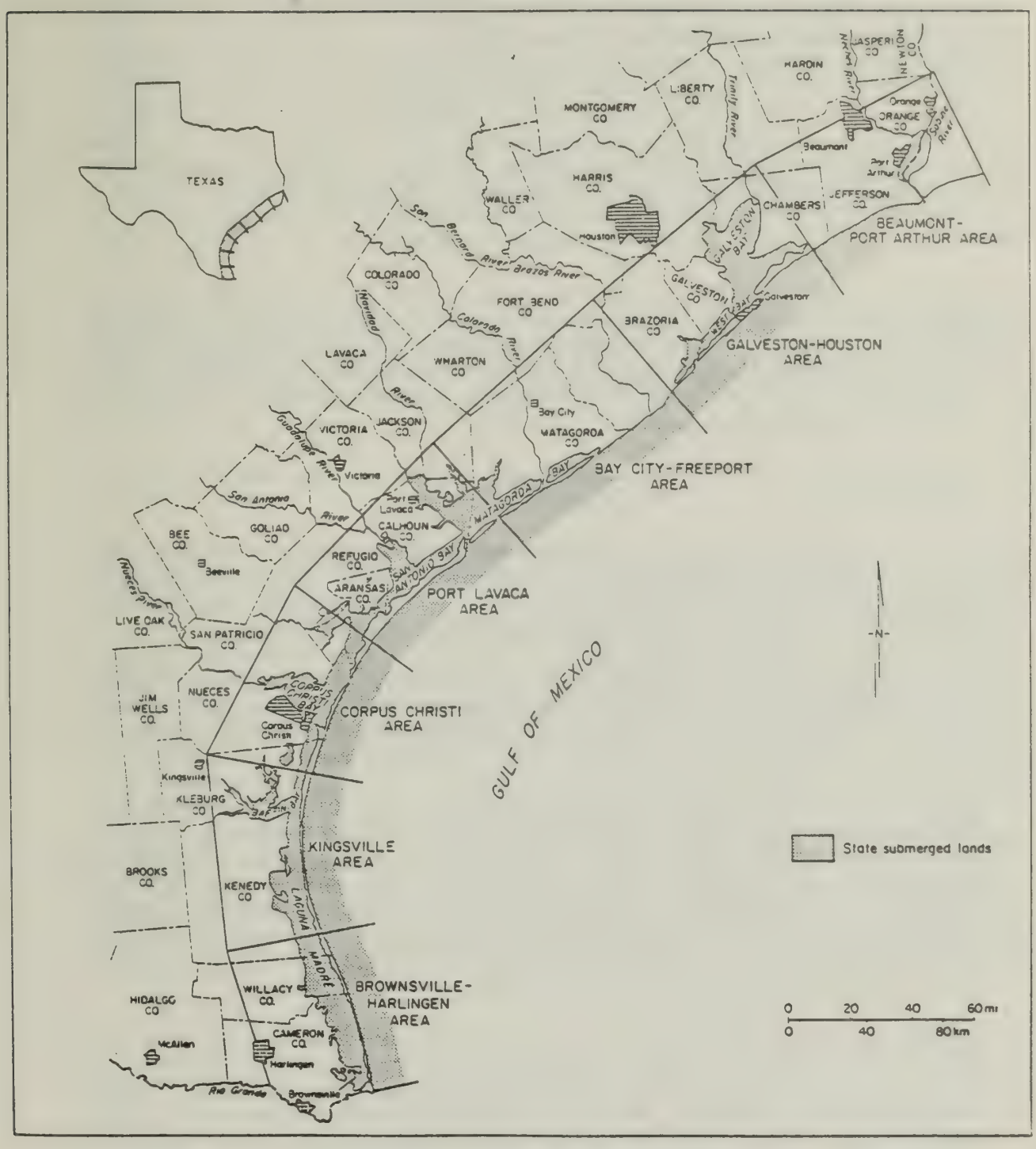

Figure 1. Index map showing seven area maps that cover the submerged coastal lands of Texas (modified from McGowen and Morton, 1979, and Brown and others, 1972-1980).

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 clam-shell 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 3 inches (4 and 7 cm). Of the 574 sediment samples collected in the Beaumont-Port Arthur area, 90 (fig. 2) were analyzed for mollusks. Bay-estuary-lagoon samples were collected in January, 1977; inner shelf samples were collected in October, 1976, and September, 1977. Other details on data acquisition and analysis can be found in the atlas on the State-owned submerged lands in the Corpus Christi area (White and others, 1983).

RESULTS

Forth-six mollusk species were collected live from the Beaumont-Port Arthur area, including 21 gastropod and 25 bivalve species. Although 129 total species (live and dead) were identified, including the scaphopod, Dentalium texasianum, 67 gastropods, and 61 bivalves, only those species collected live will be considered in this report. All species collected are listed in appendix A.

Sabine Lake (including the Sabine and Neches Rivers and the Sabine-Neches Canal)

Fourteen total species, including 3 gastropods and 11 bivalves, were collected from the 34 stations examined in Sabine Lake. Numbers of species were low throughout Sabine Lake. The highest number at a station is four and 23 stations (68 percent) had no mollusks.

Rangia cuneata, the most abundant molluscan species, accounts for 68 percent of the total number of bivalve individuals (table 1) and 65 percent of all mollusks. Rangia was collected live throughout most of Sabine Lake.

Rangia is generally dominant in parts of estuaries where salinity is too low for marine species and too high for most fresh-water species. It is almost entirely restricted to areas where salinity is below 15 ppt most of the time and is most abundant far up the tidal rivers where salinity may stay below 1 ppt continuously for months or even years (Hopkins and others, 1973). It never inhabits hard-packed sand, rock, or hard clay bottoms, although it lives in soft pockets or silt-filled depressions in hard bottoms (Hopkins and others, 1973).

Rangia has been reported by other workers as abundant in both the Neches River and Sabine Lake (Harrel and others, 1976; Wiersema and others, 1976). In the Neches River, Rangia was most abundant between the salt-water barrier, 36.6 mi (58.6 km) upstream from the river mouth, and a point 23.5 mi (37.6 km) downstream from the barrier. Wiersema and others (1976) found Rangia at all eight of their stations in Sabine Lake, where it was most abundant at their mid-lake stations.

Inner Shelf

Nineteen gastropod and 17 bivalve species, represented by 458 individuals, were collected on the inner shelf. Three species of gastropods, Nassarius acutus, Vitrinella floridana, and Parvanachis obesa, account for 69 percent of the total number of gastropod individuals (table 1). All three species also were abundant on the inner shelf in the Galveston-Houston area (White and others, 1985). Nassarius acutus and V. floridana primarily occupy substrates of 0 to 20 percent sand, whereas Parvanachis obesa is generally found in sandier substrates ranging from 0 to 60 percent sand.

Nuculana concentrica, Tellina versicolor, and Corbula contracta represent 75 percent of the 167 bivalve specimens. Nuculana concentrica and C. contracta are found predominantly in substrates of 20 to 40 percent sand, whereas T. versicolor occurs in muddier substrates of 0 to 20 percent sand.

Numerous brackish-water species, including Crassostrea virginica, Rangia cuneata, Texadina sphinctostoma, and Probythinella louisianae, are represented only by dead shells at many stations, especially those with relict muds (McGowen and Morton, 1979).

ACKNOWLEDGMENTS

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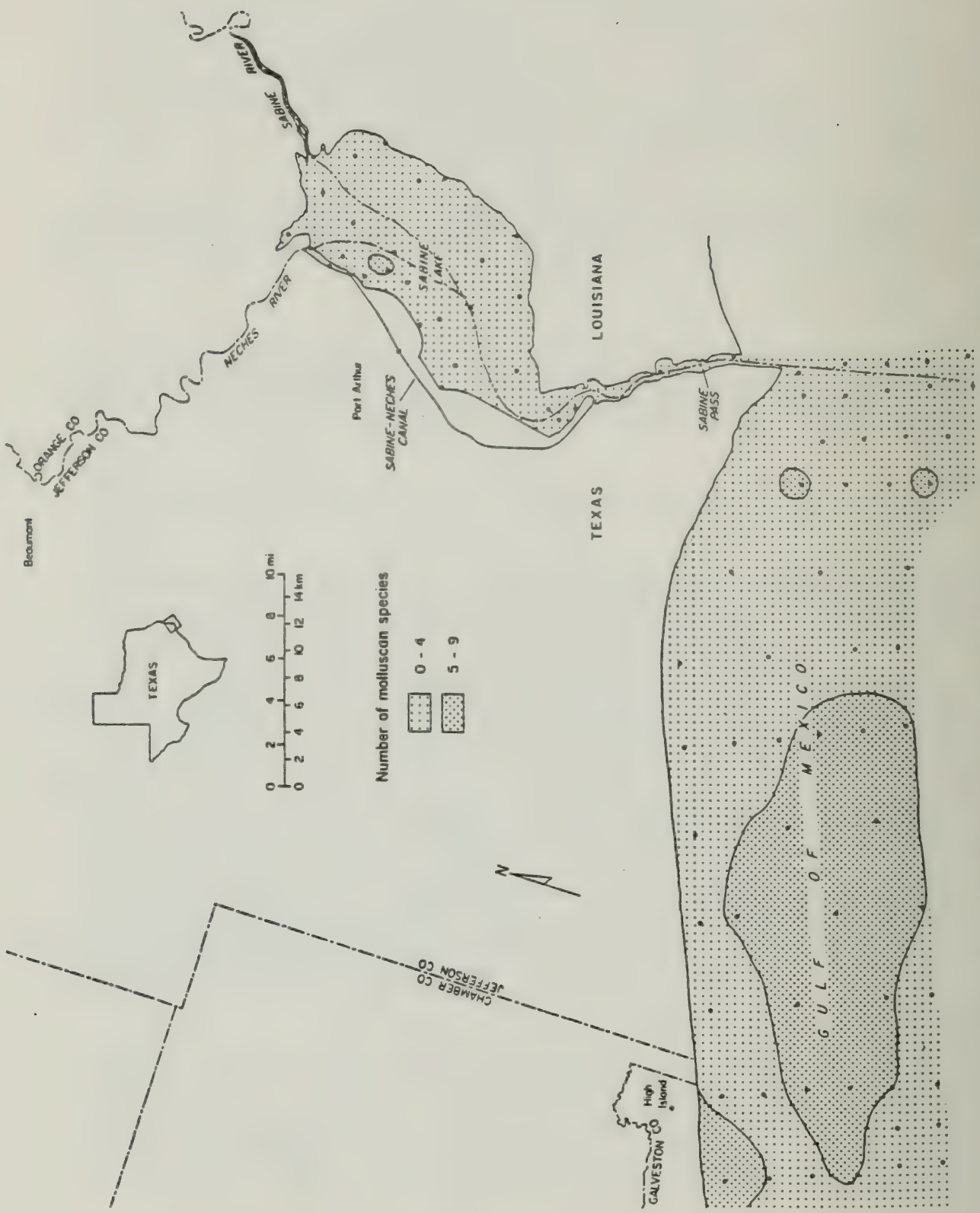

Figure 2. Map showing number of molluscan species and each sample location in the submerged lands of the Beaumont-Port Arthur area.

Table 1. Most abundant molluscan species of the Beaumont - Port Arthur area.

Sabine Lake*	Number of individuals	Percent of all (14) gastropod individuals
Gastropoda		
Texadina sphinctostoma	12	86
		Percent of all (237) bivalve individuals
Bivalvia		
Rangia cuneata	162	68
Macoma mitchelli	17	7
Ischadium recurvum	17	7
Crassostrea virginica	13	5
Inner Shelf		Percent of all (291) gastropod individuals
Gastropoda		
Nassarius acutus	108	37
Parvanachis obesa	50	17
Vitrinella floridana	45	16
		Percent of all (167) bivalve individuals
Bivalvia		
Nuculana concentrica	77	46
Corbula contracta	27	16
Tellina versicolor	21	13

*Includes the Sabine and Neches Rivers, the Sabine-Neches Canal, and parts of the Intracoastal Waterway.

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Appendix A: Distribution of Benthic Macroinvertebrates In the Beaumont-Port Arthur Area

Distribution of Molluscan Species

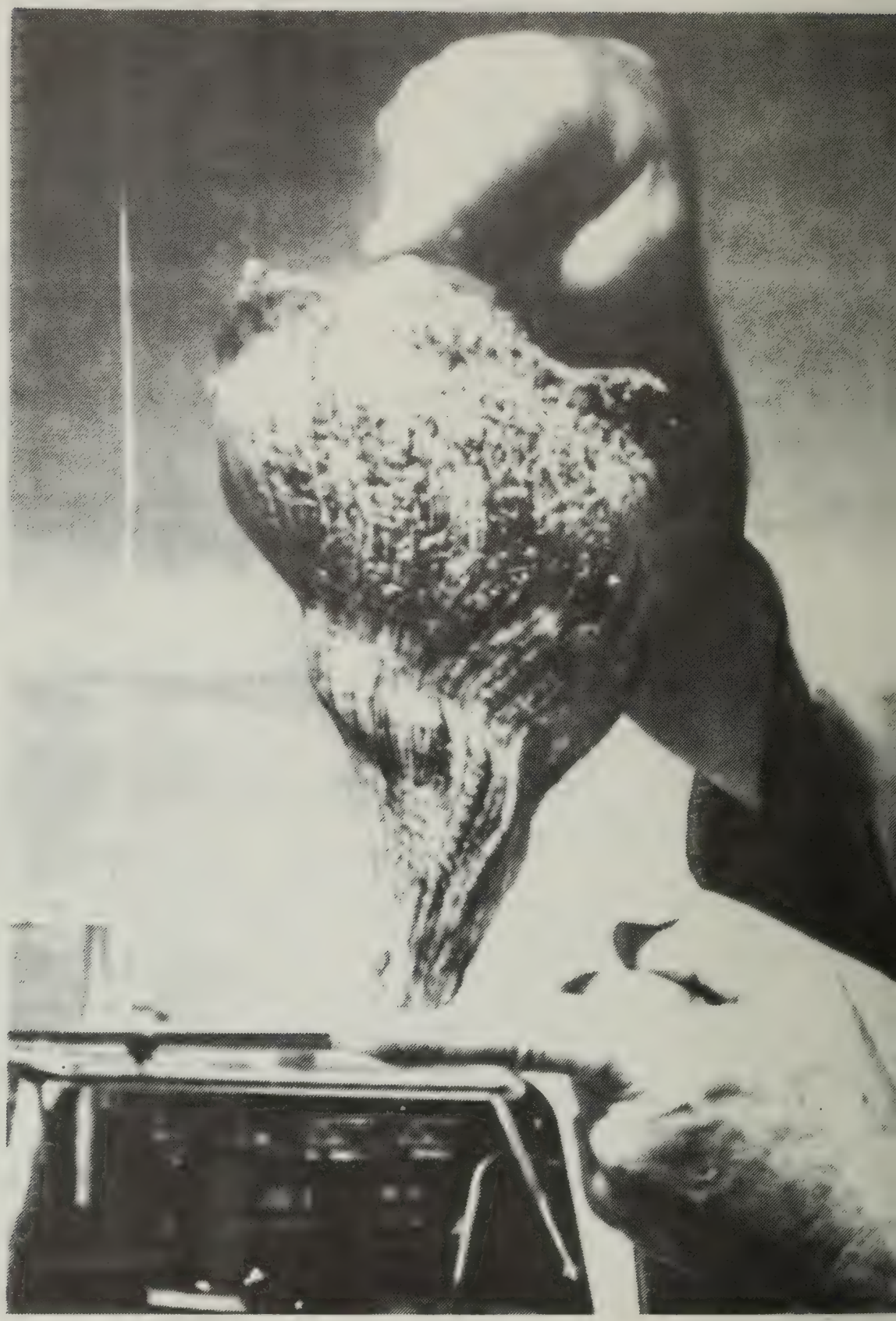
IS = Inner Shelf
S = Sabine Lake, Sabine River, Neches River, and Sabine-Neches Canal

	IS	S	Totals
Phylum Mollusca			
Class Gastropoda Cuvier, 1797			
Family Fissurellidae Fleming, 1822			
Diodora cayenensis (Lamarck, 1822)	D		
Family Littorinidae Gray, 1840			
Littorina irrorata (Say, 1822)	D		
Family Rissoinidae Stimpson, 1865			
Rissoinia decussata (Montagu, 1803)	D		
Family Assimineidae Fleming, 1828			
Assiminea cf. *A. succinea* (Pfeiffer, 1840)	D		
Family Hydrobiidae Stimpson, 1865			
Hydrobia sp.		D	
Family Littoridinidae Thiele, 1929			
Texadina barretti (Morrison, 1965)		1	1
Texadina sphinctostoma (Abbott and Ladd, 1951)	D	12	12
Family Stenothyridae Fischer, 1885			
Probythenella louisianae (Morrison, 1965)	D		
Family Viviparidae Gray, 1847			
? *Campeloma* sp.	D		
Family Vitrinellidae Bush, 1897			
Vitrinella floridana Pilsbry and McGinty, 1946	45		45
Cyclostremiscus pentagonus (Gabb, 1873)	15		15
Solariorbis infracarinata Gabb, 1881	1		1
Teinostoma biscaynense Pilsbry and McGinty, 1945	D	D	
Family Cerithiidae Fleming, 1822			
Litiopa melanostoma Rang, 1829	D		
Cerithiopsis greeni (C. B. Adams, 1839)	D		
Cerithiopsis emersoni (C. B. Adams, 1838)	D		
Seila adamsi (H. C. Lea, 1845)	D		
Family Epitoniidae S. S. Berry, 1910			
Epitonium albidum (Orbigny, 1842)	D		
Epitonium humphreysi (Kiener, 1838)	D		
Epitonium angulatum (Say, 1830)	1		1
Epitonium rupicola (Kurtz, 1860)	D	D	
Epitonium apiculatum (Dall, 1889)	1		1
Epitonium multistriatum (Say, 1826)	1		1
Family Eulimidae Risso, 1826			
Balcis jamaicensis (C. B. Adams, 1845)	D		
Balcis arcuata (C. B. Adams, 1850)	D		
Eulima hemphilli Dall, 1884	1		1

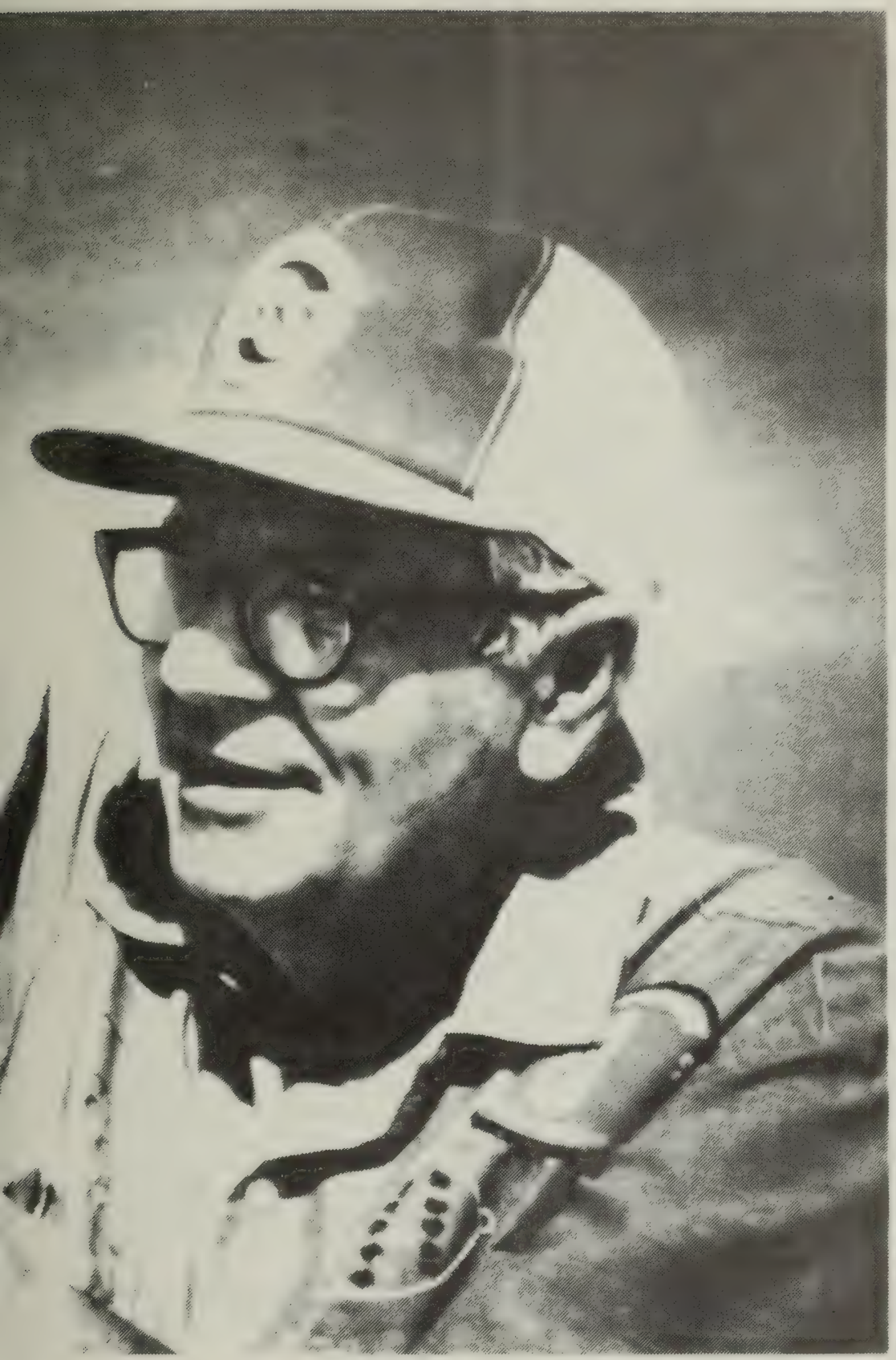
Phylum Mollusca	IS	S	Totals
Eulima bilineata (Alder, 1848)	2		2
Niso aeglees Bush, 1885	D		
Family Calyptraeidae Blainville, 1824			
Crepidula fornicata (Linne, 1758)	D		
Crepidula convexa Say, 1822	D		
Family Strombidae Rafinesque, 1815			
Strombus alatus Gmelin, 1791	D		
Family Naticidae Gray, 1840			
Polinices duplicatus (Say, 1822)	D		
Sinum perspectivum (Say, 1831)	D		
Natica pusilla Say, 1822	17		17
Family Muricidae da Costa, 1776			
Thais haemastoma (Linne, 1767)	D		
Family Columbellidae Swainson, 1840			
Costoanachis lafresnayi (Fischer and Bernardi, 1856)	D		
Costoanachis cf. *C. avara* (Say, 1821)	D		
Parvanachis obesa (C. B. Adams, 1845)	50	D	50
Parvanachis ostreicola Melvill, 1881	16	D	16
Cosmioconcha calliglypta (Dall and Simpson, 1901)	D		
Mitrella lunata (Say, 1826)	D		
Family Buccinidae Rafinesque, 1815			
Cantharus cancellarius (Conrad, 1846)	D		
Family Melongenidae Gill, 1867			
Busycon perversum (Linne, 1758)	D		
Busycon spiratum (Lamarck, 1816)	D		
Family Nassariidae Iredale, 1916			
Nassarius vibex (Say, 1822)		1	1
Nassarius acutus (Say, 1822)	108		108
Family Fasciolariidae Gray, 1853			
Fasciolaria lilium Fischer, 1807	D		
Family Olividae Latreille, 1825			
Olivella dealbata (Reeve, 1850)	D		
Family Terebridae H. and A. Adams, 1854			
Terebra concava Say, 1827	D		
Terebra protexta Conrad, 1845	8		8
Family Turridae Swainson, 1840			
Cryoturris cf. *C. cerinella* (Dall, 1889)	D		
Nannodiella cf. *N. vespuciana* Orbigny, 1842	D		
Agathotoma candidissima (C. B. Adams, 1845)	D		
Pyrgocythara plicosa (C. B. Adams, 1850)	D		
Family Pyramidellidae Gray, 1840			
Pyramidella crenulata (Holmes, 1859)	D		
Odostomia gibbosa Bush, 1909	D		
Odostomia seminuda (C. B. Adams, 1837)	D		
Odostomia impressa (Say, 1821)		D	
Eulimastoma weberi (Morrison, 1965)	4		4
Eulimastoma engonia (Bush, 1885)		D	
Turbonilla elegans (Orbigny, 1842)	D		
Turbonilla cf. *T. interrupta* (Totten, 1835)	4		4
Turbonilla (*Pyrgiscus*) sp. B	10		10
Turbonilla (*Chemnitzia*) sp. A.	1		1

Phylum Mollusca	IS	S	Totals
Family Acteonidae Orbigny, 1842			
Acteon punctostriatus (C. B. Adams, 1840)	1		1
Family Acteocinidae Pilsbry, 1921			
Acteocina canaliculata (Say, 1822)	D	D	
Family Retusidae Thiele, 1926			
Volvulella texasiana Harry, 1967	5		5
Family Cuvieridae Gray, 1840			
Cavolina longirostris (Blainville, 1821)	D		
Class Bivalvia Linne, 1758			
Family Nuculidae Gray, 1824			
Nucula proxima Say, 1822	D		
Family Nuculanidae Meek, 1864			
Nuculana acuta (Conrad, 1831)	3	D	3
Nuculana concentrica (Say, 1824)	77	D	77
Family Arcidae Lamarck, 1809			
Anadara transversa (Say, 1822)	2	D	2
Lunarca ovalis (Bruguiere, 1789)	D		
Family Noetiidae Stewart, 1930			
Noetia ponderosa (Say, 1822)	1		1
Family Mytilidae Rafinesque, 1815			
Brachidontes exustus (Linne, 1758)	D	D	
Ischadium recurvum (Rafinesque, 1820)		17	17
Family Plicatulidae Watson, 1930			
Plicatula gibbosa Lamarck, 1801	D		
Family Anomiidae Rafinesque, 1815			
Anomia simplex Orbigny, 1842	D	D	
Family Ostreidae Rafinesque, 1815			
Ostrea equestris Say, 1834	D	D	
Crassostrea virginica (Gmelin, 1791)	D	13	13
Family Lucinidae Fleming, 1828			
Linga amiantus (Dall, 1901)	2		2
Parvilucina multilineata (Tuomey and Holmes, 1857)	D	D	
Family Ungulinidae H. and A. Adams, 1857			
Diplondonta cf. *D. soror* C. B. Adams, 1852	2		2
Diplodonta cf. *D. semiaspera* (Philippi, 1836)	D		
Family Chamidae Lamarck, 1809			
Chama congregata Conrad, 1833	D		
Chama macerophylla (Gmelin, 1791)	D		
Family Kelliidae Forbes and Hanley, 1848			
Aligena texasiana Harry, 1969	D		
Family Montacutidae Clark, 1855			
Mysella planulata (Stimpson, 1857)	4	1	5
Family Sportellidae Dall, 1899			
Ensitellops sp.	D		
Family Crassatellidae Ferussac, 1822			
Crassinella lunulata (Conrad, 1834)	D		
Family Cardiidae Oken, 1818			
Trachycardium muricatum (Linne, 1758)	D		
Dinocardium robustum (Lightfoot, 1786)	D		

Phylum Mollusca	IS	S	Totals
Family Mactridae Lamarck, 1809			
Mulinia lateralis (Say, 1822)	1	2	3
Rangia cuneata (Sowerby, 1831)	D	162	162
Rangia flexuosa (Conrad, 1839)	D	1	1
Raeta plicatella (Lamarck, 1818)	D		
Anatina anatina Spengler, 1802	D		
Family Tellinidae Blainville, 1814			
Tellina texana Dall, 1900		12	12
Tellina versicolor DeKay, 1843	21		21
Tellina alternata Say, 1822	D		
Strigilla mirabilis (Philippi, 1841)	D		
Macoma tenta (Say, 1834)	D		
Macoma tageliformis Dall, 1900	2		2
Macoma mitchelli Dall, 1905		17	17
Family Donacidae Fleming, 1828			
Donax variabilis Say, 1822	D		
Family Semelidae Stoliczka, 1870			
Semele proficua (Pulteney, 1799)	D		
Semele nuculoides (Conrad, 1841)	D		
Semele bellastriata (Conrad, 1837)	D		
Abra aequalis (Say, 1822)	10		10
Family Solecurtidae Orbigny, 1846			
Tagelus plebeius (Lightfoot, 1786)		2	2
Tagelus divisus (Spengler, 1794)	D		
Family Dreissenidae Gray, 1840			
Mytilopsis leucophaeata (Conrad, 1831)	D	8	8
Family Veneridae Rafinesque, 1815			
Mercenaria campechiensis (Gmelin, 1791)	D		
Chione clenchi Pulley, 1952	D		
Chione grus (Holmes, 1858)	D		
Chione intapurpurea (Conrad, 1849)	D		
Callocardia texasiana (Dall, 1892)	1		1
Dosinia discus (Reeve, 1850)	1		1
Gemma purpurea (Lea, 1842)	D		
Gouldia cerina (C. B. Adams, 1845)	D		
Pitar sp.	D		
Family Petricolidae Deshayes, 1831			
Petricola pholadiformis (Lamarck, 1818)	8	2	10
Family Corbulidae Lamarck, 1818			
Corbula contracta Say, 1822	27		27
Corbula caribaea Orbigny, 1842	4		4
Corbula dietziana C. B. Adams, 1852	D		
Family Pholadidae Lamarck, 1809			
Pholas campechiensis Gmelin, 1792	D		
Cyrtopleura costata (Linne, 1758)	D		
Barnea truncata (Say, 1822)	D		
Family Pandoridae Rafinesque, 1815			
Pandora trilineata Say, 1822	1	D	1
Class Scaphopoda Bronn, 1862			
Family Dentaliidae Gray, 1834			
Dentalium texasianum Philippi, 1848	D		



Dr. Thomas E. Pulley at Port Aransas, Texas, with a beachworn Busycon perversum brought by a collector from a Louisiana beach.



The collector and Dr. Pulley met at St. Joseph's Island, and the specimen was given to HMNS. The photo is by member E. Joseph Deering.

TEXAS CONCHOLOGIST, Vol. XXII, No. 2, January, 1986

IN MEMORIAM

DR. THOMAS EDWARD PULLEY

15 October 1916--19 November 1985

Members of the Houston Conchology Society are deeply saddened to know that we have lost our honorary member, our teacher, our friend -- Dr. T. E. Pulley.

Thomas Edward Pulley was born in Oklahoma City, October 15, 1916, but he had lived in Houston, Texas since 1923 and considered himself a Texan. He graduated from Rice University, received his master's degree from the University of Houston, and obtained the degree of Doctor of Philosophy from Harvard University where he was a student of the late Dr. William J. Clench.

His first interest was entomology, but he used to say, ruefully, that he found there was only one job available in the state of Texas for someone with that discipline and that was held by a fairly young man. He took two master's degrees at the University of Houston, one in education and the other a master of science with his thesis titled "Marine Mollusks of the Texas Coast" (1950).

At Harvard he began his study of the bivalves of the Gulf of Mexico. Dr. Clench had had some correspondence with the late Betty Allen of Port Isabel concerning shells found off Texas by shrimpers. He suggested that Dr. Pulley get in touch with her to study the bivalves. Dr. Pulley later visited with Betty and also with Jeanne Frisbey in Port Isabel to see material from shrimpers. One story he told was about Betty's garage full of *Amusium papyraceum*, sometimes called the Sun and Moon Pecten, a shell considered very rare in those days.

The descriptions of *Chione clenchi* Pulley, 1952 and *Conus frisbeyae* Clench and Pulley, 1952 were published in the *Texas Journal of Science* from material he got from Betty and Jeanne. His Ph.D. thesis on the bivalves of the Gulf of Mexico was never published, but his "An Illustrated Check List of the Marine Mollusks of Texas" (1952) in the *Texas Journal of Science* was widely used for many years as the most authoritative work available on the subject.

His educational years were interrupted during World War II as he enlisted as a U.S. Navy Hospital Corpsman in June, 1941, and ended up commissioned an Ensign, discharged finally as Lieutenant in January, 1946, when he returned to Houston with a wife, Jeanne, he had met while at Midshipmen's school. He had also served as a seamanship instructor and Captain of a training vessel but was transferred to an attach transport operating in the Pacific, serving as Damage Control Officer, Bomb Safety Officer, Photographic Officer, Junior Watch Officer, and First Lieutenant. While he told of landing on many islands and going exploring in the Philippines when the war was over, he brought home no specimen shells, just a few polished *Pinctada* valves and some pearls for Jeanne.

He had taught science in a Houston junior high school, later became a professor of biology at the University of Houston, and was a lecturer in biology at Rice University.

He served as director of the Houston Museum of Natural Science from September, 1957 to 1981. In the beginning, the museum headquarters were in a small building in the zoo, and there was a very limited staff and activities. During his directorship, the museum moved to its present building on Hermann Drive which contains a planetarium as well as new halls for exhibits and education. He made the establishment of a major museum in Houston (and the South) his goal. During his years the museum experienced much growth, both in space and diversity of its activities. Educational courses and organized field trips to distant places commenced, with Tom Pulley the enthusiastic participant and teacher.

From 1981 to 1985 he served as Director Emeritus and Manager of Collections at HMNS. In 1985 he served as Interim Director.

His special interest was the Mollusca, though he knew a lot about everything else in natural history and science. He proceeded to build all the collections at HMNS, acquiring everything from Indian artifacts, to fossils, to guns, to radios, to cameras, to early tools and instruments, to animals of all kinds, to gems and minerals, to old engines, to oil tools and equipment, to early communication units, to pre-Columbian pottery, and to books. He had built up a study collection of mollusks of the Western Atlantic, most specifically of the Texas Coast. He was an avid collector, taking his students on many, many field trips, leading museum seminars, and organizing and directing field trips for the Houston Conchology Society and other nearby clubs. In the 1970s his study collection of mollusks was donated to HMNS after he ended his teaching at Rice.

He was always interested in building the research collection of mollusks at HMNS. He helped to organize discovery teams to the Flower Garden live coral reefs some 100 miles off Galveston, Texas. The Northwest Gulf Marine Mollusk Survey had the museum's backing, and he participated in many of the trips to Stetson Bank, Flower Garden reefs, and Heald Bank to get material which is now part of the research collection at the museum. He energetically sought good material for the growing collection and was instrumental in arranging for the museum to acquire the fine research library. Many of his own books have been donated to this library. Under his tutelage, the mollusk collection was and is being curated and has reached over 20,000 cataloged lots. An estimate is made that that many more lots remain to be cataloged. Researchers are becoming aware of the collection of recent mollusks from the Northwest Gulf which Dr. Pulley said was the best such collection in any museum. Researchers are also becoming aware of the fine library on malacology and paleontology at HMNS.

Two mollusks were named for Dr. Pulley: *Busycon perversum pulleyi* Hollister, 1958, and *Macoma pulleyi* Boyer, 1969.

He continued his study of the Genus *Busycon*. The extensive collection

at HMNS enabled him to make notes on range of species and growth factors. He was satisfied with his determination that all the left-handed specimens should be Busycon perversum. This last summer he tried to unravel puzzles of the Busycon spiratum complex, and we have arranged the cataloged material according to his thinking about possible subspecies in this complex.

Through the years he maintained his connections with malacologists across the country. He served as President of the American Malacological Union in 1961 and continued to serve on the Executive Board. In 1968, 1972, and 1979 he helped host the organization's meetings in Texas, always being involved with the field trips as he loved to discuss the beaches with visitors. In 1979 he chaired a symposium on mollusks of the Gulf of Mexico at the Corpus Christi meeting.

Club members will remember him as an enthusiastic field trip leader and as a superlative teacher. Many of our members joined the club after attending one of his seminars at the Houston Museum of Natural Science. We all know that he would dig angel wings harder than anyone, that he would stand in the surf zone shoveling sand into his box sieves to get Donax long after we had wearied, and that he could outwalk us on the sand bars. We remember him as a wonderful host who introduced us to deer chili (proclaimed as the best kind), taught us how to crack open oysters and eat the raw animals, taught us his special tricks of peeling shrimp, introduced us to chowder from Texas Mercenaria, took us to Mexico to his favorite restaurant to eat Cabrito cooked over a spit, and fed us hushpuppies and his homemade stew, soup, and gumbo. Trips to the beach included eating whatever was seined or dredged. A lot of us ate things we would never have tried otherwise. And along with all this special gift of feeding us well we were bombarded with knowledge of everything in and near the sea.

He was especially supportive of Texas Conchologist, contributing articles and suggesting others, always pushing the Editor to do just a little more research and pointing out references available.

Just a few weeks before he died, Dr. Pulley snorkeled and collected as hard as anyone on the field trip he helped plan to Caye Caulker, Belize. He came home with additions to the records by members from this locality.

Through the years, other societies benefited from his leadership. He was a past Council member of the American Association of Museums, served as president of the Texas Museum Association, was a Fellow of the Texas Academy of Science, and served as president of the Harris County Arts Council.

To his wife, Jeanne, and his sons, Robert M. and Richard L., the membership extends heartfelt sympathy and love. He will be greatly missed by this society.

The T. E. Pulley Endowment Fund has been established at the Houston Museum of Natural Science, 1 Hermann Circle Drive, Houston, Texas 77030, to benefit the museum. It would be his wish that we continue

to support the museum. He would want us to continue adding good material from collecting trips to the mollusk collection. He would like us to work toward making the research in mollusks at HMNS noteworthy. That was his dream.

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Constance E. Boone

TEXAS CONCHOLOGIST, Vol. XXII, No. 1, October, 1985

SIZE CONSTRAINTS ON RACCOON PREDATION ON A FRESHWATER MUSSEL, CYRTONAIAS TAMPICOENSIS (LEA, 1838)

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ABSTRACT

Analysis of shells of a freshwater mussel, Cyrtonaias tampicoensis, from a raccoon, Procyon lotor, midden reveals constraints on predatory activities. Small and medium-sized mussels are more susceptible than large mussels to predation due to limitations on force created by bites at wide mouth gapes.

INTRODUCTION

Freshwater mussels, due to their lack of dramatic locomotory processes, are forced to rely upon passive defense measures as anti-predator devices. Mussels are often found completely burrowed into the substrate except for the posterior margin of the shell. This posture reduces the chances of the animal being discovered and removed from the substrate by a predator but still allows water exchange via the inhalant-exhalant siphon system. The hard calcareous shell may also serve as protection from many predators but is by no means an absolute defense structure. This anti-predation function is often assumed, but few data have been presented. Below, the importance of the shell as an anti-predatory structure is discussed.

METHODS AND RESULTS

On 10 May 1978 I collected a sample of eight paired valves of Cyrtonaias tampicoensis from the edge of the water of Resaca de la Palma in Resaca de la Palma State Park, Cameron County, Texas. No other mussel species were present in this predator midden pile. Other species present in Resaca de la Palma include Lampsilis teres, Anodonta imbecilis, Toxolasma parvus, and Corbicula fluminea (see Table 1). Field surveys were made on 26 March 1980 and 24 July 1980. Surveys were made in different portions of the resaca on the two dates; thus, the samples can be totaled for an accurate assessment of the available bivalve fauna. Characteristics of tooth marks on the valves of C. tampicoensis and presence of footprints indicates that the shell midden was produced by a raccoon, Procyon lotor.

For each valve, the general dimensions, size and location of tooth marks, mouth gape required to produce tooth marks, and thickness of valve (presented as a range) at location of tooth marks are presented in Table 2. Only the posterior portions of the left valve of

individuals #1 and #2 and of the right valve of individual #3 were broken by the observed raccoon activity. Individual #7 exhibited a small notch in the posterior right valve which had been refilled by new shell material. A few of the valves examined in this study are shown in Figures 1 and 2.

In general, the teeth marks are approximately parallel to the axis of the faint rays. However, on individual number 6, the few teeth marks present are parallel to the growth lines. Teeth marks on individual number 6 were the smallest observed and may have been produced by the action of a small raccoon which could not open its mouth large enough to produce marks perpendicular to the growth lines.

DISCUSSION

The intent of this report is not to demonstrate that the prime function of the pelecypod shell involves anti-predation. The major function of the shell is to provide support for a soft-bodied organism which has very few internal structures to maintain a particular form or orientation. Secondarily, this "exoskeleton" has become multifunctional. Secondary adaptations involve protection from desiccation in bodies of water which periodically dry up, provision of an adequate calcium supply to buffer metabolic wastes, and/or unfavorable hydrochemical conditions in addition to anti-predation.

Absence of the other four bivalve species in the midden pile is probably the result of several factors. *C. tampicoensis* is by far the most abundant bivalve species. *C. tampicoensis* is probably easier to extract from the clay/silt substrate than the more linear *L. teres* whose anchoring foot would be buried more deeply. The remaining three species are both uncommon and small in size and volume. *C. tampicoensis* represents a much larger package of nutrients than the other species. The shells of *C. tampicoensis* are much like thin-shelled *Lampsilis*, although shells of *L. teres* are thicker than those of *C. tampicoensis*.

The data presented in Table 2 provide a beginning point to understand the limitations of raccoon predation upon *C. tampicoensis*. A raccoon appears able to open its mouth as much as 31 to 32 mm. between points of its teeth (canines are presumed to be the teeth utilized in such activity). However, they may not be able to break shells of *C. tampicoensis* if the mouth gape required exceeds approximately 22 to 26 mm. Mussel shell thicker than about 1.3 mm. appears to be unlikely to be broken by raccoons at the limit of mouth gape capability.

Decreased distinction for thickness between broken and unbroken valves may indicate that the size of mouth gape required may be more significant than valve thickness in determining whether a mussel shell can be broken by a raccoon. Certainly, thicker shells can be broken by raccoons, but such success may only be possible with small mouth gapes. Indication of shell repair in right valve of pair #7 indicates that individual mussels can survive unsuccessful predation attempts.

Table 1

Freshwater bivalve counts in Resaca de la Palma, Resaca de la Palma State Park, Cameron Co., Texas.

Bivalve species	Sample Dates 26 Mar 1980	24 July 1980
Cyrtonaias tampicoensis	138	163
Lampsilis teres	84	41
Toxolasma parvus	0	1
Anodonta imbecilis	1	4
Corbicula fluminea	0	7

Figure 1. Valve pairs of Cyrtonaias tampicoensis which were successfully broken by raccoon. Above - valve pair #1; Below - valve pair #2

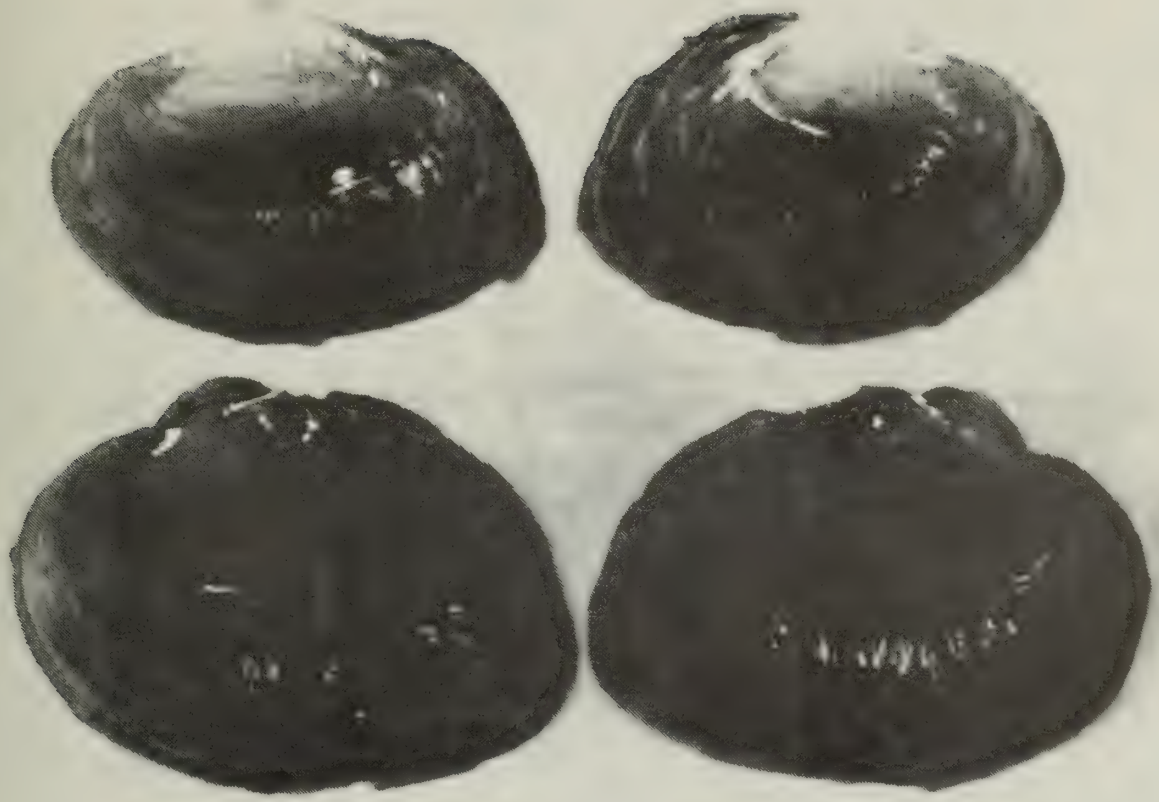

Figure 2. Valve pairs of Cyrtonaias tampicoensis which were not broken by raccoon. Above - valve pair #4; Below - valve pair #5.

Table 2

Shell measurements of Cyrtonaias tampicoensis from Resaca de la Palma State Park, Cameron County, Texas (all measurements in mm).

	Length	Height	Width	Valve Thickness[1]	Mouth Gape[2]	Mark Width[3]	Mark Location[4]
1*	68.8	47.5	30.4	1.07 - 1.22	18.0	1.8	P, L & R
2*	79.1	54.7	30.2	1.19 - 1.35	15.7	2.3	P, L & R
3*	94.5	66.9	40.0	1.22 - 1.30	22.1	1.0	P, L & R
4	89.5	62.2	38.9	1.22 - 1.30	26.2	1.1	P & C, L & R
5	97.9	68.0	42.7	1.57 - 1.65	30.5	1.8	A, L & R
6	97.7	69.7	45.5	1.32 - 1.40	34.8**	0.5	C, L
7	102.2	72.4	43.3	1.50 - 1.80	32.8**	0.7	A & P, L
8	100.6	75.1	42.6	1.32 - 1.47	33.3**	1.4	A & C, R P & C, L

[1] Thickness of valve at point with teeth marks; range indicates variable thickness of valve.

[2] Gape required to place paired valves of live clam in mouth to produce observed teeth marks.

[3] Width of largest tooth mark which was made by single scrape.

[4] Location of tooth marks on mussel valves; A = anterior, P = posterior, C = central, L = left valve, R = right valve.

* These valves were broken by raccoon activity.

** These are theoretical mouth gape measurements, because tooth marks are not paired on both valves; these distances are presumed to exceed ability of animal to open mouth.

TEXAS CONCHOLOGIST, Vol. XXII, No. 2, January, 1986

MONOGRAPH By H. Odé

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

(A Continuing Monograph)

Family HALIOTIDAE Rafinesque, 1815

This family is well known for the several large sized members living on the Pacific coast of the North American continent, where they are collected as food (abalones). The shells are flat and ear shaped with a number of open holes in the last, very much enlarged, whorl. This row of holes is a primitive characteristic which has also persisted in some fissurellids.

Two species have been described for the Western Atlantic, only one of which occurs in our waters. An extensive discussion of the Western Atlantic species is given by R. W. Foster in Johnsonia, Vol. 2 (21), p. 37-40, 1946. A later brief discussion on the ecology and distribution of our Western Atlantic species is given by Titgen, R. H., and Bright, T. J., in Northeast Gulf Science, Vol. 7 (2), p. 147-151, 1985. The identity of the Brazilian species is in doubt. Abbott 1974 suggests that it may be a Polynesian specimen and Titgen and Bright imply that it may be the same as pourtalesii. The name of the only genus Haliotis Linne, 1758 derives from the Greek words for salt (used poetically for sea) and ear.

In the Western Gulf of Mexico only a single species:

78. Haliotis pourtalesii Dall, 1881

It is now clear that this species is widespread, although never common, in the Western Gulf of Mexico. A specimen somewhat less than one inch in size was collected on Oct. 7, 1967 by divers operating from the U.S.S. Haynsworth on a collecting trip for the Houston Museum of Natural Science and the Bureau of Commercial Fisheries. This single dead shell together with other shell debris was obtained from the inner cavity of a large sponge, collected at a location 113 miles S.E. of Galveston (27 deg. 53 min. 15 sec. N - 93 deg. 19 min. W). This location is named the "24 fm lump" by fishermen and is an algal reef. In Texas Conchologist Vol. 5 (6), p. 63-68, 1969, some data about the Museum collection are given and in Vol. 9 (2), p. 48, 1972, this Haliotis and some other material of Haliotis is listed. Further data have been assembled by Titgen and Bright, 1985 in their Table 1. Live specimens have been reported from Florida reefs at 366 m. and from off Texas reefs. Dead shells from Louisiana off Cameron, collected at depths varying between 57-85 m., are in the HMNS collection. The largest recorded size is about 30 mm. (Titgen and Bright, 1985).

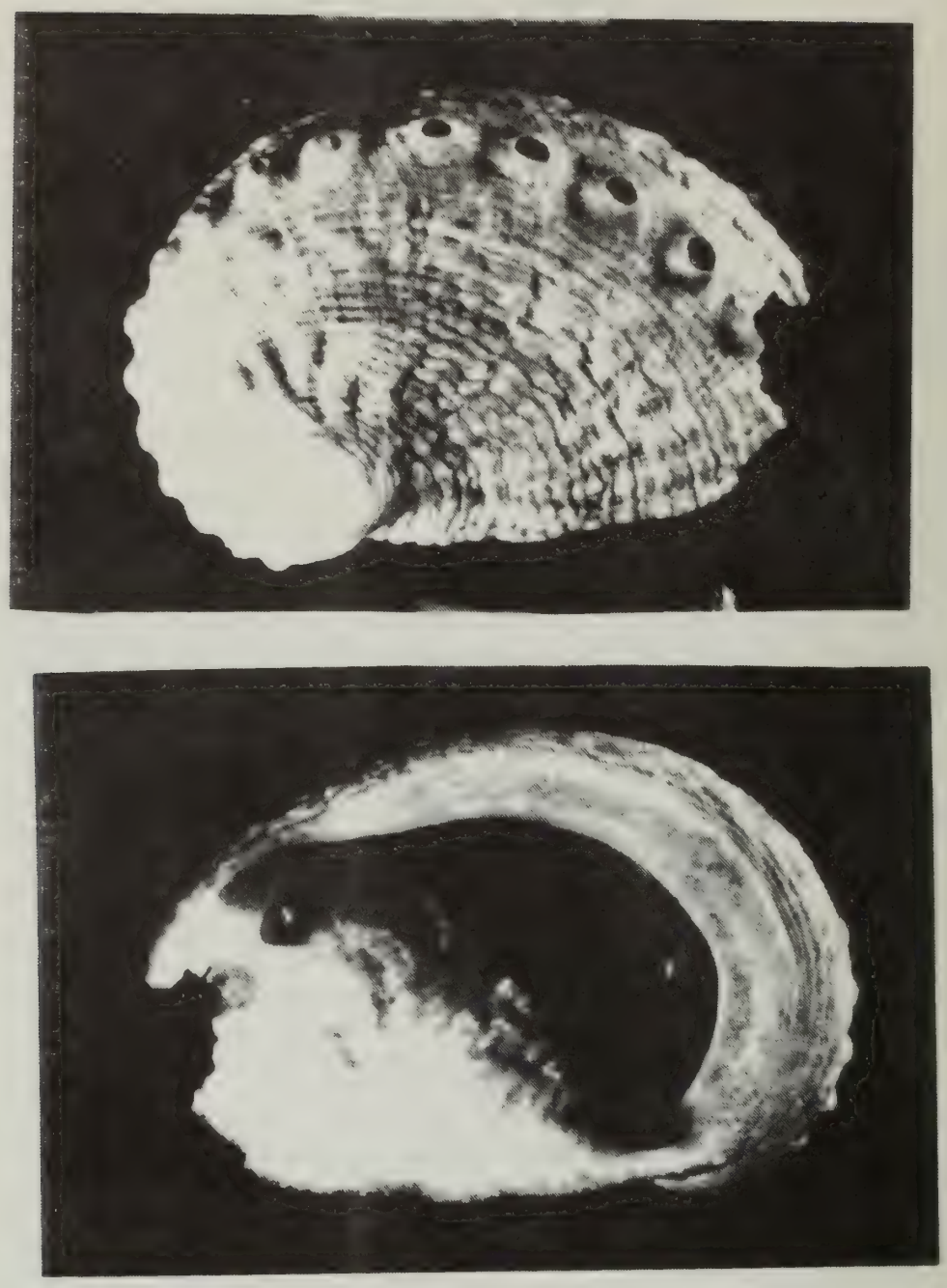

Fig. 1 This Haliotis pourtalesii, a dead shell, was collected Oct. 7, 1967 at "24 fm. lump" 113 miles southeast of Galveston, Texas, and found in a large sponge brought up by divers. It is displayed in the Texas Shells exhibit on the second floor at HMNS.

In my opinion the occurrence of this species in the Western Atlantic is another indication of the close relationship between Panamic and Caribbean faunas. The evolution of H. pourtalesii from Pacific stock should be clarified. The history of the discovery of H. pourtalesii is better known and is so interesting that it may be briefly stated here. Pourtales dredged a single live specimen off Florida in 1869. This specimen, with other material, was sent to Washington, where Dall saw it. Soon thereafter the specimen, together with much other fine invertebrate material, was sent to Stimpson in Chicago to be included in the work by Stimpson on the invertebrates of the East Coast. The Chicago fire of 1871 destroyed all of it. Fortunately, Dall was able to describe the Haliotis from memory ten years later (Dall, 1881, Bull. M. C. Z. 9, p. 79). It was only much later (in 1911) that Henderson obtained new material from off Sand Key, Florida, which now is considered the neotype of the species.

Records HMNS Survey Collection: 4 lots, no live material.
Depth range: 31 - 61 fms.
Geographical range: North Carolina to Florida, Gulf of Mexico, Cuba, Yucatan, Brazil??
Maximum size (in the HMNS): 21.5 mm.

Family SCISSURELLIDAE Gray, 1847

This family, whose members possess the primitive character of an anal slit, is therefore related to Haliotis. It is exclusively composed out of very small species mostly occurring in deeper water. Along the Texas and Louisiana coast three species have been collected, one of which is undescribed. Two species are scissurellas of the Subgenus Anatoma Woodward, 1859, and the third belongs to the Pacific Genus Sinezona Finlay, 1927. Originally I had selected the generic name Schismope for this material, but since Abbott (1974) believes that Schismope Jeffreys, 1856 is merely a synonym of Scissurella d'Orbigny, 1824, we may for the time being report this material as belonging in Sinezona Finlay, 1927. It conforms well with Abbott's all too brief characterization of that genus: "Similar to Scissurella, but the slit is closed at the margin of the outer lip, leaving a slotlike hole some distance back from the edge of the lip." (Abbott 1974, p. 17) Anatoma occurs in deeper water on sandy, shelly bottoms, but Sinezona is an inhabitant of the coral and algal reefs.

Genus Scissurella d'Orbigny, 1824

Material of this genus occurs in rather deep water, is mostly in poor condition because of erosion, but can still be easily recognized. It all belongs to the Subgenus Anatoma Woodward, 1859.

79. Scissurella proxima Dall, 1927

This species was never properly illustrated but I have seen the type, and it conforms well with most of our material, although this is mostly in poor condition. For a description see Dall, Proc. U.S. Nat. Mus., Vol. 70, art. 18, p. 110.

Records HMNS Survey Collection: 8 lots, no live material.
Depth range: 63 - 167 fms.
Geographical range: South Carolina to Florida Keys (Abbott, 1974).
Maximum size: 1.8 mm.

80. Scissurella cf. crispata (Fleming, 1828)

A second species that, with some hesitation, I give the name crispata occurs in our material. It is considerably flatter than proxima and its sculpture is much coarser. If seen from above the upper surface of the whorls is coarsely ribbed and the ribs appear slightly nodulose because of crossing spirals, which are not as delicate as in proxima. Also, the underside is much more coarsely ribbed than proxima and the two spiral flanges, almost lamellae, bordering the anal slit are much more strongly developed than in proxima. I believe that this might be a southern form of crispata Fleming, but it does not compare well with material that I have seen. From the literature it would appear that crispata is a widespread species, essentially circumarctic with occurrences in deep water in tropical areas. It has been found on both sides of the North American continent (Baja California and West Indies). To judge from the many synonyms cited by Abbott, it is variable in shape and lives in slightly deeper waters than proxima (60 - 1215 fms. according to Abbott).

Records HMNS Survey Collection: 3 lots off Louisiana, no live material.
Depth range: 51 - 85 fms.
Geographical range: Arctic seas to Florida and the West Indies, Europe, Alaska to Baja California, Japan (Abbott, 1974).
Maximum size: 2.1 mm.

Genus Sinezona Finlay, 1927

This genus, originally described from Australia, has so far not been reported from the Western Atlantic. Surprisingly, it is not rare in the material from the coral and algal reefs off the Texas and Louisiana coast. This Pacific genus once more indicates the close relationship between Panamic and Caribbean faunas.

81. Sinezona spec. indet.

In the collection of the HMNS there are no less than 8 lots of this very small scissurellid, which in shape is complete-

ly different from Anatoma. The single hole in the anal slit has elevated thin borders so that it looks as a small pustule with a hole on top. The anal slit forms a considerable shoulder at the upper side of the whorl. Seen from the top the shell is quite flat. Abbott's (1974) description of S. rimuloides (Carpenter, 1865) fits this species rather well, as far as shape is concerned, but spirals in our species are only delicately visible on the upper part of the whorl and in a few specimens very faintly on the base. In some specimens strong riblets are developed on the base, while in other specimens the base is almost smooth.

Records HMNS Survey Collection: 8 lots, none alive. Mostly on coral and algal reefs off Texas. Also on shale outcrops, and on sandy mud (off Louisiana in 55 fms.).
Depth range: 14 - 55 fms.
Geographical range: Only known from our material from the coral and algal reefs off Texas and Louisiana.
Maximum size: about 1 mm.

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ANNUAL AUCTION TO BE OPEN TO THE PUBLIC

The annual fund-raising auction sponsored by the Houston Conchology Society will be held on Sunday, April 27, at the Garden Center immediately east of the Houston Museum of Natural Science in Hermann Park. It will be open to the public this year.

Robert and Jodi Eckardt are chairmen of the event planned from 1 to 6 p.m. on that date. There will be an oral auction, silent auction tables, and several tables of sale shells, as well as some shells on consignment from dealers.

The annual project to raise funds to continue our support to the museum, to purchase books for our library, and to continue Texas Conchologist has caused the enlargement of efforts this year.

Plans include display of shells by members to interest the public in our society.

Anyone interested in helping with the event, by donating shells, by presenting a display, or by assistance to the chairmen in any way, is asked to call the Eckardts at 463-3450.

INFORMATION SOUGHT ABOUT EARLY TEXAS CONCHOLOGISTS

There is regrettably little information recorded in the molluscan literature about two early Texas conchologists, J. A. Singley and J. D. Mitchell, who published papers on Texas mollusks in the 1890s.

J. A. Singley may have lived at one time at Giddings, Texas, according to a reprint with his signature and address that is in the molluscan library at the Houston Museum of Natural Science. Abbott listed him in American Malacologists as one of the persons about whom he could find no information.

Andrews' book Shells and Shores of Texas, 1977, lists papers by Singley as follows:

1893 Contributions to the natural history of Texas: Part 1, Texas Mollusca, In Fourth Annual Rep. Geol. Surv. Texas, 1892, Austin: Ben Jones and Co.

1894 List of Mollusca collected in Texas in 1891. In Fishes of Texas and Rio Grande Basin, ed. B. W. Evermann and W. C. Kendall, pp. 123-125. Bull. U.S. Fish Comm., Vol. 12 for 1892. Washington, D.C.

Paul McGee published a brief note on Singley and Mitchell in Texas Conchologist 7(2):14.

Perhaps someone with a talent and interest in genealogical research who reads this will undertake to seek more information about Singley and write his biography.

We know a little more about Mitchell, the first native born conchologist. He was from pioneering families in Texas and grew up near Port Lavaca, later moving to Victoria, Texas. He published several pamphlets on mollusks and papers on mollusks and Texas sea life in journals. He is not mentioned in Abbott's American Malacologists. However, an article concerning his life and contributions to the knowledge of Texas mollusks was published in Texas Conchologist 3(4). It was a summary of the information gathered by Michael N. Boone (son of Constance E. Boone) for a junior high school history project and which was published in Texas Junior Historian.

Several species of mollusks from Texas were named for Mr. Mitchell by William H. Dall of the Smithsonian Institution, including Amaea mitchelli.

A review of the story in TC, with update of information and with notes from pamphlets published by Mr. Mitchell, will appear in a later issue of Texas Conchologist. We will appreciate any information you can add to what is known about Mr. Mitchell.

H. W. Harry and C. Boone

TEXAS CONCHOLOGIST, Vol. XXII, No. 2, January, 1986

WORLD RECORD SIZED UMBRACULUM FOUND IN GULF

BY JIM KEELER

A world record sized Umbraculum umbraculum (Lightfoot, 1796) was brought up in shrimp nets off Cape St. George Island, Florida West Coast, in late 1984 by Captain James Silva's vessel "The Norther." The shell, 11.1 cm. long x 9.00 cm. wide, was given to The Apalachicola National Estuarine Sanctuary by David Hill and now resides in the Sanctuary Local Marine Mollusk Collection in Apalachicola.

Official confirmation of the identification and size of the shell was made by Dr. Fred Thompson of the Florida State Museum in Gainesville, Florida.

The largest Umbraculum umbraculum previously recorded is the 10.3 cm. long specimen from Mauritius (Indian Ocean) registered in 1977 and now in the Delaware Museum of Natural History.

The registry of this new record was made to Robert J. L. Wagner, editor of Standard Catalog of Shells which includes and updates records of the largest sized shells found throughout the world.

[The Editor remarks that this species is listed in Compendium of Seashells, 1982, page 280, as occurring in the Indo-Pacific and the Caribbean and said to be rare. There the animal is measured to be 4 inches for the 10 cm. shell (a limpet-like shell which sits on top of the large animal). See also American Seashells 1974, pages 346, 347, and Neville Coleman's What Shell Is That? 1975, pages 101, 102 (Australia). At press time, we have not been able to find out if the species from the Panamic Province is still considered a different species. Having collected a specimen at night by lantern at Venado Island off the West Coast of Panama, my memory is that the animal there was reddish and was smoother and jelly-like. It is listed in Myra Keen's Seashells of Tropical West America 1971 as Umbraculum ovale (Carpenter, 1856). The only animal I have seen of Umbraculum umbraculum was a preserved one brought in by a Freeport shrimper and shown to us in the early 1970s by Mildred Tate at a club meeting. In those days, shrimpers working off Port Isabel, Texas, did bring in specimens with some regularity, and the late Betty Allen used to have the shells for sale in her shop. I am not aware of anatomical studies of Gulf specimens. The shell brought in off Cape St. George Island was empty.]

SYNOPSIS OF SUPRASPECIFIC CLASSIFICATION OF LIVING OYSTERS PUBLISHED

Harry, H. W. 1985. Synopsis of the supraspecific classification of living oysters (Bivalvia: Gryphaeidae and Ostreidae) Veliger 28 (2): 121-158.

This paper extends the classification of the living species of oysters beyond that proposed by Stenzel (1971) in order to indicate their diversity and relationships more precisely, according to the author. Recent members of the superfamily Ostreacea are subdivided into two families, four subfamilies, ten tribes (all new) and 24 genera and subgenera (12 new). Illustrations are provided of the shells of type species of the new genera and subgenera, as well as of significant anatomical features. Two junior homonyms are renamed at the species level.

This important paper continues the work by Dr. Harry on the living oysters, starting with his 1981 paper on "Nominal species of living oysters proposed during the last fifty years" Veliger 24 (1): 39-45. Since that time Dr. Harry has worked on collections in several museums and examined the animals of most of the living oysters. Several HCS members were helpful in providing dry, preserved or living specimens of oysters from worldwide field trips. The work will continue as Dr. Harry examines other museum material and does more field work.

Three genera are named for persons known to club members, as follows: Myrakeena angelica (Rochebrune, 1895), named for A. Myra Keen; Teskeyostrea weberi (Olsson, 1951), named for Margaret C. Teskey; and Booneostrea cucullina (Deshayes, 1836), named for Constance E. Boone.

The HCS library maintains a subscription to The Veliger, and the volume number mentioned above is available to members.

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HCS MEMBERS WIN AT BRAZORIA FAIR

Three HCS members received blue ribbon awards for their displays in the Brazoria County Fair Sea and Shore Exhibit, October, 1985.

Bea Sanchez won a blue ribbon and a trophy for her large display of varied marine life. Harold and Freida White came away with a blue ribbon and a special award trophy for their cases of West Australian shells. Jan Hobbs, a newcomer to the world of displaying, received two blue ribbons, one for a world-wide non-self-collected exhibit and one for a growth series of Busycon and Dinocardium.

Only Brazoria County residents can enter this annual competition.

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Texas CONCHOLOGIST

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MAY, 1986

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 in the Azalea Room of the Houston Garden Center in Hermann Park just east of the Houston Museum of Natural Science, 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.

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.

FROM THE EDITOR

This edition is a combined issue to complete Volume XXII, due mainly to the fact that the editor travelled to South America in April and will be travelling again in July. Also, we feel that we can afford to offer this as the final issue this year, since we have provided our readers with well over 100 pages. Our issues have increased in size, but they have cost us more money also. We were concerned with the rising cost of printing and postage and needed to know if the recent annual auction would support the continuance of larger issues.

At this time, we feel confident to announce that Volume XXIII will be on schedule, beginning with the October issue. The auction was a success. We look forward to publishing our quarterly and continue to plan for large issues.

HOWEVER, we do need support from our members in making the issues interesting to all the membership. We appreciate short or long articles about your collecting trips. We want you to feel free to pursue a special interest by researching a family or genus and writing about it for others to learn more about shells. (For instance, I'd like an article by a diver on success in finding shells.)

Two researchers in this issue point out that information WRITTEN DOWN by the amateur collector aids in knowing more about mollusks. You can be of help just by recording notes of what you see in the field. We would all like to hear more about mollusks. They are fascinating animals. Call and tell me what you see on the beach if you want help in producing copy.

We will appreciate articles for the October issue by the August meeting.

Constance E. Boone
(713) 668-8252

WINTER COLLECTING ON TEXAS BEACHES

Several collections of prized shells were made on Texas beaches during the last winter months.

Helen Cornellisson hit the jackpot collecting our common Simnia on the Gulf beaches at Port Aransas January 25, 1986. She and her sister literally tore apart into small pieces every bundle of Gorgonia (sea whip) they found on Mustang Island near the state park. They shook the clumps of sea whip and collected over 200 specimens that one day. One bundle produced over 40 specimens. Specimens were very good adults.

This species was named Simnialena marferula by Cate in 1973 in "A Systematic Revision of the Recent Cypraeid Family Ovulidae," supplement of The Veliger, Vol. 15, page 75. It is not listed in the 1974 edition of American Seashells but does appear in Shells and Shores of Texas, Andrews, 1977.

Please refer to the issue of Texas Conchologist Vol. XIX, No. 3, April, 1983, page 49, for a discussion of this species and a correction of the measurement of the holotype at the Los Angeles County Museum of Natural History.

Our new member David G. Alder reports that he found hundreds of live Dinocardium robustum on San Jose (St. Joseph's Island) across the jetties from Port Aransas.

Freya Oates and Susan Sweny, and later Freya again, found bonuses of live Epitonium on the beach from Jamaica to San Luis Pass, Galveston Island in January. They discovered them in the tangle of worm tubes and seaweed washed up at tide line. Hundreds were collected.

Emily Oakes and Constance Boone couldn't stand missing out on this bonus and went down to try their luck. By the time they got to Jamaica (on a freezing morning in January with the north wind blowing sand 30 miles an hour) the "worm goop" was covered with sand and not fresh. The tide was way out, and there had been no new deposit since before the north wind blew in. Nevertheless, they hopscotched down the beach to San Luis Pass, checking every larger amount of "worm goop" and found over 75 Epitonium, most still live. Most were E. angulatum. It was an interesting experience for the two. An unknown collector knew to do the same thing, and she drove in her car the same route. They kept passing each other as they sought "good" deposits of "worm goop" en route to San Luis Pass.

Carrie McElroy and her parents, Bob and Pat McElroy, scoured the beaches and huge deposits of "worm goop" at San Luis Pass in January. Examining this thoroughly, they report NO Epitonium angulatum, but Carrie did find a fairly good Amaea mitchelli. Bob found a really huge Sinum perspectivum.

Reinstated member Larry Horner reports finding another Amaea mitchelli at San Luis Pass this winter.

Dr. Harold W. Harry dug small Cyrtopleura costata, Barnea truncata, and Petricola pholadiformis in the muddy inlet at the little park near the ferry landing on Bolivar in January. He kept them alive and has been observing the animals and will report on this, we hope. He would like to have live Pholas campechiensis to study.

The Bob Eckardts dug nice angel wings at the Bolivar Dump Road Gulf flats, and the club held a field trip there. About eight members were able to dig angel wings. Localities for beds of these shells seem to be getting scarce in our area.

Jan Hobbs found her first E. angulatum in April at Apffel Park on Galveston Island when she chanced on a patch of "worm goop." She collected over 150 fresh-dead specimens — a very exciting "first."

Constance E. Boone

TEXAS CONCHOLOGIST, Vol. XXII, Nos. 3, 4, May, 1986

WHAT LAND SNAIL DID JOSIAH WILBARGER EAT AFTER HE WAS SCALPED IN 1833?

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Josiah Pugh Wilbarger was born in Bourbon County, Kentucky, on 10 September 1801. After living in Missouri for five years, Wilbarger moved to Matagorda County, Texas, in 1828. About a year later he moved up the Colorado River in western Bastrop County to a tract which included the mouth of what became known as Wilbarger Creek. Located ten miles upstream from the present location of Bastrop, Wilbarger's home was on the absolute frontier of Anglo settlement in a land still controlled by the Comanches.

In August 1833, Wilbarger and four companions were exploring the lands northwest of their holdings; these areas are now part of the city of Austin (which did not exist in 1833). The party was returning to their homes when they stopped at midday to rest themselves about one-half mile above Pecan Springs on the Tannehill Branch of Boggy Creek. The area was quite open, having trees which "were not large." There was sufficient cover, however, in the form of "brush and timber" to allow several Indians to approach the party unobserved. The Indians fired upon the group, whereupon the Anglo settlers jumped behind small trees and returned fire. In the exchange, two of the men in Wilbarger's party were critically wounded while two others fled on horseback, believing Wilbarger also to be dead.

Wilbarger was assumed to be dead because he had been shot in the back of his neck as he ran after them. This neck wound was received after he already had suffered "an arrow through the calf...and...a flesh wound in the hip," after which "his other leg was pierced with an arrow." When he was struck in the neck, Wilbarger fell to the ground, apparently dead (but only paralyzed). The Indians scalped him but did not cut his throat, assuming that he was already dead. His other two wounded companions were killed when their throats were cut.

Wilbarger lost consciousness until sometime later when "the evening was far advanced." Wilbarger was alone, naked, hungry and bleeding when "he dragged himself to a pool of water." Refreshed by drinking water but chilled by the cool pool, Wilbarger crawled out of the water and warmed himself in the sun and once again collapsed. After re-awakening, Wilbarger returned to the pool to drink additional water. He then "crawled over the grass and devoured such snails as he could find, which appeased his hunger." Attempting to make it to Reuben Hornsby's house (six miles away), Wilbarger fell exhausted after "about six hundred yards...under a large post oak tree."

Wilbarger was discovered by a relief party the next day. He survived

the effects of his wounds, although his scalp never entirely covered the exposed skull. Later, the bone became infected and pieces flaked off, exposing the brain. Wilbarger died on 11 April 1845, almost twelve years after he was scalped, of complications which developed after he hit a low door frame in his cotton gin.

The above adventure was recounted by the brother of Josiah, J. W. Wilbarger, who published a compendium of stories concerning Indian attacks on early settlers (Wilbarger 1889). The story was written "from the lips of Josiah Wilbarger...and confirmed by Wm. Hornsby, who still lives and others who are now dead." Today, one can never know how much embellishment of the true events occurred between 1833 and 1889. In fact, alleged time sequence of some of the events are somewhat contradictory. However, the key point to be considered in this paper is the identity of the snail which "appeased" Wilbarger's hunger.

SITE LOCATION AND SURVEY METHODS

The exact location of the creek pool which quenched Wilbarger's thirst and the stand of grass which supported the snails which "appeased his hunger" will never be known. The written version of the story (Wilbarger 1889) places the spot "one-half a mile up the branch above Pecan Spring, and four miles east of where Austin afterwards was established, in sight of the road now leading from Austin to Manor." In 1936, a granite marker was placed on the southeast side of Manor Road (now Old Manor Road) on the right bank of the Tannehill Branch. This spot is slightly over one-tenth mile above Pecan Springs and about 3.7 miles from the State Capitol. Brune (1981:434) stated that Josiah Wilbarger crawled to Pecan Springs but gave no supportive reasoning.

The distances given by Wilbarger (1889) more closely fit the eastern portion of Bartholomew Park. However, construction of park facilities, maintenance mowing of grass/weed areas, park user impact, and invasion by non-native plants has substantially altered the biotic communities of the city park. A survey of the larger snails of the area to the southeast of the original location of the historical marker was performed to determine the possible species of snail(s) consumed by Josiah Wilbarger.

Plant communities of this area also have received substantial human impact. Houses, unimproved roads, and pastures have been present on this plot at various times in the past. However, sufficient time has ensued since direct human utilization that floral and faunal communities (including land snails) have returned to a reasonable approximation of natural communities. In reality, reconstructed plant communities of this site more closely resemble the description of the site than the area of Bartholomew Park.

SURVEY RESULTS

The upland area is a severely impacted prairie site which is presently dominated by a juniper-dryland willow (*Juniperus ashei*-*Baccharis neglecta*) savannah. Most abundant grasses are K-R bluestem and little

bluestem (Bothriochloa ischaemum and Schizachyrium scoparium). Some small mesquite (Prosopis glandulosa) are present. Substrate is a gray brown clay soil with some small gravel present. Trash piles are present in this area. Snails were sampled in an area with no trash and an area with substantial lumber trash on the ground.

A slope area with a gravel soil exists at a slightly lower elevation than the upland area. Dominant plant communities are juniper - mesquite - dryland willow open woodland and a juniper-little bluestem savannah.

Several woodland communities are present at this site. Small gullies are dominated by Texas sugarberry, bois d'arc, pecan, and poison ivy (Celtis laevigata, Maclura pomifera, Carya illinoinensis, and Rhus toxicodendron). Creek terrace woodlands are dominated by cedar elm (Ulmus crassifolia), bois d'arc, roughleaf dogwood (Cornus drummondii), pecan, and western soapberry (Sapindus saponaria var. drummondii). Creekbed woodlands are dominated by black willow (Salix nigra) and several weedy non-native trees, i.e. privet (Ligustrum sp.), Arizona ash (Fraxinus velutina), and chinese tallow (Sapium sebiferum). A fenceline woodland has developed along Old Manor Road; dominant species are cedar elm and Texas sugarberry.

Land snails with shells greater than 10 mm (either diameter or height) were noted in each plant community (see Table 1). Helicina orbiculata was the most common species and was found in all habitats, except the creekbed which contained no snails. Two closely related bulimulid species were recovered at the site. Rabdotus dealbatus is normally found in deciduous woodlands associated with creeks and rivers in central and portions of eastern and southern Texas. Rabdotus mooreanus is found in grassland, savannah, and open woodland habitats in central Texas. Polygyra texasiana is found in wooded habitats which have downed wood or rocks to provide cover. Praticolella berlandieriana is found in disturbed open woodland habitats. Mesodon roemeri is found in deciduous woodlands with substantial downed wood.

DISCUSSION

Six macrosnails were observed at the study site (Table 1). The only clue given as to the habitat is that Josiah Wilbarger "crawled over the grass." This habitat would exclude M. roemeri which is found under downed wood in woodlands. Both P. texasiana and P. berlandieriana are not abundant in grassy areas (normally found under downed wood), are rather small to be eaten by humans, and are rarely found in concentrations of over four or five individuals. H. orbiculata is also rather small and is most commonly found in open wooded areas with downed wood. R. dealbatus is normally found in wooded areas. In grassy areas of central Texas, the only large species of land snail normally present is Rabdotus mooreanus, the Texas prairie snail. A process of logical analysis and elimination indicates that the snail eaten by Josiah Wilbarger was most likely R. mooreanus.

R. mooreanus is often encountered in large numbers in archeological sites in central Texas. Most workers have assumed these shells represent food resources consumed by aboriginal inhabitants of central

Texas. In at least some cases, this assumption seems warranted (Neck 1981), but other explanations are available (Clark 1973; Hester 1975). Herbert Lehman (in Greene 1972:62) reported that he ate snails (probably Rabdotus alternatus) while a captive of the Apaches in the 1870's. MacNeish (1958) reported pieces ("some uncomfortably large") of unidentified snail shell in human coprolites from Tamaulipas, Mexico. Certain health risks are present from consumption of uncooked land snails. Land snails are intermediate hosts for a variety of nematodes whose primary hosts are mammals (Malek and Cheng 1974). Undoubtedly, Josiah Wilbarger would not have been concerned with this possibility if he had been so informed.

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Table 1. Occurrence of land snails in various plant communities at Wilbarger scalping site, Austin, Travis County, Texas.

	H.o.	R.d.	R.m.	P.t.	P.b.	M.r.	Total
Upland-trash	X	X	X			X	4
Upland-no trash	X		X				2
Gravel slope	X		X	X	X		4
Gully woodland	X	X		X	X	X	5
Terrace woodland	X	X		X		X	4
Creekbed woodland							0
Fenceline woodland	X	X	X	X	X	X	6
Total (7 habitats)	6	4	4	4	3	4	—

AMERICAN MALACOLOGICAL UNION PLANS SUMMER MEETING

The annual meeting of the American Malacological Union will be held July 1-5, 1986, at Monterey, California. The Houston Conchology Society is an affiliate member, and all members are welcome to register and attend.

The meeting will be held at the Sheraton Hotel at Monterey in the heart of historic Cannery Row and the home of the new Monterey Aquarium, which registrants will visit. There are several symposia planned, including one by Dr. Roger Hanlon on cephalopods and another on nudibranchs. Dr. James Nybakken is president this year. There will be field trips, but collecting will not be allowed except at the fossil collecting site. Meeting jointly with AMU will be the Western Society of Malacologists.

Anyone desiring more information is asked to contact Constance E. Boone, at 668-8252. Registration forms and outline of the program are available.

TEXAS CONCHOLOGIST, Vol. XXII, No. 3, 4, May, 1986

SEARCH AND SEIZURE

By Constance E. Boone

I FINALLY COLLECT LIVE Xenophora!

On a week's collecting trip with Dr. Emilio Garcia in January to the Dominican Republic, I finally collected live Xenophora conchyliophora (Born, 1780). All of the party of collectors, including Barbara Hudson of our club, did collect many live specimens of this fairly common carrier shell.

I have been many times to localities in the Bahamas and Florida where this species was collected by friends, but I was never lucky. This time, Dr. Garcia assured me that I would find live specimens, but I have been promised this before and ended up coming home only with specimens other persons collected. Most of us have this species from offshore dredgings both from Texas and Florida. Some of you collected it at Harbour Island in the Bahamas, and some of you got specimens at Belize (I went there twice last year and didn't find any!).

We do not have the species onshore or in our bays in Texas -- so far. It is usually brought in by shrimpers here. The collection at the Houston Museum of Natural Science does contain specimens from the Northwest Gulf of Mexico.

In the Dominican Republic we stayed in Santo Domingo and travelled every day by van some two hours along the coast west to a little inlet and peninsula called Playa Las Salinas. Emilio had found this spot several years ago on a trip there, and this was the only really productive area for shells we found on this trip.

The area was patrolled by the navy, and there was a salt industry on flats before you reached the point and the beach. A few bathers and picnickers came every day, but there were certainly no other shell collectors unless you count the native fishermen who did bring in shells in their nets for food. There were small piles of "holed" Strombus gigas, Strombus costatus, and some Strombus raninus on the beach. (The holes are made by the natives to cut the muscle to extract the meat for food.) Incidentally, we saw very few adult S. gigas. The sand was coarse and dark. There was usually a good debris line. That first morning I loped down the beach, checking the debris and picking up nice dead shells, including Xenophora. (Later, we discovered that some of the dead carriers still had animals and operculums.)

Encouraged by this, we plunged into the very cool water, first finding a rock shelf, then a drop off to three feet where there was sand and patches of algae and rock. Emilio had told us that we would probably find the Xenophora in this area and to examine the algal clumps which might be the carrier. Every clump I picked up turned out to be a decorated urchin or a rock!

So I snorkeled out to the grassy patches just a bit farther offshore. I stayed in about four to five feet, as I do not dive and cannot get down to get shells beyond that. Besides, I am uneasy in water over my

head. I am not that good a swimmer. None of the trips I go on have much of a buddy system. Everyone is so busy getting or trying to get shells that you don't stay very close to each other.

Eventually, Emilio came snorkeling by and asked if I had found a live Xenophora. He said they were everywhere in the grass. He was tired of picking them up and didn't need them. He was headed down to another point where he hoped to find more Conus daucus (which he had found before there). At that time, I had not found a live Xenophora, but I said I would! Pretty soon, I saw a clump of rocks "sit down" in the grass. I knew it had to be something live. It was a live Xenophora. From then on, I did get the live shells, and later on I found everyone else had also. During the four days we went to this beach, it is my personal knowledge that at least 100 live Xenophora were seen. This really was the home for this species. Those who snorkeled better found them in abundance in the grasses a little deeper and farther out from shore.

The specimens are not pretty. They are decorated mostly with black rocks and broken pieces of shells. The arrangement is certainly not artistically done in these specimens. How they carry all the solid black rocks is beyond me.

One very interesting specimen was collected by Dr. Cecil Bankston of Baton Rouge, Louisiana. It had two live Turritella attached to it. You see it pictured here. The Turritella are filter feeders, so I guess they didn't mind tagging along with the grazing Xenophora. Once cemented on, I do not know if they could escape. However, note that they are attached on two different layers and not digitate but in different directions.

Dr. W. F. Ponder's new account of recent species and subspecies, Xenophoridae of the World, Memoir 17 of the Australian Museum, 1983, is most helpful in learning about Xenophora.

Dr. Ponder recognized three subgenera within the Genus Xenophora: Stellaria (with 5 species and one subspecies), Onustus (four species), and Xenophora s.s. (with 13 species and 2 subspecies). He described a new species, X. granulosa, from the central Indo-Pacific, and three new subspecies, one from Hawaii, one from the Gulf of Aden, and one from Kermadec Islands. Fossil species are discussed.

The species I found is listed as Xenophora (Xenophora) conchyliophora. Recently, the species of Xenophora in the Eastern Pacific has been made a subspecies of this species. Dr. Ponder has now made the Panamic species a synonym of X. conchyliophora. Most of the specimens I have from the Panamic area have orderly layers of bivalves as attachments, but I understand the shells of this Xenophora and the animals cannot be distinguished from the Atlantic species. Therefore, we will no longer use X. robusta for specimens from the Panamic area. It is X. conchyliophora.

We have two other members of the Family Xenophoridae in the Western Atlantic. Those of us who got the dredge baskets from off Florida did get specimens of the deep water Xenophora (Onustus) caribaea Petit de

Fig. 1, 2 This Xenophora (Xenophora) conchyliophora (Born, 1780) was collected live in the grasses at Playa Las Salinas, Dominican Republic, by Constance E. Boone in January, 1986. Most of the specimens were adorned with cemented black rocks, making the light-weight shells quite heavy.

Fig. 3, 4 This Xenophora (Xenophora) conchyliophora (Born, 1780) specimen was collected by Dr. Cecil Bankston of Baton Rouge at Playa Las Salinas, Dominican Republic, in January, 1986, and had two live Turritella specimens attached at different levels.

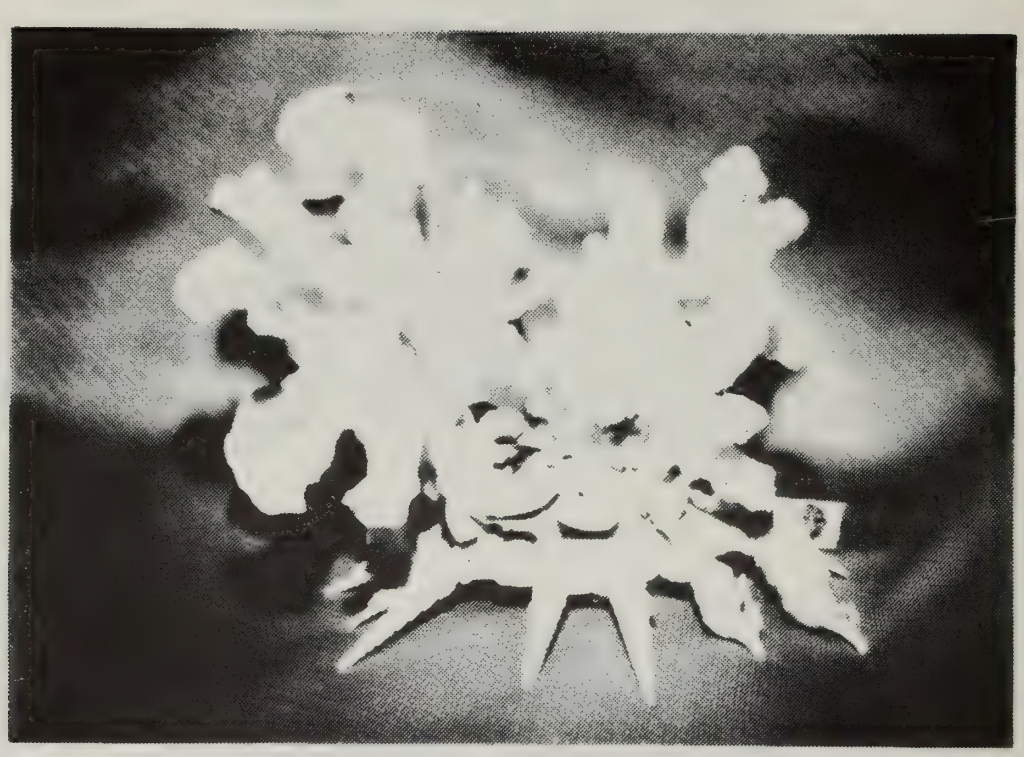

Fig. 5 Prized by collectors this is a specimen of Xenophora pallidula (Reeve, 1842) from the Philippines, often with many interesting shells attached and frequently with a crown of sponge which can be as high as 10-12 inches on the shell. Tested with vinegar on advice from Dr. Harold Harry, the growth proved to be of glass sponge material. It did not dissolve. Often this species has many deep water shells attached. Recently, a new species of Terebra was named after being found on several specimens of this species of carrier shell.

Photos by Constance E. Boone

la Saussaye, 1857 and Xenophora (Onustus) longleyi Bartsch, 1931. Note that Dr. Ponder places both of these in the Subgenera Onustus. Both attach few shells and live in mud or soft bottoms. They don't need camouflage. They live below the limits of light penetration. The shells extend with skirts instead of having attached shells that overhang the periphery.

This new book discusses habits of Xenophora, and thus I learned that the species I found has been studied by several authors, and a lot is known about it. Locomotion has been described for X. conchyliophora as a "leaping motion" by Morton, as a "one-legged stomp" by Linsley and Yochelson, and as a "looping" or "gallop" by Crozier.

It is said to be able to extend to a height equal to that of the shell and can lift up two or three times the weight of the shell and animal by using its muscular column or trunk. It moves by thrusting forward for about half its diameter and then falling forward, using its operculum to some extent. There are several discussions of the placement of the operculum in this locomotion. The food for my species was discussed as being microscopic algae collected from the substrate beneath the shell. The feeding posture is described as the animal being lifted by the foot above the substrate so that the proboscis has to be extended to gather food. That is evidently what my first live Xenophora was doing. It was raised above the substrate, and when it sensed me above it in the water it simply "sat down."

I was very interested in the discussion of method of attachment of foreign objects discussed in Dr. Ponder's book. Apparently, an object, such as a dead shell or rock, is maneuvered into position by the "proboscis" or snout, and in X. conchyliophora it has been determined that the dead shell or rock chosen for attachment is held between the snout and tentacle bases, the shell surface is cleaned, and the object is cemented to the edge of the periphery. Gaps are filled with sand or tiny pieces of debris to ensure a firm bond. Bivalves are usually cemented with interiors facing up. As the shell grows, the objects originally on the periphery lie across the shoulder of the succeeding whorl to which they are also cemented. The objects can be many different things the animal finds in the sea.

The cemented material is implanted so that it overhangs the periphery and helps provide a skirt or frill to raise the base and aperture above the substrate. This helps the animal "safely graze and facilitates its method of locomotion" (quoted in the book from St. Jean). St. Jean also said that everything this animal does suggests means of eluding detection, including the feeding posture, the locomotion with no continuous trail, the habit of burying the faeces, and the attachment of foreign material.

With all that is known about the species I collected, and true also for all the Xenophoridae, according to Dr. Ponder, researchers still need to discover the nature of spawn. It is thought that there is a long planktonic larval life to account for the wide geographic range of some species.

TOM PULLEY AND THE TRAIN

(The following account was written by the late Dr. T. E. Pulley for the 100th anniversary volume of The Nautilus and printed in the January, 1986 issue. It was prepared in July, 1984, in response to the request from Dr. R. Tucker Abbott, editor of The Nautilus, for personal anecdotes typifying Dr. Pulley's mentor, the late Dr. William J. Clench of Harvard, since the 100th anniversary issue of The Nautilus in January was to be dedicated in part to Dr. Clench. Both Dr. Pulley and Dr. Abbott were students of Dr. Clench. In Dr. Abbott's earlier article titled "Farewell to Bill Clench" (The Nautilus 98(2): 55-58) Bill drew a huge arrow in the sandy beach for his students that pointed to a waiting train. We reprint Dr. Pulley's memory of Bill here with permission from Dr. Abbott.)

Everyone who knew Bill was aware of his capacity for enthusiasm over a new shell. We who worked with him at the MCZ often witnessed the thrill of anticipation with which he opened each new package of shells and spread out the contents on the wide brown table. It was almost like watching the bright-eyed wonder of a small child at his first real Christmas.

But Bill had the same happy way of appreciating most of the other simple pleasures of life. He and Julia once invited me and my wife and 5-year-old son to a Sunday afternoon picnic; Bill would grill the hamburgers.

When we arrived at his chosen site I was a bit surprised to see that we were on a nice grassy spot, but it was on the railroad-right-of-way. There were houses nearby, but they were mostly concealed by trees. I had known that Bill liked trains, and I soon learned that we were here to wave at the afternoon train when it passed by. We lighted the charcoal and opened some beer and cokes.

When the coals were ready, Bill grilled the hamburgers and they were delicious. As we were finishing I saw that Bill kept glancing at his watch. Soon we heard the faint whistle of one of the last steam trains, and Bill quickly jumped to his feet. He strained to view the big engine when it first came into sight around a distant bend, and long before it was near us he raised both hands in the air and began to wave. As the train approached he began jumping in the air and waving more excitedly. The engineer saw him and began tooting his whistle in a long series of short bursts. The excitement was catching, and by the time the engine had reached us my son was as excited as Bill, and I was amazed to find that I, too, was jumping and waving like a 5-year-old. The smiles that were exchanged between Bill and the engineer as the train roared by led me to believe that this must have happened many times before.

I understood Bill's joy that afternoon as the train passed by, because I had taken part in it. I later realized that Bill experienced this same kind of happy pleasure in many of the less dramatic events of daily life. To Bill, the thrill of seeing a new shell, meeting an old

friend or making a new one, finishing another number of Johnsonia, or even telling one of his old bad jokes was comparable to his pleasure that day by the railroad tracks.

Tom Pulley, July 1984

C.O.A. 1986 CONVENTION

The Conchologists of America's 14th annual convention will be held at the Sheraton Yankee Trader Hotel at Fort Lauderdale, Florida, from July 15 - July 19, 1986. It will be hosted by the Broward Shell Club. All shell collectors, whether novice or advanced, as well as shell dealers and scientists from around the world are invited.

For further information and pre-registration packets, please contact Ruth Chesler, Convention Chairman, at 7401 S.W. 7th Street, Plantation, Florida 33317.

NEW EDITION OF AMERICAN MALACOLOGISTS DUE SOON

Dr. R. Tucker Abbott, editor, plans a new edition of American Malacologists. He invites shellers to send him biographical sketches, molluscan interests and travels for entry in this edition. If you have already filled out a new sketch, you need not send another now, but the Houston Conchology Society has many new members since the last edition was published (1974 and Supplement 1975). If you have a question about what to send, write for a form or check out the earlier issues from our library. Dr. Abbott's address: American Malacologists, P.O. Box 2255, Melbourne, Florida 32901. There is no charge for the entry.

DUES NOTICE

Our fiscal year is June 1 - June 1. Pay your dues to Mrs. R. E. McElroy, HCS Treasurer, 5202 Bryanhurst, Spring, Texas 77379 so you won't miss Volume XXIII.

TEXAS CONCHOLOGIST, Vol. XXII, No. 3, 4, May, 1986

ANATOMICAL NOTES ON *ODOSTOMIA* SP. LIVING ON THE PEARL OYSTER, *PINCTADA MAZATLANICA* AT ACAPULCO, MEXICO

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The large number of nominal species proposed in the opisthobranch family Pyramidellidae, particularly in the eastern Pacific area, is surely far greater than the number of biological species there (see Keen, 1971, and the earlier papers she cited). The amount of variation within species is rarely and briefly noted. The precise habitat of the species, which are now known to be intimately associated with other animals, chiefly molluscs, as external parasites, is rarely mentioned. Nothing seems to be known of the anatomy of the flesh in pyramidellids of that area.

Such a state of affairs impedes study of the group; it encourages the pernicious habit of naming new species, or at least gives writers pause in identifying their material, when, as in the present case, specimens could justifiably be referred to more than one nominal species, or even to more than one subgenus or genus. The supraspecific taxa are presently arbitrarily limited, vague, poorly defined and not mutually exclusive.

But such a state of affairs, which is not limited to the pyramidellids, need not prohibit further study of the group. If we record our observations of unidentifiable species in sufficient detail, with descriptions and illustrations of the shell and anatomy and precise data on the habitat, an acceptable specific identity can be made later. Meanwhile, information will be available which will hasten the resolution of the impass now encumbering the nomenclature and classification of the group.

In an earlier note in the Texas Conchologist (Harry, 1985) I reported finding in July, 1984, the pearl oyster, *Pinctada mazatlanica* being sold as food by street vendors in the older part of Acapulco, Mexico, and that I bought four specimens for anatomical studies. These specimens had been soaked in alcohol in Acapulco, which was drained off and only replaced after the moist specimens were flown back to Houston.

The associated organisms adhering to or boring into the shell of such bivalves are often of interest. These pearl oysters must have been given a perfunctory cleaning by the vendor, at least enough to make them attractive for sale. But they still contained considerable epibiota. On one of the four specimens, and only one, there were several specimens of a small white snail.

The general aspect of the shell - smooth, subglobose, with moderate spire and rounded, large aperture - reminded me of the pulmonate land snails of the family Succineidae, but of course their presence in a marine setting indicated they were more likely to be prosobranchs, particularly since they had an operculum. On closer look, I was

surprised to find that the head of the animal was distinctly that of the opisthobranch snails of the family Pyramidellidae, which I had described earlier in the Texas Conchologist (Harry, 1984). This was further remarkable, since the apex of the shell is scarcely heterostrophic (coiled anticlockwise, whereas the later shell is clockwise), nor is there any columellar lamella in the shell aperture. Both characters are generally present in that family.

However, the ten specimens were clustered about the base of the large byssus of the pearl oyster, and indeed, byssal threads had been cemented to two empty shells, which suggests this snail may have fed on the mucous of the bivalve, and this is characteristic of odostomias. The shells nearly fit several nominal species of Odostomia, distributed among the subgenera Evalea, Amara and Heida as defined by Dall and Bartsch (1909; the species, plus some named later are listed in Keen, 1971). Rather than encumber the literature with additional nominal species, the specimens are presently designated Odostomia sp.

Shell: The largest shell was attached by a byssal thread and slightly worn, but has 4 3/4 whorls and is 5.52 mm. high. The next largest has 4 whorls, is 4.83 mm. high and has a diameter of 3.17 mm. (Fig. 3). The shells are minute, moderately thick for their size, faint tan when fresh but pure white when the periostracum is worn off. The shape is turbinate, with the whorls inflated, evenly rounded, and the suture deeply indented. The spire is about equal to the height of the aperture. The shells are imperforate, the outer lip sharp, the aperture is nearly subcircular below, but above is drawn out to a point ending at the suture. There is a distinct parietal and columellar callus, and thus the peritreme is complete. No apertural denticles or lamellae are present. The body whorl is slightly flattened on the shoulder, but the periphery is evenly rounded. The shell is smooth but not polished, faintly roughened by closely spaced, discontinuous growth lines, and occasionally with small areas of faint, closely spaced spiral incised lines on the penultimate and body whorl (Fig. 3). The first half of the apical whorl is smooth, polished, without sculpture, and separated from the later shell by a faint, sharp line (line not shown in the Figs.). It is slightly upturned, indicating a very reduced heterostrophy.

Flesh: The animal (Figs. 4, 5, 6) is entirely white. There are two flattened, triangular tentacles, meeting in the midline, each with a groove along the lateral margin. The eyes are small black cups, deeply situated, in the base of the tentacles. A true mentum extends forward below the tentacles, projecting slightly at the foot margin; it is a flattened, narrow ridge, attached throughout its length to the top of the foot. The retracted foot is oval with sides nearly parallel; the front and hind ends are broadly rounded; there is no anterior marginal groove. On the sole, the hind half of the foot seems bounded by a low ridge, and this half seems to be a sucker, but the point needs verification from live material.

There is a thin, horny, transparent operculum attached transversely to the dorsal surface of the hind end of the foot; it is oval, with ends nearly pointed, and as long as the shell's aperture is high, but it

does not fill the aperture in the preserved snail. On its outer surface the operculum has curved growth lines parallel to its margin, but no nucleus was seen, nor any evidence of spiral growth.

The mantle margin is slightly thickened, not reflected over the shell, and without papillae or siphons. The hypopeplar (or perisomatic) mantle cavity is very shallow behind the body stalk, and it extends as a median dorsal mantle cavity in front, along the entire outer lip of the shell's aperture. No penis nor any reproductive groove was found in either of the two larger specimens examined. Within the median mantle cavity the rectum is incorporated in the wall at the very angle of the right side, thus subtending the suture of the shell. The anus opens simply at the thickened mantle margin. Separated by a narrow space slightly to the left of the rectum, on the roof of the mantle cavity is a low, narrow, well defined lamella, which passes from the mangle margin to the apex of the mantle cavity. Below that lamella, paralleling it on the floor (diaphragm) of the cavity, is a much higher one. The two unite at the upper end of the cavity. I could not find an appendicular pocket of the mantle cavity, extending above its upper end, but such may be present.

The large lamella extends beyond the aperture of the median mantle cavity, where it turns to the right, and the last part is a free, subquadrate flap. The attached part of this lamella has a neobranch on it: although the free margin is straight, paralleling the margin of attachment of the lamella to the diaphragm, the sheet of tissue between the two margins is much larger than the space within which it is contained; it consequently bulges out alternately on each side of the lamella with symmetrical regularity, and the resultant folds appear to be the lamellae of a gill. There is no true "gill" (ctenidium) homologous to that of the pectinibranch prosobranchs (the Caenogastropoda).

To the left of the neobranch there is a large, flattened, triangular body, with its long axis somewhat transverse; this seems to be glandular, having alveoli inside it, and a few darkly colored particles in its wall. Above and adjacent to this glandular mass is a flattened, quadrate body, which I have tentatively identified as a kidney. This seems to have transverse markings which may represent internal trabeculae (infoldings of the body wall of the kidney sac). Above and immediately to the left of the quadrate organ, at the upper end of the median mantle cavity is a heart of two chambers in an elongate pericardial sac.

Not much detail could be determined of the upper visceral complex - that part of the body apicad to the median mantle cavity - the tip of which was broken off in the specimen drawn in figures 4 and 5. It seems to be mostly occupied by the liver, which in these specimens was white, not the usual tan or greenish brown of the liver of most preserved molluscs. Imbedded in the mass on the columellar side, about half way up the upper visceral complex, is a flattened, subcircular, compact alveolar mass which may represent the gonad. Near the lower end of the mass is a large body which may be the stomach.

Within the head, I could find no radula or jaw; a mass of small,

brittle tubules may represent a retracted proboscis or salivary glands or both; nothing could be determined of the nervous system.

The columellar retractor muscle is a continuous broad strip subtending the columellar (hind) side of the body stalk (the part of the body joining the head and foot to the upper visceral complex) just above the perisomatic mantle cavity. It does not extend apicad very far, and attached along the body whorl and columellar part of the shell's aperture.

The presence of mantle cavity lamellae, a mantle cavity gland and heterostrophic shell apex in the pyramidellids and related snails have recently been reviewed by Robertson (1985). The first two of those characters, plus the circumstances of their occurrence, the size and shape of the shells, the peculiar tentacles and mentum, the position of the eyes and the apparent absence of radula and jaws all point to the genus Odostomia, sensu lato, as the proper one for this species.

Whether the lamella on the columellar wall of the shell's aperture is always absent in this species, or variable in its presence, must await further study. Perhaps the specimens studied were not fully developed? The reduced heterostrophy of the shell apex in groups in which heterostrophy normally occurs is a phenomenon more frequent than the literature indicates, and should be more carefully noted in the description of shells.

The eight remaining shells have been deposited at the Houston Museum of Natural Science.

References

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Explanation of the figures

Fig. 1. Odostomia sp. from a pearl oyster at Acapulco, Mexico. A juvenile shell of 1 1/2 whorls, showing reduced heterostrophy. Drawn by transmitted light to show internal shell features (dashed lines).

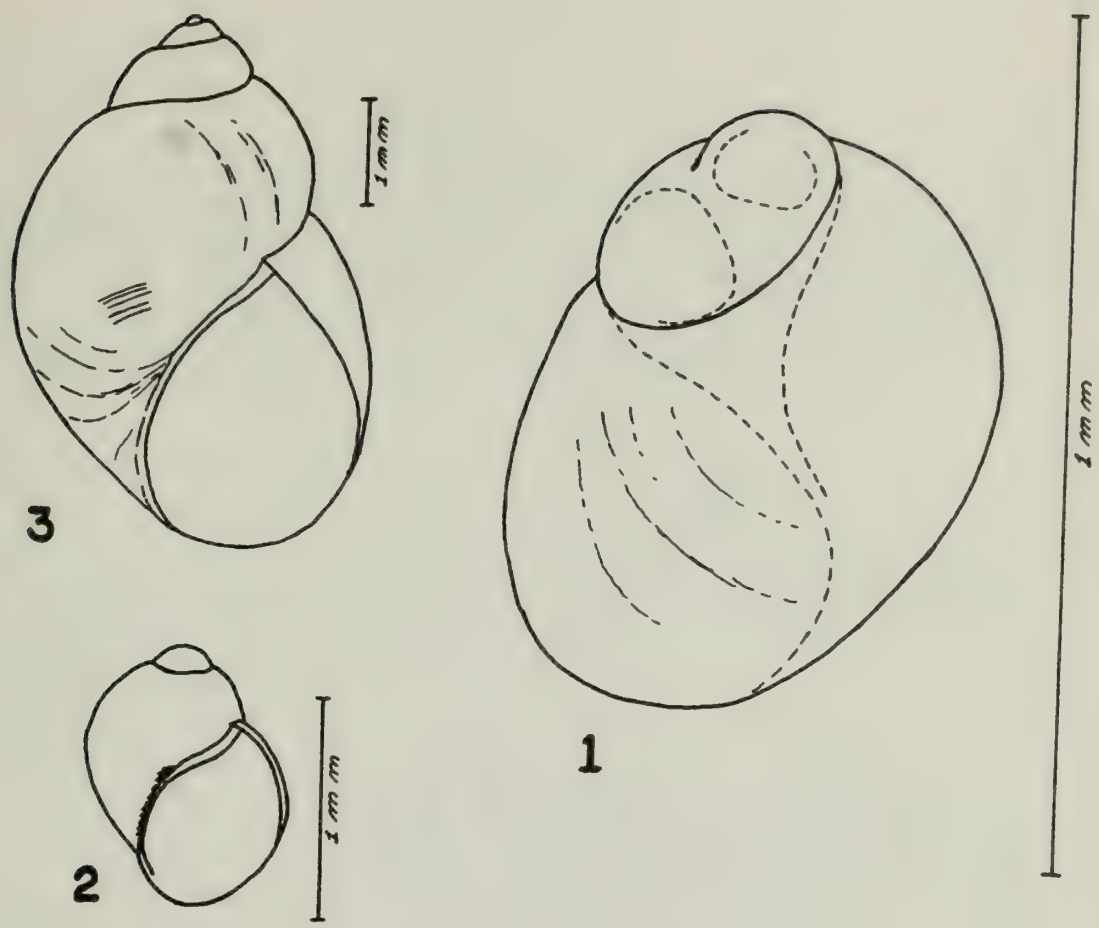
Fig. 2. A slightly larger shell.

Fig. 3. A specimen of 4 whorls, 4.83 mm. high. Note patch of spiral incised lines on body whorl to left of aperture.

Fig. 4. Underside of a preserved animal removed from the shell.

Fig. 5. Upper side of the same animal. The apical tip was broken off.

Fig. 6. Same animal, with median mantle cavity opened to show structures therein. The heart was cut through, and is not shown.


1 mm
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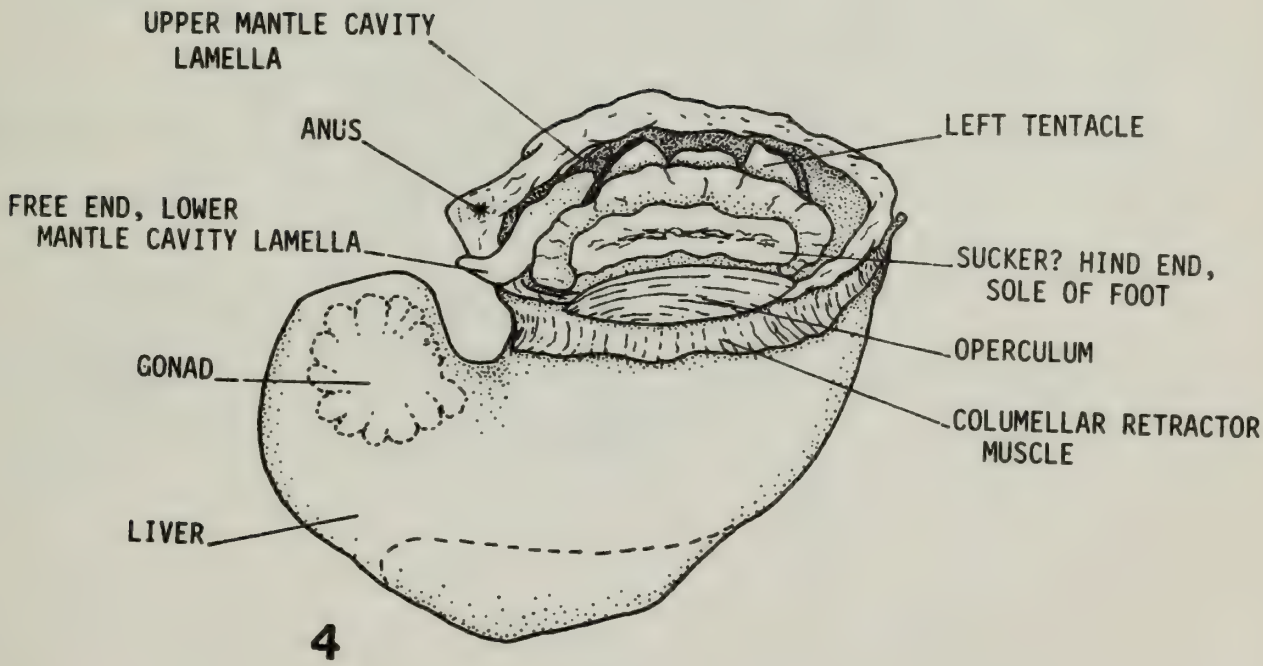
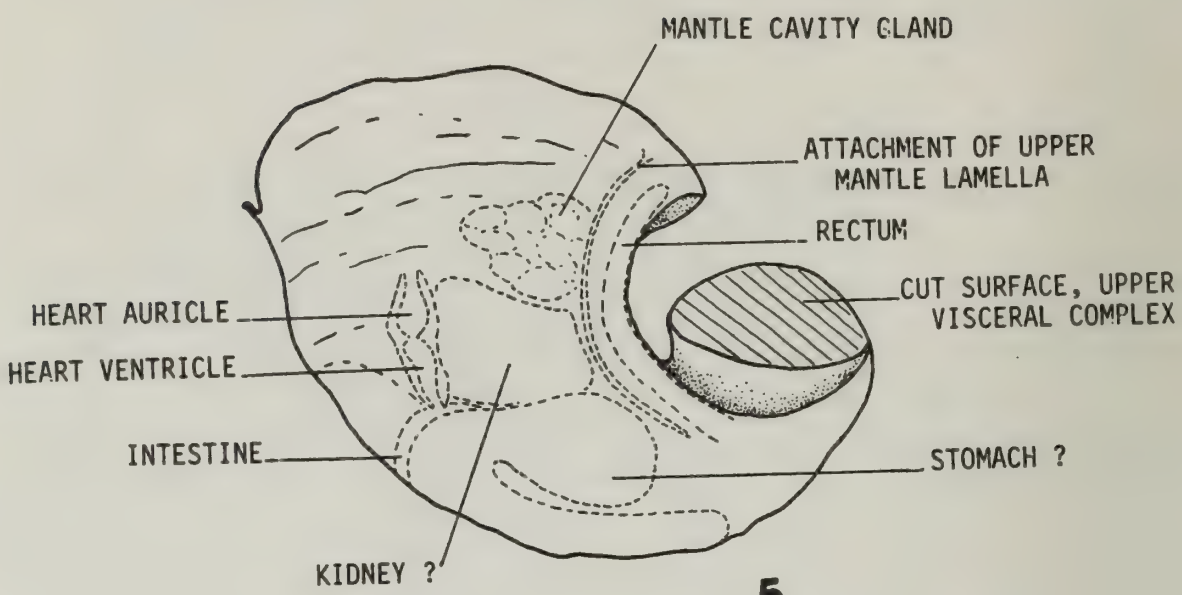
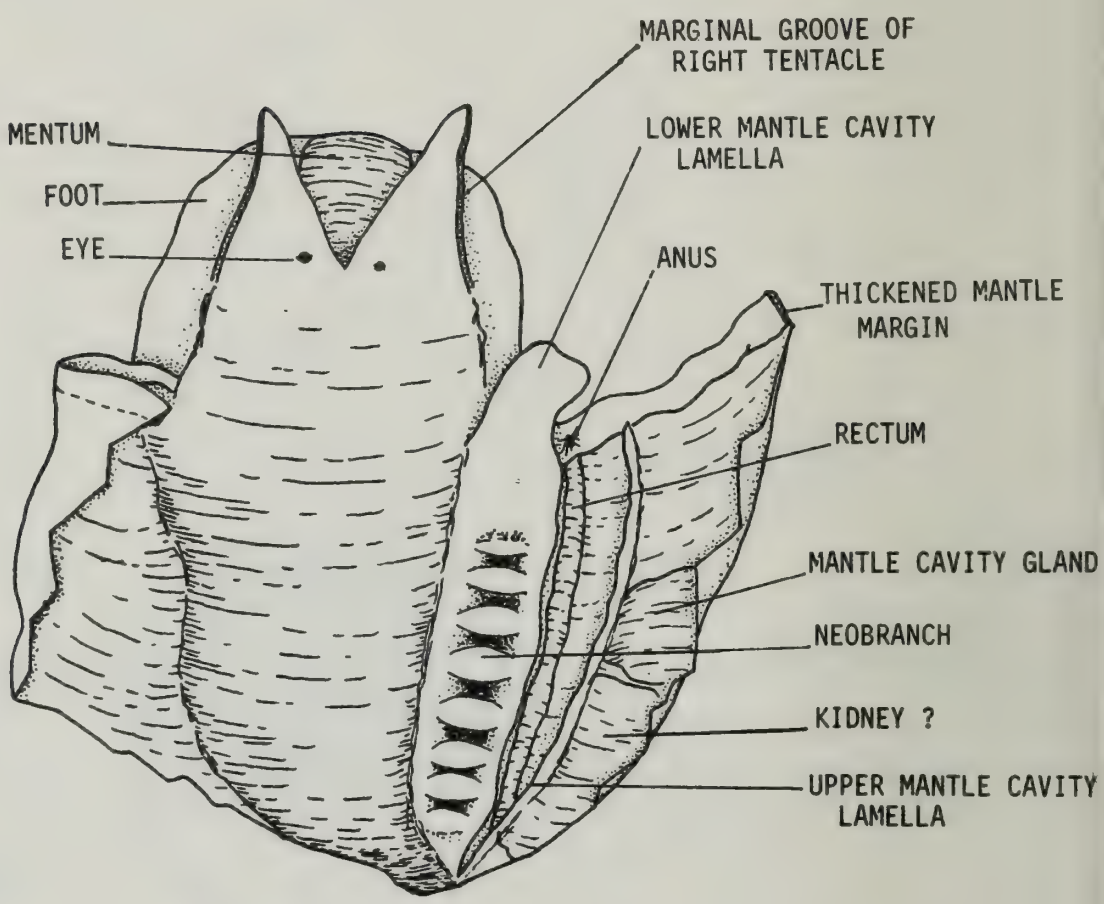

UPPER MANTLE CAVITY LAMELLA
ANUS
FREE END, LOWER MANTLE CAVITY LAMELLA
GONAD
LIVER
LEFT TENTACLE
SUCKER? HIND END, SOLE OF FOOT
OPERCULUM
COLUMELLAR RETRACTOR MUSCLE
4


MANTLE CAVITY GLAND
ATTACHMENT OF UPPER MANTLE LAMELLA
RECTUM
CUT SURFACE, UPPER VISCERAL COMPLEX
HEART AURICLE
HEART VENTRICLE
INTESTINE
STOMACH ?
KIDNEY ?

5


MARGINAL GROOVE OF RIGHT TENTACLE
MENTUM
LOWER MANTLE CAVITY LAMELLA
FOOT
EYE
ANUS
THICKENED MANTLE MARGIN
RECTUM
MANTLE CAVITY GLAND
NEOBRANCH
KIDNEY ?
UPPER MANTLE CAVITY LAMELLA

6

MONOGRAPH By H. Odé

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

(A Continuing Monograph)

Family CANCELLARIIDAE Forbes and Hanley, 1853

In this family a number of rather well developed somewhat biconic shells with prominent lirae on the columella are brought together. In the N. W. Gulf of Mexico live only two species belonging to the genera Cancellaria and Agatrix. Recently R. E. Petit published two short papers on this family which are of interest to our fauna: Notes on Cancellariidae (Mollusca: Gastropoda), Tulane Studies in Geology and Paleontology, Vol. 5(4), 217-219, 1967 and ibid Vol. 8(2), 83-88, 1970.

Genus Cancellaria Lamarck, 1799

The precise characteristics of the various socalled genera in the Cancellariidae are not well defined and depend on the overall shell shape. Agatrix is in general considerably smaller than Cancellaria and has a much deeper suture than Cancellaria. There is in the N.W. Gulf of Mexico only a single species.

82. Cancellaria reticulata (Linne, 1767)

This well known species - the socalled "Common Nutmeg" - is fairly common offshore. On the Texas beaches, however, it is quite rare, but it has been taken on Padre and Mustang Islands and at San Luis Pass, Galveston Island. Most dredged material in the HMNS survey collection is rather worn but some live collected material is present. This was collected on Heald Bank, where old shells are more common than elsewhere along the Texas coast. In structural appearance the species in Texas is quite uniform and the intensity of the nodulose spirals is equal in all specimens. Completely white specimens or smoothish specimens, sometimes denoted as a subspecies (adelae Pilsbry) are not known from Texas. The somewhat depressed nepionic whorls are quite small and consist of slightly more than two quite smooth and shiny whorls which without gradual change are replaced suddenly by heavily sculptured growth.

Records HMNS Survey Collection: 22 lots, of which 2 contain live collected material.
Depth range: 0 - 40 fms.; alive at 4 - 6 fms.
Geographical range: North Carolina to both sides of Florida, Texas; Caribbean to Brazil (Abbott, 1974).
Maximum size (HMNS collection): 44 mm.

Genus Agatrix Petit, 1967

In general much smaller than Cancellaria and with a much deeper suture, so that some species acquire a scalaroid aspect. I have followed here Abbott (1974) who places our only species in Agatrix, whereas Petit in 1970 made it the type species of a new genus Olssonella. It is unfortunate that Petit in his original description of the genus Agatrix did not describe the nepionic whorls. However, Abbott (1974) mentions that the nucleus of A. agassizii (Dall, 1889) is "finely reticulate." Because the nepionic whorls of our species, here labelled Agatrix (Olssonella) smithii (Dall), are exactly like Petit (1970) described them: "smooth, polished, about 2 1/2 in number," there is some doubt that Abbott's procedure of making Olssonella a subgenus of Agatrix is a correct one. It might be more correct to retain Olssonella as a full genus closely related to Cancellaria, which has identical nepionic whorls. In this respect it may be mentioned that there is in our material a rather fresh specimen whose color pattern although by no means as contrasting - in fact, quite faint - is exactly like that of Cancellaria reticulata.

83. Agatrix (Olssonella) smithii (Dall, 1888)

This species is widespread in somewhat deeper water in the N.W. Gulf of Mexico. It is instructive to look at the content of Olssonella as enumerated by Petit (1970). They range from some Miocene species of the Eastern U.S.A. and the Gatun formation of Panama to two recent forms in the Panamanic Pacific and our species in the N.W. Gulf of Mexico. This indicates once more that the Western Gulf of Mexico has retained a fauna closely related to the Panamic one. Also the fact that A. smithii belongs to a large group of species in diverse families, which are quite common in the N.W. Gulf, but were described from the Carolinas and do not occur off Florida, is in my opinion an indication that a warmer clear water fauna of the Caribbean has interrupted the fauna in the muddy continental edge of North America. The cause of this is the emergence of the Florida peninsula. Thus the place to look for older elements of the Western Atlantic fauna is the N.W. Gulf of Mexico (see also H. Ode, Texas Conchologist Vol. 10(2), p. 14-20).

Records HMNS Survey Collection: 20 lots, no live material. One shell in this collection appears to be quite fresh and probably was collected alive. Also in the Mississippi Delta mudlump fauna.
Depth range: 11 - 51 fms.; possibly alive at 11 - 23 fms.
Geographical range: "Off the Carolinas" (Abbott, 1974).
Maximum size (HMNS collection): 11 mm.

Finally there is in the HMNS survey collection a single nepionic whorl taken at 28 fms., unbroken and complete, less than 1 mm. in size, not belonging to one of the above mentioned species. It must remain unidentified. In a previous list (see Texas Conchologist Vol. 9, p. 68) I had attached the label Admete sp. A to it. Its columella shows clearly two plaits and its surface is smooth and shiny.

Family MARGINELLIDAE Fleming, 1828

All members of this family are smooth and shiny, some having conspicuous color patterns. In the N.W. Gulf of Mexico the habitat of rather sandy and muddy sea bottoms is not favorable to this family and the few species found in offshore Texas and Western Louisiana waters are rather drab and colorless and small in size. Known are only the following genera Hyalina, Marginella, Granulina and Cystiscus.

Genus Marginella Lamarck, 1799

This genus consists of very glossy shells and is subdivided into a number of subgenera, two of which have representatives in our area.

84. Marginella (Prunum) apicina Menke, 1828

This species has been collected in the coastal bays south of Matagorda Island. It was discussed in the Texas Conchologist Vol. 5, p. 46, 1969. It has rarely been collected alive. (See C. Boone's report of live specimens at South Padre Texas Conchologist Vol. XIV(2), Dec., 1977.) It has never been dredged in offshore waters. Probably it invaded the south Texas coastal bays from Mexico, and due to causes not well understood is unable to stabilize its presence there. On the mud flats in the Corpus Christi area, dead and bleached specimens can often be washed out of the clay. Abbott (1974) mentions that 1 in 5,000 specimens is sinistral, but I have never seen a sinistral specimen collected from Texas.

Records HMNS Survey Collection: 7 lots, no live material.
Depth range: 0 - 2 fms. (South Texas coastal bays).
Geographical range: North Carolina to Florida; the Gulf States and the West Indies (Abbott, 1974).
Maximum size (HMNS collection): 12 mm.

85. Marginella (Dentimargo) aureocincta Stearns, 1872

This quite common offshore species is widespread along the coast. In most populations mature specimens do not reach more than 2 1/2 mm. in size, but in a few the largest specimens do indeed reach 4 mm. as Abbott indicates. It is a rather variable species which in Texas is mostly completely colorless except for a slightly brownish apex (only in fresh material). All whorls are shiny and white. In 1890 Dall (see Trans. Wagn. Free Inst. Science, Vol. 3, part 1, page 53) named this colorless form M. aureocincta immaculata. It should be noted that the range of this form (according to Dall) is given as "Virginia to Florida."

Records HMNS Survey Collection: 25 lots, of which 3 contain live collected material. It may also be noted that this species is quite common in the mud lump fauna of the Mississippi Delta.
Depth range: 16 - 76 fms.; alive at 23 - 40 fms.

Geographical range: North Carolina to both sides of Florida; West Indies, Brazil (Abbott, 1974).
Maximum size: 4.3 mm.

Genus Hyalina Schumacher, 1817

Members of this genus are slender, low spired marginellas whose placement in a separate genus is not always clear. Only a single species is in our area.

86. Hyalina veliei Pilsbry, 1896

In the past I have listed this as Marginella sp. A, but this thin shelled species with 4 quite prominent plaits on the columella corresponds exactly with Abbott's description and figure (pl. 11, fig. 2758). It is completely colorless and somewhat translucent. It is, however, not clear to me why it is not in the genus Marginella (compare fi. Abbott's figures 2726 and 2758). The absence of color can hardly be a reason for this classification. Much of our material is in poor condition, but it is clear that the species is widespread in offshore waters. The only live specimens were two small juveniles. This apparently is a Marginella that has adapted quite well to a muddy environment. Abbott mentions as its habitat dead Pinna shells and mangrove mudflats and gives as localities "South Carolina to Florida." Hence this is another typical socalled "Carolinian" species, of which the N.W. Gulf of Mexico is so rich.

Records HMNS Survey Collection: 29 lots, of which two contain live material (small juveniles). Also in the mudlump fauna of the Mississippi Delta. It is interesting to note that a small quite juvenile specimen from the mudlump fauna is a left hand shell.
Depth range: 23 - 76 fms.; alive at 23 - 76 fms.
Geographical range: South Carolina to Florida (Abbott, 1974).
Maximum size (HMNS collection): 10.2 mm.

Genus Granulina Jousseaume, 1888

Members of this genus are very small; immature shells appear considerably different from full grown specimens. The heavy callus which covers the apex and also forms a thickened outer lip in maturity is missing in juvenile shells, which thus look more slender and pointed. Also the fine denticulation of the inner lip is missing in juvenile specimens.

87. Granulina ovuliformis (Orbigny, 1841)

This is a quite common sand bottom inhabitant along the Texas coast, where it is quite variable. In many populations the largest full grown specimens reach only 1.75 mm. in size, but in some the maximum size is about 2.4 mm. Some

specimens are almost spherical in shape; others are more cylindrical. Also the number of plaits on the columella is variable. In most mature specimens their number is 4 but specimens with only 3 and a few with 5 have been noticed in our material. In his 1927 paper giving diagnoses but no figures (Proc. U.S. Nat. Mus., Vol. 70, Art. 18) Dall described two other species of Granulina from off Fernandina, Florida in 298 fms. In view of the noted variability of G. ovuliformis one might have some doubt about the status of these two species and their validity should be checked. In the past I have reported this species as Bullata ovuliformis.

Records HMNS Survey Collection: 34 lots, no live material. Also in the mudlump fauna of the Mississippi Delta.
Depth range: 12 - 167 fms.; alive at 25 fms.
Geographical range: North Carolina to both sides of Florida and the West Indies (Abbott, 1974).
Maximum size: 2.3 mm.

Genus Cystiscus Stimpson, 1865

This very small genus closely resembles the better known subgenus Gibberula of Marginella. Comparison of figures 2747 and 2770 in Abbott (1974) shows no visible structural major difference. We have placed our material in Cystiscus because in all of it the inner lip is completely smooth within, whereas in Gibberula Swainson, 1840, there are "microscopic spiral teeth inside the thin curled-in outer lip" (Abbott, 1974). We entertain some doubt whether such a rather trivial difference is sufficient reason to place Gibberula and Cystiscus in different subfamilies. From the Western Atlantic two species have been reported, one from off Fernandina by Dall and the other from Panama by Olsson and McGinty. Ours constitutes a third one.

88. Cystiscus c.f. palantirulus (Roth and Coan, 1968)

Our material of this small species was originally reported as Persicula minuta (see Texas Conchologist Vol. 9, p. 68), a species now labelled "Marginella (Gibberula) lavalleeana Orbigny, 1842" by Abbott (1974, p. 251). On the basis of the slender evidence at my possession I prefer at this moment to classify 5 lots as Cystiscus instead of Marginella (Gibberula). All this material comes from calcareous environment, not muddy bottoms. The figure of C. bocasensis Olsson and McGinty (= larva Bavay) shows a shell more slender than ours and with 8 small columellar plaits, which diminish in size upwards. Keen (1971), in Sea Shells of Tropical West America gives a figure of Cystiscus palantirulus which cannot be distinguished from our material. There can be hardly any doubt that this Baja California species and ours were derived from the same stock.

Records HMNS Survey Collection: 5 lots, no live collected material. From outer shelf coral reefs.

Depth range: 10 - 40 fms.; no live material.
Geographical range: Unknown from Western Atlantic.
Maximum size: 2.6 mm.

In conclusion of this installment, I may remark on the noteworthy fact brought out by these two families: the occurrence of closely homologous species in the Galapagos Islands and the North West Gulf of Mexico. Our common Olssonella smithii is related to Olssonella funiculatum of the southern part of the Panamic Province, Granulina ovuliformis is homologous to Granulina margaritula Carpenter, which apparently has the enormous range from Alaska to the Galapagos Islands, and, finally, Dentimargo eremus Dall lives, according to Keen, "near the Galapagos Islands, in 80 to 1,300 m.; rare. A twin or homologous species in the Caribbean is D. aureocinctus (Stearns, 1873)."

(To be continued)

Fig. 1 Cancellaria reticulata (Linne, 1767) approximately 30 mm., was collected by diver Harold Geis at Southwest Buoy, Heald Bank, at 40 ft. in 1965.

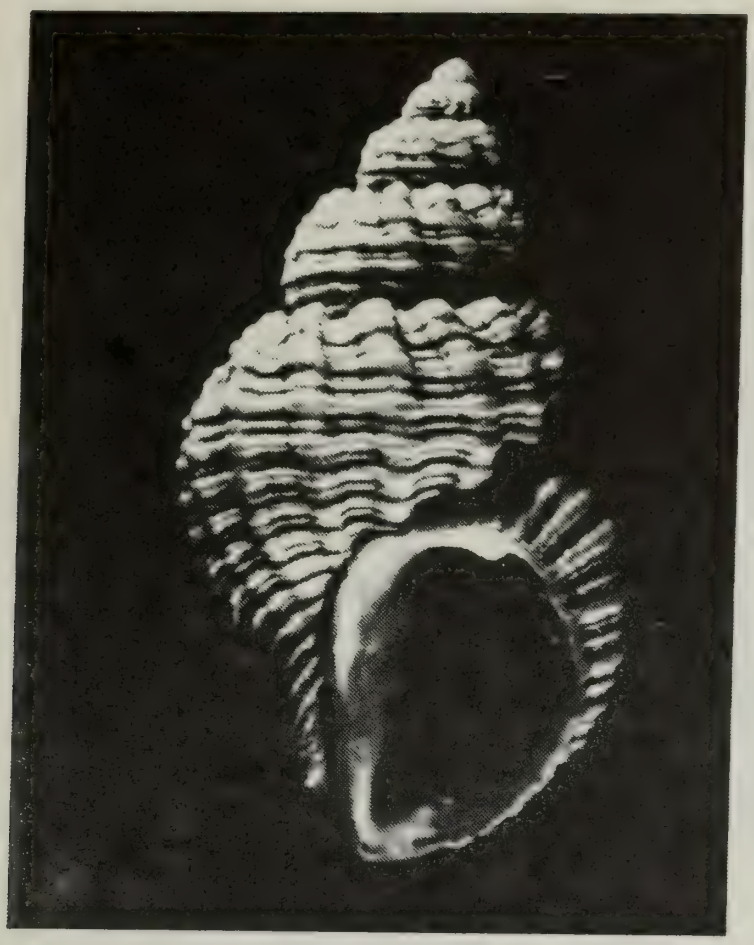


Fig. 2 Agatrix smithii (Dall, 1888), 11 mm., was collected 32 1/2 miles north of Port Isabel, Texas, at 12 fms., trawled by the Gus III, Bureau of Commercial Fisheries, on the research trip of August 10-25, 1965.

Fig. 3 Marginella aureocincta Stearns, 1872, 3.8 mm., was dredged at 25 fms. by Gus II, Bureau of Commercial Fisheries, 55 miles southeast of Freeport, Texas, December 7, 1966.

Fig. 4 Granulina ovuliformis (Orbigny, 1841), 2 mm., was taken in a grab sample at 140 fms., unctous mud, 102 1/2 miles south-southeast of Freeport, Texas by Harold Geis and Sidney Stubbs, 1965.

Fig. 5 Cystiscus c.f. palantirulus (Roth and Coan, 1968), 2.6 mm., collected by divers taking bottom samples at the East Flower Gardens coral reef 103 miles southeast of Galveston, Texas, at 65-85 ft., from the USS Haynsworth DD700, October 6, 1967.

TEXAS CONCHOLOGIST, Vol. XXII, No. 3, 4, May, 1986

ON A COLLECTION OF LAND AND FRESHWATER GASTROPODS FROM CAMERON COUNTY, TEXAS

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Examination of the nonmarine snail collections at the Houston Museum of Natural Science revealed an interesting collection of terrestrial and freshwater snails from the Lower Rio Grande Valley of Texas. The purpose of this report is to recount the circumstances of the collection, to discuss the shells contained within the collection, and to encourage amateurs to accumulate and document collections of nonmarine molluscs.

CIRCUMSTANCES OF COLLECTION

The collection was the result of efforts by the late Mary Foote and Marion Scruggs of South Padre Island, Cameron County, Texas. Purpose of the collection was to provide an exhibit for the 10th Annual Shell Fair of the South Padre Island Shell Club in February 1969, entitled "Texas Land Snails." The project was the idea of the late Betty Allen. Upon the death of Mary Foote, the collection was left to Constance Boone, who presented it to the Houston Museum of Natural Science.

Cleaned shells of each species were placed in exhibit boxes which were accompanied by index cards with scientific name of each species. Each box contained a series of shells of a single species; some of these contained a size-graded series of shells which demonstrated the growth stages of a particular species.

These display boxes have no collection data, but additional shells are present in vials and other containers, some of which do contain locality labels (some with date of collection). Shells were collected in the eastern portion of Cameron County during the time period from December 1968 to February 1969, except for a single lot which was collected in June 1968. Included in the shell exhibit were several Polaroid photographs of collection localities with specific habitat shots in addition to several of crawling snails.

COLLECTION LOCALITIES

Laguna Vista (LV) is a small community (1980 population - 632) located on State Highway 100 and Farm Road 510, approximately 9 km west-northwest of Port Isabel.

Laguna Atascosa National Wildlife Refuge (LA) is an 18,232 hectare area along the Laguna Madre and south of the Arroyo Colorado. Besides numerous freshwater and brackish ponds, lakes and sloughs, this area

contains substantial areas of native thorn scrub (brush) and grasslands. Presence of shells of introduced species indicates that some of the lots originated from disturbed habitats, probably near structures.

Los Fresnos (LF) is a farming community (1980 population - 2173) located 18 km north of Brownsville at the intersection of Texas Highway 100 and Farm Road 1847.

Harlingen (H) is a medium-sized city (1980 population - 43,543) which is located 44 km northwest of Brownsville. One locality was an automobile junk yard on the Arroyo Colorado at the U.S. 77/83 overpass. The other locality was a residential yard on Dilworth Road near the Arroyo Colorado on the southwest side of Harlingen.

Brownsville (B) is a moderate-sized city (1980 population - 84,997) located on the left bank of the Rio Grande opposite Matamoros, Tamaulipas. Most Brownsville collections were made at "Fort Brown," an area just east of the downtown area which includes the area of Fort Brown, a U.S. Army fort which was closed in the late 1940's. One significant collection was made in the "yard of La Parr" in Brownsville.

ANNOTATED SPECIES LIST

Helicina orbiculata (Say, 1818) is a widespread species which occurs in areas with some woody vegetation. This species is the only terrestrial operculate snail known to occur in Texas. Most shells in this collection were white or light-colored as are most shells of this species from Cameron County. However, the lot from Laguna Atascosa included one shell of a light reddish chestnut color. Cheatum and Brooks (1937) listed color variation of H. orbiculata in Texas.

Succinea luteola Gould, 1848, is the most common succineid snail in southern Texas. This species may be extremely abundant at times in abandoned agricultural fields, vacant lots, and open brushy plots.

Euglandina texasiana (Pfeiffer, 1852) is a fairly large land snail which is predatory on other land snails, especially H. orbiculata. This species is native to northeastern Mexico and only a very restricted portion of the Lower Rio Grande Valley of Texas. For many years collections were known only from the Brownsville area (Pilsbry 1946:196). More recent workers have found populations in adjacent Hidalgo County (Pratt 1965) and along the Arroyo Colorado in northern Cameron (Pratt 1965) and southernmost Willacy (Neck 1981) counties. An introduced population is known from San Antonio (Neck 1985).

Rumina decollata (Linne, 1758) is an introduced land snail which is native to the portions of southern Europe, northern Africa and western Asia which border the Mediterranean Sea. Initial collection of this species in Texas was made in 1913 by R. D. Camp at Fort Brown (Ferriss 1914). Early personal surveys of the introduced snails of the Brownsville area (Neck 1976) revealed no populations of R. decollata. Subsequently, a single bleached shell was found in a residential yard in Brownsville. The collection of a large number of fresh shells of

R. decollata in Brownsville ("yard of La Parr" in December 1968) indicates that highly localized populations of this species have survived into the latter part of the twentieth century.

Lamellaxis gracilis (Hutton, 1834) is an introduced snail which is native to tropical America. This species is common in urban residential areas in the Lower Rio Grande Valley of Texas.

Rabdotus alternatus (Say, 1830), known as the South Texas tree snail, is the most common snail in this collection. Shells from a residential yard in Laguna Vista are smaller and have more brown mottling and banding than shells from Laguna Atascosa. Some of the Laguna Atascosa R. alternatus were collected alive and subsequently laid eggs in a terrarium.

Polygyra cereolus (Muhlfeld, 1818) is another introduced species which is common in disturbed sites in the Valley. The species is native to the southeastern United States and along the Texas coast as far south as Nueces County (Pratt 1981:55).

Polygyra texasiana (Moricand, 1833) is a common land snail in natural and disturbed habitats of the Valley.

Praticolella berlandieriana (Moricand, 1833) is common in disturbed habitats in the Valley and much of southern and central Texas. The populations present in the Valley and sampled by Mary Foote have been referred to Praticolella candida by Hubricht (1983) but the specific status of this phenotype is not accepted by this author at this time. These shells have a whitish base with spiral striae which lack pigmentation. The body whorl is solid white above the insertion and contains no solid bands of either white or unpigmented appearance.

Praticolella griseola (Pfeiffer, 1841) is a tropical species with a disjunct geographical range (Rehder 1966; Neck 1977) which reaches its northernmost occurrence in the Valley. This species is most common in disturbed and slightly saline habitats.

Physella virgata (Gould, 1855) is a widespread species found in aquatic habitats with various environmental characteristics. Most localities with P. virgata are typified by shallow, slow-moving water. These water bodies may periodically dry out.

Planorbella trivolvis (Say, 1817) is another freshwater snail which is found in a variety of aquatic habitats. Typical habitat of P. trivolvis generally contains deeper water of somewhat higher quality (and probably more permanent nature) than those of Physella virgata.

Biomphalaria obstructa (Morelet, 1849) is found in warm, temporary or permanent, but isolated, bodies of water.

Melampus bidentatus Say, 1822, is an intertidal pulmonate found in saline marsh habitats. Mitchell (n.d.) reported that, "This is really a land snail." Normally one or more species of the halophytic grass genus Spartina are present. Active at night, this species spends daylight hours under driftwood, piles of organic matter, and other

objects which may provide cover.

DISCUSSION

Although recovered from only two of the five localities, Rabdotus alternatus was the most common species in the total collection. This species is often found in large numbers and is the largest land snail in the Valley. Both these factors make shells of R. alternatus very visible. Praticolella griseola was collected from more localities than any other species. This wide-spread occurrence is due to the ability of P. griseola to successfully colonize impacted areas, including residential and commercial areas. The three non-native species (Rumina decollata, Lamellaxis gracilis, and Polygyra cereolus) were each found at only a single locality. This restriction is somewhat surprising due to the general widespread occurrence of introduced species in impacted areas. Obviously, Mary Foote collected most of the snails in this collection from areas dominated by native species.

This analysis of the nonmarine snail collection made by Mary Foote demonstrates the contributions that can be made by amateur shell collectors. As long as sufficient locality data are recorded, the shells have potential scientific value. Labels should be placed in vials with snails or permanently attached to boxes. Habitat notes can increase significantly the importance of a collection.

The most important contribution of the Mary Foote collection is the occurrence of a modern collection of the introduced Mediterranean snail, Rumina decollata, from Brownsville.

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Table 1. Distribution of snails collected by Mary Foote in eastern Cameron County from June 1968 to February 1969 for 10th Annual Shell Fair of South Padre Island Shell Club in February 1969. Letter headings refer to collection sites in text; "?" refers to unlabeled lots present in the collection.

	LV	LA	LF	H	B	?
Helicina orbiculata		X			X	X
Succinea luteola		X		X	X	X
Euglandina texasiana						X
Rumina decollata					X	X
Lamellaxis gracilis		X				
Rabdotus alternatus	X	X				X
Polygyra cereolus		X				X
Polygyra texasiana		X			X	X
Praticolella berlandieriana		X		X		X
Praticolella griseola		X	X	X	X	X
Physella virgata						X
Planorbella trivolvis						X
Biomphalaria obstructa						X
Melampus bidentatus						X

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