Scotch Bonnet

NUMBER 7

NORTH CAROLINA SHELL CLUB BULLETIN

NOVEMBER 1973

DEDICATION

MRS. ROSE C. McLEAN 1889 – 1972

Rose McLean, or "Mom", as she was lovingly called by her friends of the Shell Club, died of a coronary attack on June 13th, and was buried in the family plot at Bensalem Church near her home. She was the daughter of David C. and Catherine Leach Cochran of Star, N. C. where she was born.

Rose was educated at the University of North Carolina at Greensboro, where she majored in science. She taught school in both Montgomery and Bladen counties; later she taught home economics at Samarcard Manor in Moore County.

In 1912 she was married to Robert C. McLean, peach grower and merchant of Eagle Springs, North Carolina. Five boys and one girl blessed this union and all survive her; they are: Robert C. McLean, Jr. Physicist- Miami, Fla. Col. W. Roger McLean, of the home, Dr. David A McLean, Laurinburg, N. C., Lin K. McLean, Engineer, Factoryville, Pa., Dr. Clifton C. McLean, Southern Pines, N. C., Rose C. Forrest, Gastonia, N. C. She is also survived by one brother, Carl A. Cochran of Star and one sister Kate C. Charles of Fayetteville, N. C. Kate is also a well known and loved member of the N. C. Shell Club.

In civic and social affairs, Rose was active in Red Cross in both World Wars, a decorated "plane spotter" during W. W.,II, president of the Women of the Church and teacher at Bensalem Presbyterian Church, active in choir and womens circles. She was also president of P. T. A. and other related school activities. Rose was an outstanding genealogist and has written the history of the Cochran family of Montgomery County. She was a member of the Moore County Historical Association and a member of the Alfred Moore Chapter of the Daughters of the American Revolution.

Rose was much in demand for talks to Civic Clubs throughout the area, and was presented with an award by the Sandhills Kiawanis Club for a fascinating talk on North Carolina sea shells.

The highlight of Rose's later life was the presentation of a silver Scotch Bonnet for a nominating speech for the Scotch Bonnet as the North Carolina State Shell.

According to her last wish she was buried with the Scotch Bonnet clasped in her hands.

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PRESIDENT'S MESSAGE

Douglas A. Wolfe

The North Carolina Shell Club was in the midst of its fifteenth year when I ascended to the presidency upon Walter Lowry's resignation in March, 1972. It has now been six years since R. Tucker Abbott warned the Club at its Tenth Anniversary Banquet in Raleigh "not to relax and bask in the sunshine of past achievements." During these years, the membership has grown and the members have continued to give their enthusiastic support to Club functions and activities. The Club owes its progress to the many members who have donated willingly of their time and energies as officers and committee members, as listed elsewhere in this bulletin. Our continued success will depend on the extent to which you the members take part in future meetings, field trips, shell shows and committee work of the Club. Let's improve our organization any way we can - - - together.

Significant developments of the past year include plans to incorporate the Club as a non-profit educational organization. Incorporation will allow the organization to accept and dispose of property readily, and to sponsor group activities such as the Sanibel Island trip discussed a few years ago. We have also planned for and begun to assemble a permanent traveling display of North Carolina shells to be used initially in the North Carolina State Fair.

In the past our Club has never been active or vocal in matters pertaining to conservation. I believe that preservation of our molluscan fauna (and therefore preservation of essential habitat - whether marine, estuarine, freshwater, or terrestrial) should be an important goal of our organization; and that greater group effort should be made in the future to adopt conservation in our own collecting, to educate others in the practice of environmental conservation, and to influence public decisions concerning projects which will adversely affect natural habitats essential to molluscs. These and other educational activities should provide us with plenty of incentive and motivation for continued enjoyment and success in Shell Club activities.

NORTH CAROLINA SHELL CLUB

CONSTITUTION

(As revised to date)

This club shall be called THE NORTH CAROLINA SHELL CLUB.

MEMBERSHIP shall be open to any persons interested in the collection of shells or the study of Malacology. New members may be received by consent of the club at any regular meeting. ANNUAL DUES for Adults shall be $1.50, For JUNIOR MEMBERS, $.50. Junior membership shall include all individuals of grade school age or younger. SUSTAINING MEMBERSHIPS are offered at $5.00 and SPONSORING MEMBERSHIPS at $10.00. Those members three or more years behind in their dues shall have their membership terminated after due notice.

HONORARY MEMBERSHIPS may be granted by a majority vote of the members present at a meeting following recommendation by the executive committee. Honorary members will not be eligible to hold an elected Shell Club office, vote, or be required to pay dues.

The following OFFICERS shall be elected annually, by ballot on the last meeting of the year: President, Vice-President, Secretary, and Treasurer.

An EXECUTIVE COMMITTEE shall consist of the above officers, all past presidents, and one member who shall be elected annually. It shall be the duty of the Executive Committee to arrange programs for the meetings and supervise the affairs of the club.

The constitution may be altered by a majority vote of the total membership at any regular meeting, but written notice shall be given for any proposed change.

OFFICERS 1973

PRESIDENT ..... Douglas A. Wolfe

VICE PRESIDENT ..... Carl W. Truckner

RECORDING SECRETARY ..... Cornelia McInnes

CORRESPONDING SECRETARY ..... Janet F. Truckner

TREASURER ..... Janet F. Truckner

NORTH CAROLINA SHELL CLUB
1973
COMMITTEES AND ASSIGNED RESPONSIBILITIES

PROGRAMS
Doug Wolfe, Chairman
Hugh J. Porter
Miss Marguerite Thomas

MEETING ARRANGEMENTS
Mrs. Cornelia G. McInnes, Chairman
Paul Jennewein
James Wadsworth
Ruth Dixon

FIELD TRIPS
Mrs. Harriet Riggs, Chairman
Doug Wolfe
Roland Shelley
Mrs. Betsy Higgins

JUNIOR MEMBER ACTIVITIES
Mrs. Hugh J. (Pinky) Porter
Mrs. Douglas (Sally) Nunnally, Chairman
Miss Diane Truckner

PUBLICATIONS
C. W. Truckner, Chairman
James Wadsworth
Mrs. Ruth Dixon

EDUCATION
Dr. John H. Ferguson- Chairman
Dr. Jack B. Upchurch
Roland Shelley

MEETING HOSPITALITY
Miss Ann Yelvington, chairman
Mrs. John H. (Doris) Ferguson
Mrs. T. Moyle (Charlotte) Johnson

STATE FAIR EXHIBIT
Mrs. A. Lincoln (Nancy) Sherk, chairman
Miss Marguerite Thomas
George Crumpler

PUBLICITY
Paul Jennewein, Chairman
Mrs. E. H. (Lucy) Piper
Mrs. K. L. (Charlotte) Johnson
James Wadsworth

MEETING REGISTRATIONS
Mrs. Nancy Wolfe, Chairman
Mrs. Harriet Riggs
Mrs. F. L. (Lucille) Crawford

SHELL SHOW
Hugh Porter, Chairman
Miss Ann Yelvington
Mrs. K. L. (Charlotte) Johnson

SHELL AUCTION
James Wadsworth, Chairman
Mrs. H. J. (Pinky) Porter
George Crumpler

PHOTOGRAPHER
Paul Jennewein

HISTORIAN
Mrs. K. L. (Charlotte) Johnson

LITERATURE
Miss Marguerite Thomas

LULA B. UPCHURCH MEMORIAL SHELL COLLECTION

Dr. John H. Ferguson, chairman
Jack Upchurch
Bill Hammnett

MEMBERSHIP
Mrs. C. W. (Janet) Truckner

North Carolina Shell Club

Financial Report

May 25, 1973 - September 22, 1973

Balance on Hand	$ 342.44	
Deposits	30.00	
Balance on Hand		$ 372.44
Disbursements:		
Shell Cases - Mrs. Nancy Sherk	$ 155.54	
Postage Stamps	16.00	
Total Disbursements		$ 171.54
Balance on Hand		$ 200.90
Check Book Balance	$ 191.15	
Cash on Hand	9.75	
Balance Check Book	$ 200.90	
Savings Account as of September 22	$ 1,306.42	

Respectfully submitted

Mrs. Janet Truckner, Treas.

NORTH CAROLINA SHELL CLUB ACTIVITIES

From Winter 1971 through Summer 1973

By: Cornelia McInnes, Recording Secretary

1971 WINTER MEETING was held November 12 - 14, 1971 at the Chesterfield Inn, Myrtle Beach, S. C. The 42 members attending enjoyed the meeting, perhaps even more than past meetings there, realizing that this might be one of the last held at The Chesterfield since it has become increasingly difficult to get reservations there in the Spring and Fall due to the competition of Canadian golfers. And so it was with enthusiasm, coupled with nostalgia, that members trekked to the "rocks" a few blocks south of the Inn--and some to the beaches north of Myrtle and some south to Pawley's Island. And before going home on Sunday, a number of members revisited Brookgreen Gardens with Paul and Gennie Jennewein where there are several statues by Paul's father, the most recent of which is "Don Quiote."

At the business meeting on Saturday, Dick Petit, well known shell dealer of Ocean Drive, S. C., spoke on current molluscan literature. The following officers for 1972 were elected: President, Walter G. Lowry; Vice President, Dr. Douglas A. Wolfe; Secretary, Mrs. Cornelia G. McInnes; and Treasurer, Mrs. Carl (Janet) Truckner.

1972 SPRING MEETING was held March 10 - 12 at Wrightsville Beach with the Ocean View Motel as headquarters. The Friday evening program featured a "SHELLECTURE" entitled "A Mud Flat Medley," a slide show about a collecting trip off Sanibel Island. This was followed by a shell auction. An estuarine collecting trip was held on Saturday. That evening at the business meeting, Dr. Doug Wolfe submitted the new club constitution. After some discussion on the advisability of changing the amount of time allowed a delinquent member to pay dues, the club decided to provide one year's grace instead of three. Approval with the change was unanimous.

President Walter Lowry announced that he was resigning as Club President since he had accepted a position in Georgia. Dr. Doug Wolfe was elevated to succeed him as President.

The program was two-fold, with Dr. Ferguson presenting a systematics discussion on "Arks and Bittersweet Clams," and Dr. Rowland Shelley of the N. C. State Museum of Natural History speaking on "Rare and Endangered Mollusks of North Carolina." The meeting closed with a standing round of applause for retiring president Walter Lowry.

1972 SUMMER MEETING was held June 9 - 10 at Morehead City, with evening meetings being held at UNC's Institute of Marine Sciences. On Friday evening these members gave short talks on their experiences with salt-water acquariums: Harriet Riggs and Diane Truckner.

On Saturday there were two field trips--one to mud flats led by Dr. Wolfe an abortive trip led by Paul Jennewein reported elsewhere in this Bulletin by Paul himself. At the business meeting, after reports on those two field trips by Doug and Paul, Carl Truckner was elected vice president succeeding Dr. Wolfe who had been elevated to President. A report was read from Dorothy Beetle on May 13 field trip to fossil pits and fresh water locations near Newport News, Va. Pete Parker, a zoologist on the TEKTITE 1970 project, spoke to the club on that project using color slides to illustrate and also on the subject of skin diving.

1972 FALL MEETING was held September 22 - 23 at Yaupon Beach. Most members stayed at the Ocean Front Motel and meetings were held in the nearby Seafood Platter Restaurant. The Friday night meeting was attended by 56 members and guests. President Wolfe showed slides of various shells which he invited members to identify. He received enthusiastic but not always accurate responses. Hugh Porter showed both his and Paul Jennewein's slides of the Galveston, Texas AMU meeting.

Findings were slim on the Saturday field trip to the South end of Long Beach. At the evening business meeting, Carl and Janet Truckner wore lapel buttons bearing a photo of a Scotch Bonnet and the words "N. C. Shell Club" and said they could get a large supply made up to be sold for the club at a nominal charge. They were asked by the club to proceed to do so. Aaron Padgett of CP & L in Raleigh spoke on the environmental aspects of the company's planned Brunswick County Nuclear Plant. A shell auction brought $62.25. Carl Truckner was auctioneer.

WINTER MEETING was postponed until Saturday, January 20, 1973, and featured the Club's Second Shell Show which is described in detail elsewhere in this Bulletin.

1973 SPRING MEETING was held at the Islander Motel on Emerald Isle on March 2 - 3, with 81 attending. At the Friday night meeting Hugh Porter showed a movie he made of scallop harvesting. A shell auction, with Jim Wadsworth as auctioneer, netted the club $86.00.

On Saturday, a few hearty members braved the foul weather to accompany Jimmy and Harriet Riggs on a boat trip to collect in Bogue Sound. Specimens found on that trip were on display at the evening meeting which followed a buffet dinner. President Wolfe reported that Jim Tyler, N. C. Wildlife Resources, had invited the club to hold a shell show at the October State Fair in Raleigh. After discussion, the club approved the idea of a display-type, non-competitive exhibit. Dr. Dave Frame, National Marine Fisheries Service, Beaufort, gave a slide-illustrated program on "New England Shell Collecting."

1973 SUMMER MEETING was held at Wrightsville Beach. The Silver Gull was the headquarters motel and meetings were held in the "Little Chapel on the Boardwalk." Dr. Mike Heeb, biochemist at UNC's Wilmington Institute for Biomedical Research, spoke Friday night on his research activities on chemoreception.

On Saturday there was no organized field trip but some members went on their own expeditions. At the evening business meeting President Wolfe announced the following committee to develop an educational display of North Carolina shells to be shown for the first time at the State Fair in Raleigh in October: Nancy Sherk, Chairman, Marguerite Thomas, George Crumpler, and David Weed. The display is to be a permanent one which can be exhibited later at other places. Nancy told the club of some of her plans for the display, emphasizing that she would like for the exhibition to be a club project and asked that members contribute shells. Dr. Ferguson gave the second part of his workshop on the super-family, CERITHEACEA, illustrated with color slides and also the actual shells.

FIELD TRIP OF June 20, 1972 - Comparison Study

By Paul Jennewein

The field trip scheduled on June 10 in the Morehead City general area was designed as a comparison of habitats of mollusks.

Dr. Douglas A. Wolfe headed one group that went by boat to an area on Shackelford Banks. Dr. Hugh J. Porter headed another group of Shell Club enthusiasts who were to go by boat to another island near the inland waterway behind Bogue Banks about 30 miles from the Shackelford Banks area.

Both groups were to proceed in the same fashion. The area to be investigated was ruled off in sections like a grid. Each cube of muck from various points on the grid was to be strained until mollusks were found. The mollusks were to be identified and counted. Dr. Wolfe's group of mud slingers found 24 snails and clams on 32 tenths of Shackelford Banks acreage. Most frequent mollusk was Nassaria vibex. Others were Tellina versicolor, Anachis mitrella, Pyramidilla crenulata, Corbula and Mercenaria.

While Wolfe's students were busily sorting mud chunks along came a torrential rain and caught them without cover (the boat having been arranged on a temporary schedule, due to pick them up later.) The rain dampened most of the remaining enthusiasm for the trip.

Meanwhile, Dr. Porter's crew was perhaps a bit more fortunate in one sense. Arrangements had been made to meet at a rickety dock on the waterway, students being led by car to the dock by an associate of Dr. Porter. Dr. Porter and Paul Jennewein were to take a boat and all the straining equipment to the dock, take on board the other bunch and move to the designated island across the waterway.

Getting away from the dock with the wind and tide against them was the first feat of the daring duo. Jennewein fortunately took along a six-pack in a cooler and was looking forward to the trip. Dr. Porter knew approximately where to go, but not exactly how to get there. The trip east from the Marine Sciences lab dock called on virtually all their navigational skill. Luckily, the engine worked. That is, until it ran aground. This developed when Dr.Porter sighted the dock and headed right for it.

"Scrunch " the boat went as it grounded a few feet away from the inland waterway. Putting the engine in reverse didn't help much. It created a big cloud of muck, but the boat didn't budge. Putting over the oar showed there was about two and a half feet of water under the boat.

"I'll be the hero," said Jennewein and jumped overboard. He shoved and the boat was floated back to the main channel.

Dr. Porter cruised slowly in the deeper channel of the waterway to a point more nearly across from the dock. Those on the dock spotted the boat and began frantically waving, thinking that those knuckleheads out in the boat were going right by.

There was something of a channel from the waterway to the dock, but there were a few places where Jennewein had to jump out and bird-dog the best channel away from high ground. And not too infrequently, both Dr. Porter and Jennewein were out of the boat pushing. Finally, the boat reached a section of deeper water just a few score feet from the dock and cruised slowly the remainder of the way to it.

Meanwhile, the tide ebbed.

Sixteen people, pails, coolers, raincoats, rakes and shovels rained into the boat. The launch's waterline got higher and higher. And the engine wouldn't crank.

"We're on the bottom," some perceptive witness announced.

Up went half the crew. The boat moved about 20 feet toward the waterway and bumped into higher ground. Sadly, the director of this team announced he didn't think there was any point of pushing the boat over the mud flats to the channel, especially with the tide having to drop another hour.

This was the fortunate part. Over toward the east, a large thunderhead was forming and sky got blacker and blacker. The 16 or so would-be investigators scrambled up the dock as soon as the boat was within jumping distance. All were under cover when the storm broke.

Jennewein even had the forethought to rescue the six-pack and pass a few out before it got to raining good and hard. The day wasn't entirely lost, even though Group B could have found a whole lot more shells by staying at the lab.

THE SECOND SHELL SHOW
OF THE N. C. SHELL CLUB
By: Cornelia McInnes

The second Shell Show of the N. C. Shell Club was held on January 20, 1973, at the N. C. Museum of Natural History in Raleigh and was open to the public from 9:30 until 5:00. There were 43 entries in 56 cases.

Mastermind and executor of the Show was Hugh Porter of Morehead City, a former club president, who served as Show Chairman. Some of the members who assisted him in various ways were Charlotte Johnson, Ann Yelvington, Jim Wadsworth, Carl and Janet Truckner, Doug Wolfe, and Roland Shelley.

The exhibits were judged by Dr. Ann McCrary, a member of the zoology faculty at UNC-Wilmington; Dick Petit, well-known shell authority and former shell dealer of Ocean Drive, S. C.; and Eugene T. Upchurch, Curator of Education at the N. C. Museum of Natural History.

The entry of Hugh and Pinky Porter containing three cases of shells in the Family CASSIDIDAE won the award for the Best Overall Exhibit. This impressive display contained a large variety of excellent specimens (including Helmet, Bonnet and Morum shells) from all over the world and were displayed by area, such as North Pacific, South Pacific, West Indies.

Shell of the Show award was won by Cornelia McInnes for a large and lovely specimen of Tegurium (formerly Xenophora) longleyi Bartsch, which had been dredged in deep water off the coast of Key West, Fla.

The judgesawarded ribbons for first, second, and sometimes third place in the various categories, as follows:

NORTH CAROLINA SHELLS: First Place was won by Harriet Riggs for an exceptional exhibit containing two cases of self-collected shells, many rare, most of which had been dredged by Scallop boats off Emerald Isle. Second Place was won by Janet and Carl Truckner for their exhibit of excellent specimens of self-collected shells, many of which also were dredged by Scallop boats.

REGIONAL COLLECTION: First Place was won by Dr. Douglas Wolfe for an attractive and educational exhibit containing two cases of freshwater mussels belonging to UNIONIDAE, all of which he had collected in the Atlantic Coastal Plain --from North Carolina to Georgia.

Second Place was won by Cornelia McInnes for an exhibit of shells from the "Florida Keys and the Surrounding Seas," over half of which were self-collected. This is the exhibit which contained the Shell of the Show.

Third Place was won by Harriet Riggs for an exhibit of CYMATIIDAE specimens dredged by Scallop boats from North Carolina to Florida.

FAMILY OR GENUS COLLECTION: First Place was won by Hugh and Pinky Porter's exhibit of CASSIDIDAE which was described above as Best Exhibit of Show. Second Place was won by Charlotte Johnson for her collection of worldwide Pectens.

SPECIALIZED COLLECTION: First Place was won by Harriet Riggs for a colorful display of small Lyropecten nodosus Linne (Lion's Paws), showing variability of color this shell exhibits. She had found the shells in a decaying condition shortly after they had been dredged. This exhibit looked like a true work of art with the shells of varying shades of deep red, yellow, orange, amber and brown, displayed on a background of deep red velveteen. Pretty enough to be shown in the National Georgraphic, as Pinky Porter so aptly said.

Second Place was won by Marguerite Thomas for her display of Iceland Scallops, Clamys islandica Muller. These shells also showed variability of color--delicate pastel shades. These live-taken shells were given to Marguerite by a friend in Iceland.

MINATURES: First Place was won by Nancy Wolfe for her exhibit of self-collected minatures from the beaches of Puerto Rico, displayed and labelled in a very attractive manner.

Second Place was won by Bruce Huffaker for his exhibit of tiny shells from South Florida beaches, 90% self-collected.

Third Place was won by Harriet Riggs for her exhibit of self-collected minatures, dredged from off-shore Emerald Isle.

JUNIOR COLLECTION: First Place was won by Mary Elizabeth Sherk for her exhibit containing three large cases of North Carolina shells which she and her mother collected. Second place was won by Diane and Jimmy Truckner for their exhibit of self-collected North Carolina shells. Third Place was won by Cynthia Wolfe for her exhibit of Worldwide shells.

SHELLCRAFT: First Place was won by Mrs. Ralph Lawrence. Second place and Third place were won by Mrs. K. B. Watson.

Needless to say, these award-winning exhibits contributed to the success of the Show. But also contributing much, not only to the success of the Show, but also to the enjoyment of spectators--both members and the public-- were the exhibits which did not receive ribbons, many of which were extremely interesting and very fine exhibits.

That evening sixty-five members met at the College Inn Restaurant for a social hour followed by a dinner and a program. Following the dinner, Dr. Wolfe presented engraved silver bowls to Hugh Porter for "Best Exhibit of Show" and to Cornelia McInnes for "Best Shell of Show."

Dr. John Ferguson presented a paper he had written on "North Carolina Sea Shells," illustrated with color slides taken by Dr. Jack Upchurch. This program, developed as a teaching tool for students and novices, presents a clear resume of all classes of Mollusks, along with clues on collecting and identifying. It has been made available to the N. C. Museum of Natural History.

THE BIVALVES - Part II: Arks, Bittersweets, and Limopsis Clams

Dr. John H. Ferguson, Chapel Hill

Part I of a series of talks to the N. C. Shell Club on BIVALVES was published in the North Carolina Shell Club Bulletin No. 6, pp. 13 - 18, Nov. 1971. It consisted of an Introduction, followed by systematic coverage of SUPER-FAMILIES: (I) NUCULACEA (the Nut Clams); (II) NUCULANACEA (the Little Nut Clams); and (III) SOLEMYACEA (the Awning Clams). H. E. Vokes' 1967 'Genera of the Bivalvia', with our own numberings of the categories, is used for the systematics (or taxonomy).

Omitting four FOSSIL Super-Families, we now turn to SUPER-FAMILY (VIII): ARCACEA, for the Arks and their relatives. We'll ignore a FOSSIL Family (17) and we'll reshuffle the systematic sequence of the next three families, in order first to take up FAMILY (19): ARCIDAE and its subfamily: ARCINAE, based on Genus: Arca, of Linnaeus, 1758, with the strict type-species Arca (Arca) noae Linnaeus, the Noah's Ark Shell, from the Mediterranean. Very close to this is Arca (Arca) zebra Swainson, the Zebra Ark or Turkey-Wing. This shell is occasionally found in North Carolina but it is much more common in Florida and the West Indies. So great, in fact, is its similarity to the Noah's Ark, that they were long thought to be the same species. Thus, in Julia Rogers' popular old Shell Book, the specified habitat of A. noae was given as 'North Carolina to the West Indies', as well as the Mediterranean. Then, without mentioning it in the text, she used A. zebra for her photographic illustration. A. (A.) zebra grows up to 2 or 3 inches long and is about half as wide. In life, as in all Arks, there is an outer covering formed by the fairly dense, hairy periostracum. It is common also to find a heavy coating of chalky marine growth, attached sea-weeds, etc. When the surface of the Turkey-Wing (or the Noah's Ark) is cleaned off, there is seen to be a pretty pattern of radiating riblets and the typical red-brown zebra-like stripes, which brighten the drab-white background color. The hinge-line is nearly straight and it is beset with numberous small, similarly-arranged (or 'taxodont') hinge-teeth, below the conchiolin ligament. Although there is a wide, flat, so-called ligamental area, the ligament itself is thin and inconspicuous. The umbo (or beak) projects upward and faces its counterpart, on the opposite valve, about one-third of the way from the anterior (or front) end. The live mollusk forms a short, strong, shiny, olive-green byssus, which emerges from the ventral (or lower) shell margin, near the middle, via an elongated opening called the byssal notch. In the living animal, along the middle fold of the mantle edge, there are a series of little eye-spots (or ocelli), which are relatively simple sense organs, mostly responding just to light intensity. Since there are more complex eye structures, perhaps able to distinguish light patterns, in many larval forms of Arca species, this fact may supplement other evidence to suggest that our modern Arks may have regressed to some extent during their evolution from earlier ancestral forms.

Arca (Arca) imbricata Bruguière (long known by Lamarck's later synonym A. 'umbonata') is popularly called the Mossy Ark, because of its particularly dense periostrcum. A.imbricata grows to an inch or so shorter than the largest A. zebra, and it lacks the zebra-like markings. It is also more swollen than the typical Turkey-Wing, and its byssal notch is very wide and conspicuous. Some Indo-Pacific (especially Japanese) Arks, which are close relatives of the species we've been considering, are: (a) A. (A.) navicularis Bruguière, the Boat Ark; (b) A. (A.) boucardi Jousseaume, the Boucard Ark; and (c) A. (A.) ventricosa Lamarck, the Swollen Ark.

Genus: Barbatia Gray, 1842, is based on the strict type-species, Barbatia Barbatia) barbata Linnaeus, the Mediterranean Bearded Ark. Another species, Barbatia (Barbatia) candida (Helbling), the White-Bearded Ark, occurs from N. Carolina down to Brazil. This shell is 1 to 2 inches long, and with many concentric growth lines crossing the radiating riblets, so as to give a cancellate (or cross-barred) appearance to the shell surface, under the brown periostracum, which is typically longer and somewhat beard-like at the posterior (or rear) end. Barbatia (Barbatia) cancellata, the Red-Brown Ark, is larger than the White-Bearded Ark, and it is easily distinguished by its color. It does not reach up to N. Carolina, but is to be found in Florida and the Caribbean area. One of a great many Indo-Pacific Barbatias is Barbatia (Barbatia) lima (Reeve), which we found to be abundant in Tahiti. In a Japanese sub-genus is Barbatia (Barbatirus) cometa (Reeve); and another relative, which is rarely dredged in the deeper waters of the Japan Sea, is Barbatia (Bentharca) xenophoricola (Kuroda). Barbatia (Acar) plicata (Dillwyn), the Folded Ark, also comes from Japan and elsewhere in the Pacific. In the same Acar subgenus (?genus) is Barbatia (Acar) domingensis (Lamarck), which we encounter in North Carolina and as far South as the Lesser Antilles. This little shell, popularly called the White Miniature Ark is 1/2 to 3/4 in. long. It can be distinguished from the Adams' Ark (see later) by having a long, narrow ligament behind the beaks, typically, (instead of a small triangular ligament between the umbones). B. (A.)domingensis is close to a tiny Californian species, Barbatia (Acar)bailyi Bartsch, Baily's Miniature Ark. This is only 1/2 inch long and it is rather fat and squarish, but again with the usual cancellate sculpture. From S. Florida and the Caribbean comes Doc Bales' Ark, Barbatia (Fulgeria) tenera C. B. Adams. It reaches 1 to 1 1/2 inches length and the shell is thin, white, rather fat and evenly trapezoidal, with numerous fine, thread-like, evenly-spaced riblets. It has a thin, brown periostracum. The popular name comes from a later synonym, B.'balesi', of Pilsbry and McLean. Barbatia (Ustularca) bicolorata (Dillwyn), the two-colored Ark, is a pretty brown and white Indo-Pacific species, of which we have single valves (beach specimens) from Saipan and from Ceylon.

From the many other Arcinae genera, we'll just select Irisidos (Trisidos) Tortuosa (Linnaeus), the Twisted Ark of the Indo-Pacific, which is readily identified by its unique twisted shape. There is also a Japanese sub-species, T. (T.) Tortuosa kiyonoi (Mikayama).

The Ark Subfamily: Anadarinae includes most of the larger Arks which are common on our Carolina beaches and elsewhere. Genus: Anadara Gray, 1847, was based on Anadara (Anadara) antiquata (Limmaeus), whose original type-location is unknown, but it is now recognized in the N. W. Pacific, extending down to the Philippines. A closely similar Australian species is Anadara (Anadara) trapezia (Deshayes). Locally it is mis-called the 'Sydney Cockle'. (Actually, true 'Cockles' belong to the quite different Family (130): Cardiidae).Anadara (Anadara) tuberculosa (Sowerby), the Knobby Ark, is another close relative, from the Panamic region of the Central East Pacific, extending from Baja California to Peru.

In 1935, Reinhart proposed a sub-genus Larkinia for certain FOSSILS from the Tumbez Beds of Peru and Ecuador, with the type species Anadara (Larkinia) larkini (Nelson). This sub-group also includes Anadara (Larkinia) lienosa (Say) which is a common FOSSIL in the Carolinas. From this particular fossil has evolved a similar recent sub-species, Anadara(Larkinia), lienosa floridana (Conrad), commonly called the Cut-ribbed Ark. The name 'cut-ribbed' arises from the fact that the squarish radial ribs are typically grooved by a fine-cut line. These ribs number 30 to 38 and they may be weakly double-beaded. Between them run some fine concentric lines. The fresh shell has a thick, dark-brown periostracum. While occasional valves of this shell may be found on our Carolina beaches, the best specimens can be live-dredged offshore, and good shells may be picked up in the scallop shell-pile-discards, where these shellfish are processed commercially. It is fairly common in Florida.

Anadara (Larkinia, or 'Sectiarca') transversa (Say), the Transverse Ark is 1/2 to 1 1/2 inch long and is the smallest of our S. E. Coast Anadaras. Its left valve rather noticeably overlaps the right valve, and the 30 to 35 ribs are beaded only on the left side. The hinge-ligament is fairly long, narrow,

and roughly pustulose (pimpled). The periostracum is grayish-brown. On Sanibel I., Florida, there is an ecological variant with a pretty pink-tinged interior.

Anadara (Caloosarca) notabilis (Röding), the Eared Ark ranges from Florida to the Caribbean and N. Brazil. It is a sturdy shell, with 25 to 27 heavy, grooved ribs, which are crossed by fine concentric lines. The ends of the top (dorsal region) of the valves form a prominent wing, or ear, in young specimens. Anadara (Lunarca) ovalis Bruguière (whose name has several synonyms), is popularly called the Blood Ark and this is appropriate because the live mollusk actually has red blood, containing hemoglobin, much like that of human blood, but quite unusual in mollusks. The oval shape (not triangular) and the dark brown (not black) periostracum help to differentiate between the Blood Ark and the fairly similar Ponderous Ark (see later), which is found in same localities, from Cape Cod, Mass., all along our Eastern Coast to the Gulf States, and thence to the West Indies. A. (A.) ovalis has a long sturdy shell with 26 to 35 squarish ribs, which are separated by narrow grooves. The beaks almost touch each other across the narrow ligamental area (whereas, in the Eared Ark (see above), this area is wider and the umbones farther apart). Single valves of the Blood Ark are exceedingly common on our Carolina beaches and good, fresh pairs are not hard to find. Anadara (Cunearca) brasiliana (Lamarck) is popularly called the Incongruous Ark (after a later synonym: A, 'incongrua'(Say)). It ranges from N. Carolina to Brazil. This shell is 1 to 2 1/2 inch long and almost equally high. The beaks face each other near the center of the transversely-striated ligamental area. The left valve overlaps the right valve to a noticeable degree. There are 26 to 28 squarish ribs with strong bar-like beadings. The periostracum is thin and light-brown in color. Anadara (Cunearca) chemnitzi (Philippi), Chemnitz's Ark, is a related species, mostly found from the Greater Artilles to Brazil, but occasionally occuring round the Gulf of Mexico from Texas to West Florida. Its shell is smaller, up to 1 inch long, and thinner, with the beaks slightly in front of the ligamental area. Some Pacific Anadaras are: (a) Anadara (Scapharca) broughtoni (Schrenck), from Japan, (b) Anadara (A. or 'Diluvarca') tricenicosta (Nyst), from Japan; (c) Anadara (Tegillarca) granosa (Linnaeus), var. bisenensis (Schrench and Reinhart), from Hong Kong; and Anadara (Potiarca) pilula (Reeve) var. saccula Iredale, from Queensland, Australia. These are only some examples of the many subgenera and species of Anadara on a worldwide basis.

Genus: Senilia Gray, 1840, is for an unusual Anadara-like Ark from West Africa with the appropriate name Senilia senilis (Linnaeus), the Senile Ark.

Subfamily: Litharcinae is based on genus: Litharca Gray, 1842, whose type-species is Litharca lithodomus (Sowerby), the Rock-dwelling Ark, which is an exceedingly rare shell dreged off the shores of Peru and Ecuador, and, on one occasion, off Panama.

Since Stewart (1930), a number of Arks have been put into a separate FAMILY (20): NOETIIDAE. Its first subfamily: Noetiinae is based on Genus: Noetia Gray, 1857 (not 1860), which was created for those Arks with a deep, triangular shape. the strick type-species, Noetia (Noetia) reversa (Sowerby), (with synonym: N. (N.) triangularis' Gray). The Reverse Triangular Ark, is Panamic, ranging down the E. Pacific coast of the Americas from the Gulf of California to Peru. Our very common Carolina species, ranging from Virginia to the Florida Keys, is Noetia (Eontia) ponderosa (Say), the Ponderous Ark. Its surface sculpture shows 27 to 31 ribs, each divided by a fine-cut line. The Ponderous Ark has a massive, inflated, triangular shape, and, in life, it is covered by a thick, velvety, blackish periostracum, which is definitely darker than that of the Blood Ark (see earlier). with which it should not be confused. Both these arks actually have red hemoglobin in their blood.

A second Noetiid Subfamily: Striarcinae is based on the FOSSIL Genus: Striarca Conrad, 1862, with the strick-type species, Striarca (Striarca) centenaria (Say). A recent form, Striarca (Galactella) lactea (Linnaeus), the Milky Ark, is common on the coasts of Great Britain and Europe. Its milky-white color is hidden in life by a brownish velvety periostracum. The valves are of equal size and reach 3/4 to 1 inch in length. It lives in rock crevices

or inside old shells to which it is attached by a stout byssus. The Milky Ark used to be considered as a 'Barbatia'. Also in the Striarcinae is Genus: Arcopsis, which Koenen (1885) set up for certain FOSSILS. A well known recent representative (see earlier) is Arcopsis adamsi 'Shuttleworth', Dall, Adams' Miniature Ark, which ranges from N. Carolina to Brazil. It is only 1/4 to 1/3 inchs long and is white or creamy in color. The shape is oblong and rather fat, but with somewhat flattened sides. The striate, cancellate surface is covered with a very thin periostracum. The ligament is triangular and is more anteriorly located than is the slender, elongated, posteriorly-located ligament of Barbatia (Acar) domingensis, as we previously noted.

We now return to FAMILY (18): CUCULLAEIDAE, for the Cowl Shells, including many FOSSIL genera, which in Evolution, seem to have preceded the Arks. Genus: Cucullaea Lamarck, 1801, however, is based on the recent type-species Cucullaea labiata (Solander), with syn.= C. 'concamerata' 'Martini,' Bruguière. This is the great Australian Cowl Shell, of which there is also a Japanese variant, Cucullaea labiata granulosa (Jonas). The Cowl shells are smooth and brown and are much larger than most of the Arks. Their shape is rounded rhomboidal and very much inflated.

SUPER-FAMILY (IX): LIMOPSACEA follows (VIII): ARCACEA, but before considering its name FAMILY (22): LIMOPSIDAE, we'll first present the phylogenetically older FAMILY (21): GLYCYMERIDAE, the Bittersweets. Genus: Glycymeris Da Costa, 1778 (Syn.: 'Pectunculus' Lamarck, 1799) is based on the strict type species Glycymeris (Glycymeris) glycymeris (Linnaeus), the European Bittersweet, which the English call the Comb Shell or Dog 'Cockle'. Unaware of the prior Linnaean name, Da Costa called it G.'orbicularis' (=Syn.), which does indicate its rounded shape. In fact, with the umbones, or central beaks, mostly facing each other, and with the two valves of equal size and also equilateral (that is, as much in front as behind the beaks), it is often difficult to orient a Bittersweet shell and to tell the right valve from the left. It helps when the posterior adductor muscle scar has a slight flange around it and is smaller than the anterior adductor scar. In the living animal, of course, there's more to go on, such as the foot protruding forward from the ventral margin and, especially, the siphons located in the rear. In contrast to many other bivalves, however, the siphons do not make any pallial sinus, but the mantle edge just runs along close to the ventral margin in a simple pallial line, which joins the two adductor muscle scars. A fluting, or crenulation, of the ventral margin corresponds to the external sculpture of the radial ribs but in some species these ribs are poorly developed, resulting in a fairly smooth shell surface. Beneath the brown, velvety periostracum, the surface of most bittersweets is brownish and usually in uneven splotchy patches. The ligamental (or cardinal) area on the upper (dorsal) surface is triangular and extends for about the same distance in front of as well as behind the umbones. Its chevron-shaped grooves hold the external ligament stretching on both sides of the beak. This is not like a typical bivalve in which the external ligament is limited to the posterior region, where it often occupies a depression called the escutcheon, as we mentioned in our (cited) Introductory Lecture. Another point is that the whole hinge plate in Bittersweets is arched, to round off the top of the shell. It is also quite thick and is provided with a double series of grooves, which make the similarly-ordered (or taxodont) hinge teeth. The outer teeth are more horizontal and bend in a chevron-like manner, whereas the inner teeth are more vertical and tend to disappear toward the center in older shells.

Glycymeris (Glycymeris) americana (Defrance,) the Giant American (Atlantic) Bittersweet, from our Carolina coast, is somewhat compressed and it can reach 5 inches across. Under the thick, brown periostracum, the shell surface has only weak markings. This is not a common shell nowadays, but good specimens are available from the offshore Scallop dredgings and some large beds have recently been found. Occasional single valves are washed up on the beach, especially on Cape Lookout. Its habitat ranges from N. Carolina to N. Florida and

Texas. This shell was much more common some 5 to 15 million years ago, to judge from its abundance among the Pliocene and Miocene Fossils of the Cape Fear River and the Lumber River basins.
Glycymeris (Glycymeris) undata (Linnaeus) is the ordinary Atlantic Bittersweet, which reaches only 2 inches in length. It is relatively heavy and is marked with numerous, fine, barely-discernible, radial scratches, separated by whitish lines and crossed by microscopic concentric grooves. The surface shows bold splotches of nut-brown,and the white interior may be stained with brown in some cases. Glycymeris (Glycymeris) spectralis Nicol, the Spectral Bittersweet, is still smaller, up to 1 inch, and with the beaks slightly facing the rear. Its color is an almost uniform light-brown. Glycymeris (Glycymeris) pectinata (Gmelin), the American Comb Bittersweet, is a fourth Carolina species, which also extends to Florida and the West Indies. It is only 1/2 to 1 inch across and has 20 to 40 smooth radial ribs. Its color is grayish-white and splotched with purplish-brown. It is particularly common in shallow water on the Florida Keys. Glycymeris (?Glycymerella') decussata (Linnaeus), the Decussate Bittersweet, occurs in S. E. Florida and in the Caribbean area down to N. Brazil. This species is also represented by FOSSIL specimens, which are particularly abundant in the Caloosahatchie Marl Pliocene near LaBelle, Florida. It reaches nearly 2 inches in size and is close to circular shape, with the left valve (especially) a bit larger posteriorly. The next unusual feature is that the external ligament is typically limited to the hinge in fron of the umbones. (As stated earlier, most bivalves have the external ligament behind the beaks.) It was this peculiar feature which led Woodring (1925) to suggest a separate subgenus 'Glycymerella', but recent workers point out that there are intergrades, so that it is not a reliable feature for name-splitting.

Some illustrative Bittersweets from other parts of the world include: (a) Glycymeris (Glycymeris) gigantea (Reeve), the Giant (Pacific) Bittersweet, from the Gulf of California. It can reach up to 4 inches across but this hardly rivals the (5 inch) Giant Atlantic (or American)Bittersweet. G. gigantea shows very colorful markings when the periostracum is removed. (b) Glycymeris (Glycymeris) multicostata (Sowerby), the Many-ribbed Bittersweet, comes from the Panamic Region of W. Central America. (c) Glycymeris (Glycymeris) vestita (Dunker), the Clothed Bittersweet, comes from Japan; as does yet another species (d) Glycymeris (Glycymeris) imperialis (Kuroda), the Emperor's Bittersweet. (e) Glycymeris (Glycymeris) scripta (Lamarck), the Lettered Bittersweet, is from Ceylon. (f) Glycymeris (G.Veletuceta') albolineata Lischke, the White-lined Bittersweet, is one of the largest species from Japan. Tom Iredale's (1921) attempt to create the subgenus: 'Veletuceta' is rejected by most recent works as unnecessary, whereas another of his (subgenic) suggestions 'Tuceta' is also rejected, but, in this case, because of a prior valid use of the senior synonym 'Axinaea' by Poli (1791). Iredale's 'Tucetona' however, is 'available' to the name-splitters, and it may be illustrated by two species, namely, (a) Glycymeris (Tucetona)pectunculus (Linnaeus), the East Indian Comb Bittersweet, and (b) Glycymeris (Tucetona) auriflua (Reeve), the Flowing-gold Bittersweet of Japan and the Indo-Pacific.
Returning to FAMILY (22): LIMOPSIDAE (from which SUPER-FAMILY (IX): LIMOPSAEA gets it name), these terms are based on Genus: Limopsis Sassi, 1827, orginally used for a Tertiary Italian FOSSIL, Limopsis (Limopsis) aurita & Brocchi, the Eared Limopsis. It has since been learned that this little bivalve has survived into recent times in the deeper waters of the Mediterranean and particularly in the neighboring N. E. Atlantic, including waters off the North of Scotland in about 85 fathoms. I have a rare shell find in just one valve of the Eared Limposis, which was washed ashore at Birsay in the Orkney Islands. Limopsis Clams have a typical taxodont hinge, resembling that in the Bittersweets, but they are easily identified as a group because of their oblique oval shape and the heavily-tufted, gray-green periostracum. They only occur in deep ocean waters, so are seldom found as beach specimens. They are fairly small in size. Tucker Abbott says there are about six species off our Atlantic (N.W.) coast and about four off the (N. E.) Pacific coast of the U. S. A. Limopsis

(Limopsis) sulcata Verrill and Bush, the Grooved (or Sulcate) Limopsis, is perhaps the commonest of our Atlantic species, particularly dredged in the Gulf of Mexico. It is about 1/2 inch long and is very oblique, with prominent round ribs, which are finely cut on the upper edge by short radial grooves. The inner margins of both valves are smooth. The exposed shell surface is dull-white in color, but in live-dredged specimens this is covered completely by the thick, tufted, greenish-gray periostracum, which extends well beyond the ventral (lower) edge of the shell. Limopsis (Limopsis) minuta Philippi The Tiny Limopsis, ranges from Newfoundland to both sides of Florida, offshore. As the name indicates, it is a very small species. Illustrative of worldwide distribution, we may just mention: (a) Limopsis (Limopsis) tajimae Sowerby and (b) Limopsis (Oblimopa) forskali A. Adams, both of which come from the Japan Sea.

There are two or three more Families in SUPER-FAMILY: LIMOPSACEA, but, since they are rarely to be seen outside the museum collections, we'll just give them a very brief mention.
FAMILY(23): PHILOBRYIDAE Bernard 1897, contains several genera and subgenera of rare vivalves, based on the type-species Philobrya (Philobrya) setosa (Carpenter)
FAMILY (24): ? MANZANELLIDAE† CHRONIC, 1952, is for the Fossil Genus: Manzanella† Girty 1909.
FAMILY (25): ? NUCINELLIDAE Vokes 1956, is questionably included in the LIMOPSACEA. It contains about half a dozen genera and sub-genera, with the Genus: Nucinella Searles-Wood 1857, orginally based on an English Crag FOSSIL Nucinella (Nucinella) ovalis† S. Wood. This minute shell gives some evidence of an external ligament, suggestive of a Limopsis. There are also some recent species in this shell group, but we, as amateurs, may well leave the details to the professional malacologists and the curators of the museums. However, without attempting real competence, we can readily learn enough to appreciate the basic systematics which goes into the namings in a shell family.

Ed. note, †
"Arrow" superscript denotes FOSSIL!

A SHELLER'S PRAYER

Walter Lowry

Dear LORD, we thank thee for the beauty of thy creation
For creatures with designs beyond our imagination
For Oceans, reefs, rocky shores, mud flats and beaches
For the beautiful shells within our puny reaches

Help us to overcome our tremendous greed
That we may take only the shells we need
And leave most of your delightful creatures
For others to note their artistic features

We thank thee that some are plentiful and some rare
The harder one is to get the more we seem to care
We thank thee for our insatiable curiosity
And for thy great unlimited generosity

We thank thee for others with whom we can share
The charm of the scallop, the cone, the sea hare,
The cowry, the conch, the auger, the jewel box,
The shells we find on the beach and on the rocks

We thank thee most of all for serenity of the soul
We find on a lonely coast or solitary sandy shoal
Thy goodness and mercy continue without end
Please accept our thanks and humble praise, Amen.

Confusion

By Paul Jennewein

This year 1972 has been a bad year for fisheries along the Atlantic Coast. Source of the trouble is a certain confusion in terms, which in some cases, governmental sources have fostered themselves over the years.

The effect of this confusion came to a head in 1972, significantly. But it is expected to linger.

The source is the misunderstanding of terms. In a broad sense, fish are any animals which live in the sea or in water. Reporting agencies break down this category into finfish and shellfish. The general public can distinguish between the finfish—such as bluefish, trout, mackerel, marlin, or those caught for sport and commercial varieties of menhaden, mullet and shad—and shellfish.

Difficulty comes from the shellfish term. In the broad sense shellfish are thought to be any animal of food value with a shell. Fisheries biologists and those with some scientific learning know of a narrower distinction. These are the reptiles, mollusks and crustaceans. In more common terms, they are the turtles within the reptiles; clams and oysters (and squid), within the mollusks, and crabs, shrimp and lobsters within the crustaceans grouping.

The finfish, reptiles, and crustaceans being higher on the evolutionary ladder are affected differently when it comes to the food they eat. Their digestive system is different from that of the mollusks.

Mollusks are filter feeders. From the water they filter nutrients. Their digestive system acts like a sieve. They retain microbes in their tissues in a living state and these microbes may be harmful to man.

When water becomes polluted—usually with certain bacilli—mollusks (clams, oysters and mussels) will retain these bacilli in a viable, or living state, as long as the water remains polluted.

Eat a clam, oyster or mussel from water which is reported polluted by bacilli-usually as a result of sewage from man or from animal droppings-and you acquire these bacilli which can can cause any number of diseases, depending on the type. The typhoid bacilli are probably the most feared of the lot, although there are others which can cause unpleasant symptoms.

The finfish, crustacean or reptile digestive systems being different from the mollusk, they can eliminate the harmful bacilli. Man has less chance, too, of receiving an infection because of the cooking process required in preparation of these animals.

The North Carolina Division of Commercial and Sports Fisheries of the Department of Natural and Economic Resources, along with the National Marine Fisheries Service, reports mollusks as shellfish, making a distinction only when listing the different species.

When a mid-October announcement was made by the State Board of Health that 105,804 additional acres of North Carolina coastal waters were closed to shellfishing because of pollution, the general public decided that this meant shellfish as they had understood them in general. These were an enormous number of acres of coastal waters. Maybe, they'd better quit eating fish.

One coastal seafood dealer, according to the December publication of the Office of Fisheries and Wildlife, claimed his entire business of selling seafoods had fallen off 50 per cent.

Other seafood dealers reported a similar falling off of business even though some had gone to the trouble of obtaining supplies of oysters and clams from non-affected areas and from South Carolina.

A similar confusion existed also in the waters of Massachusetts, New Hampshire and Maine by the report of the red tide, or a type similar to the red tide's organism, which caused cases of paralytic shellfish poisoning.

While the red tide in this case affected only clams and mussels and the mollusk type of shellfish, the stigma carried over to all seafood. Restaurants found themselves without customers and seafood dealers saw the demand for their products—even lobsters—drop.

Although the outbreak of paralytic mollusk poisoning was a new experience for New England waters, it had been a problem for hundreds of years in other areas of the world. It has been a particularly difficult problem in eastern Canadian waters, where the toxin or poison produced by the organism—identified in this case as Gonyaulux tamarensis—is especially potent. Gonyaulux is a microscopic one-celled animal that flits along in water propelled by two tiny whiplike parts or flagella. In other words, it's a dynoflagellate.

When these animals multiply rapidly, or "bloom" they create the red tide - or it can be green or yellow, depending on the species. Sixty species have been identified, some of which are poisonous in large quantities. Favorable conditions include low salinity, high sunshine, warm water and plenty of nutrients. The heavy rains experienced in New England were blamed last summer for triggering the dynoflagellate explosion.

The dynoflagellates appear normally in plankton, but they are in such small numbers as to be harmless. Seabirds and ducks feeding on the clams which absorb these animals usually die first to signal the start of the blooms. Red tides can kill fish simply by exhausting the oxygen in the water and suffocating them.

It should be emphasized, however, that the danger to man both from pollution and the poison of the dynoflagellates lies in eating mollusks - - not the other types of commonly called shellfish. And government reporting sources should look into making a better distinction between mollusks and the other shellfish, in order that future reports of pollution or the red tide won't have the devastating effect on commercial fishing that it had during the past season.

SHELLFISH, ET AL.								
CRABS, BLUE:								
HARD	1,269,497	101,591	750,036	74,469	25,673,569	2,458,094	22,185,141	2,227,963
SOFT AND PEELER	-	-	-	-	1,531,063	731,349	1,507,423	722,855
LOBSTERS	464	464	183	229	28,088	28,029	21,116	26,426
CLAM MEATS:								
HARD	49,093	21,885	4,599	2,150	260,408	165,886	126,035	64,918
SOFT	300,552	150,276	-	-	5,545,496	2,622,748	1,949,520	1,014,782
SURF	406,110	63,044	340,459	53,053	7,369,174	923,476	6,773,854	1,070,934
CONCH MEATS	4,638	696	5,669	1,618	56,228	8,990	90,940	15,995
OYSTER MEATS, MARKET	3,706,300	2,323,777	3,797,735	2,299,984	13,141,600	8,125,135	13,314,075	8,094,474
SQUID	42	11	47	9	10,875	2,021	4,370	1,030
TERRAPIN, DIAMOND-BACK	750	375	250	125	5,798	2,319	3,545	1,030
TURTLES, SNAPPER	-	-	-	-	34,580	6,112	18,029	3,597
TOTAL SHELLFISH, ET AL.	5,737,446	2,662,119	4,898,978	2,431,657	53,976,899	15,275,099	45,994,042	13,244,024
GRAND TOTAL	6,347,091	2,716,740	5,231,888	2,475,609	69,956,982	16,943,786	59,502,343	14,865,333
OYSTERS, NUMBER OF BUSHELS	MD. BUSHELS 555,294		MD. BUSHELS 562,621		MD. BUSHELS 1,942,518		MD. BUSHELS 1,937,906	

NOTE:--THE CUMULATIVE AND COMPARATIVE MONTHLY DATA MAY INCLUDE REVISIONS. A MARYLAND OYSTER BUSHEL CONTAINS 2,800.7 CUBIC INCHES. ALL WEIGHTS SHOWN ARE IN TERMS OF ROUND (LIVE) WEIGHT, EXCEPT AS NOTED.

JUNIOR MEMBER ON THE LECTURE CIRCUIT

Mary Elizabeth Sherk, aged 12, a Junior Shell Club member has been "talking-up" the fun and rewards of shell collecting.

After the fun, came the rewards. She won her first blue ribbon in October, 1972, at the Dixie Classic Fair. The second came in March, 1973, at the North Carolina Shell Club Show in Raleigh. Her category is, "North Carolina Self-Collected Shells." It presently consists of over 190 specimens and, as she says, "is still growing."

In January, Mary Elizabeth spoke to a garden club in Winston-Salem. She told the members about her interest in serious collecting and the steps necessary to prepare a shell for exhibition. The next month, February, she told her sixth grade class about her hobby, with the aid of slides loaned to her by Dr. John Ferguson and Mr. Jack Upchurch. She gave her class an interesting and informative talk. The reception was so good, in fact, she spent the rest of her morning talking informally to the first thru fifth grades at the request of the teachers.

The talks evolved from a project Mary Elizabeth undertook at the request of the Nature Science Museum in Winston-Salem. She was asked to prepare a shell environmental kit for the museum. The kit, when completed, was to be taken, by a volunteer, to the fifth and sixth grades in the Winston/Salem Forsyth County School System.

Helped by her mother, Mary Elizabeth prepared two black exhibit boxes - 3 feet-by-2 feet. In the first, about 20 specimens were mounted - univalves on the top and bivalves on the bottom, with their scientific names, common names, where found and the date. Among those included are the Scotch Bonnet (our State shell), an Atlantic Distorsio (showing its periostracum), a whelk with its egg case, and several shells with their operculums. In the second box-the top shows diagrams of both a Gastropod and a Bivalve. This box includes loose shells that each student may handle. Also the booklet prepared by Mr. Hugh Porter, "North Carolina Seashells" is included along with forty of the booklets prepared by Shell Oil Company, "Let's Collect Seashells" (one for each student to use).

This kit is accompanied by a set of instructions for the teacher (or volunteers) on how to use the material. There are study questions for each student that provides only the simplest research. The purpose of these questions is to stimulate the student's interest. Mary Elizabeth wrote the following text to accompany the kit:

Sea Shells (Mollusks)

There are many varieties of shells. Did you know that there are more sea shells than any other order of the animal world--except insects? You can find all shapes and sizes of shells by just walking along the seashore.

Mollusks are spineless or invertebrates. Their skeletons are their shells. Long after the animals are dead one can find the shells and they are just as pretty as if you found them alive. They are a monument to the passing beauty of life.

Shells are the product of the limestone-like deposit of the animal living inside. They have glands that control the form, color, and the pattern of the shell. This gland is called a mantel.

The Phylum Mollusca is divided into six classes:

1. Amphineura (chitons)
2. Monoplacophora (gastroverms)
3. Gastropoda (univalves, snails)
4. Pelecypoda (bivalves, clam-like)
5. Scaphopoda (tusk shells)
6. Cephalopoda (octopus, squid)

The two main classes are bivalves and univalves. The bivalves are two shells connected by a hinge or ligament. Univalves are one shell that goes up into a spiral point.

Mollusks are no simple unfeeling creatures. They have a heart, stomach of sorts, a liver and kidneys. Shells breathe through gills just like fish. If they live in mud, they send up a siphon to reach the water. One familiar shell that does this is the coquina which buries itself in the sand along the tide line of the sea.

Mollusks have very delicate senses. Some even have compound eyes like insects. They have a much keener sense of smell than ours. Their touch is distributed all over their bodies and especially in the "foot". (The foot is the basic part of the snail that you see when it is extended from the shell.)

The sexes are usually separate in the mollusks. But some shells are two sexed or hermaphroditic such as the lady slipper which can change from male to female.

You may see a shell moving rapidly across the sand and turn it over to find a reddish crab inside. This is the hermit crab which takes up residence in dead shells to protect itself.

Shelling is a great hobby. Try it sometime!

Prepared by Mary Elizabeth Sherk
Age 11, Grade 6, October 1972

FOSSIL SHELL COLLECTING TRIP
VIRGINIA

The fossil shell collecting trip to Newport News, Virginia on May 13, 1972 drew only 4 hardy souls, Sara McGirt, Ruth Darden, George and Annette Crumpler. There would have been a few more, but both Hugh Porter and Doug Wolfe took a wrong turn and landed in the hospital where they found stones and bones, but no shells. The agenda for the day included a morning's dig at Rice's Fossil Pit in Hampton and lunch in the glorious outdoors at a McDonalds Hamburger stand. In the afternoon we made 2 stops for freshwater mollusks, one at Big Bethel Reservoir and the other at Woods Lane pond. After a tour of the Peninsula Nature and Science Center, the group drove to Dorothy Beetle's apartment to see her shell collection and restore their energies before parting.

Rice's Fossil Pit was begun as a commercial operation for sand and gravel. The owners, Mr. and Mrs. W. M. Rice and their son, Kenneth, became interested in the fossils scattered abundantly in the sand. With the discovery of what proved to be a complete whale skeleton and assistance from the Smithsonian Institute in identification of material, the pit was opened to the public as a fossil hunter's paradise.

Later a small museum displaying the hundreds of species found at the site was erected to the memory of their son who was killed in the pit when a tractor turned over on him.

The fossil pit is located in the Yorktown formation of Miocene age, estimated to be between 12 to 15 million years old. The formation consists of beds of sand, gravel and clay, largely unconsolidated, and part of the thick marine sediments of the Atlantic coastal plain. Mollusks are the most

abundant phylum. Boring and encrusting sponges, several corals, barnacles, sea urchins, decapod burrows, shark and ray pavement teeth and whale remains have been found. The fossils can be hand picked or sifted from the sand. They are in good condition and traces of color can be seen on some shells. The surface of Oliva specimens is still shiny. Many large pectens, some up to 8 inches in diameter, have colonies of barnacles, sponges and corals on the shell.

Most of the following Miocene fossils were found. They have been identified from material at the college of William and Mary. In the main, they are correct and the most recent synonomy. At least we used them under these names in an exhibit and nobody screamed.

Turritella alticostata
Turritella variabilis
Oliva carolinensis
Gibbula americana
Vermicula spirata
Sinum fragile
Mercenaria campechiensis
Terebra strioterebrum carolinensis
Illyanassa granifera
Crepidula fornicata
Dentalium attenuatum
Polinices heros
Conus marylandicus
Crucibulum ramosum
Diodora sp.
Cancellaria perspectiva
Pecten jeffersonia
Pecten clintonius
Chama congregata
Fusinus parilis
Ostrea disporalis
Crassatellites undulata
Dosinia acetabulum
Glycymeris americana
Astarte undulata
Arca idonea
Cerastoderma acutilaqueatum

At Big Bethel Reservoir we found adult Campeloma decisa Say and valves of Anodonta cataracta Say. I had scouted this locality April 1 and found adults of Sphaerium partumeium Say, Physa acuta Drap (introduced from Europe, identified by Dr. Wm. J. Clench), Pseudosuccinea columella Say, Planorbula armigera Say, Memetus dilatatus Gould, Laevepex fuscus C. B. Adams abundant in the leaves around the edge of the reservoir. Egg capsules covered the leaves and sticks in shallow water. On May 13, we found just juveniles of these species and only a few egg capsules.

Woods Lane Pond in Hampton is a shallow, plant choked widening of a small stream that flows into Big Bethel Reservoir. A few adult Menetus dilatatus were picked from maple leaves in the water, but the adults of this species and Laevepex fuscus, seen in April, had presumably deposited their egg capsules and died.

The last stop was to see my cabinet of several hundred marine specimens, one of a kind. My main collection, however, consists of several thousand lots of land and freshwater mollusks, principally from localities in the Rocky Mountains.

The weather cooperated to give us a mild and sunny day for our trip. See what you missed by not coming to Virginia?

Reported by Dorothy E. Bettle

Ed. Note- Shortly after conducting this field trip for the North Carolina Shell Club, Dorothy Beetle moved to Ohio, where she now manages the Norwood High School Planetarium (2060 Sherman Avenue, Norwood, Ohio 45212)

NEW SHELL BOOKS FOR YOUR LIBRARY

Marguerite Thomas

1. ATLANTIC BEACHES. J. N. Leonard. Time-Life Books. 1972. $5.95
Beautifully written and illustrated....the latest book in the American Wilderness Series....covers the beaches from Cape Cod down through North Carolina....includes the marshes, tides, flora, fauna, outer banks, sounds, islands, etc. Marvelous reading for all of us beachcombers as well as the more serious-minded malacologists, conservationists, ecologists, etc. Highly recommended.

2. SHELLS IN COLOR. R. Tucker Abbott & Kjell Sandved. Viking Pr. 1973 $12.95
Two aspects of conchology are explored in this book.... seashells as biological specimens and as photographic subjects of rare beauty. It's a fine book for the coffee table or a serious guide for the collector.

3. AUSTRALIAN SHELLS. B. R. Wilson & K. Gillett. Tuttle. 1971 $21.50
A most exquisite book which is a real conchologist's dream. Over 600 gastropods are shown in full color, a great many of them showing live animals laying eggs or engaged in other snail activities. Excellent descriptions for identification. This book received wonderful reviews at the AMU in Delaware this summer. No bivalves are shown and no common names are used. Both authors are world-renowned. It's worth "Shelling" out the money!!!

4. SNAILY VERSE. Pat Holliday. 1972. Marsland Pr. Softbound. $1.25.
Malacological rhymes and limericks....easy and fun to read but with a wealth of good information too. Cute etchings. For adults and children to enjoy.

5. SEA SHELLS OF SAGAMI BAY. Takubei Kuroda. 1972. $75.00
This volume is called the "Emperor's Shell Book" and the price and size imply just that too. I have not seen this book but understand it pictures the collection of the Emperor of Japan in its entirety....outstanding color plates.

6. THE EROTIC OCEAN. Jack Rudloe. World Pub. Co. 1971. $15.00
This is a handbook for beachcombers written by the founder of the Gulf Specimen Co. in Florida. He is a lover of the sea and the book is written for all of us who share his passion to learn the secrets of the sea from which we all sprang. These secrets are not easily discovered unless we probe around in the sea, on the sea, beside the sea....under rocks, in mud flats, on oyster reefs, around coral rocks and all the many habitats the ocean's creatures use for eating, hiding, spawning, living!!! It's a good know-how book for collecting, preserving and shipping specimens of all types of phyla including mollusca.

7. KINGDOM OF THE SEASHELL. R. Tucker Abbott. Crown. 1972. $14.95.
If your personal library can afford only one shell book let it be this one for it is truly beautiful and a joy to own. Dr. Abbott's 35 years of study and research are summed up thoroughly in this volume and I feel sure it will inspire all of us to greater study in our chosen avocation. It's an excellent book for young people and beginning collectors as well as a fine reference book for experienced conchologists.

8. WONDERS OF THE WORLD OF SHELLS. Morris K. Jacobson & William K. Emerson. Dodd, Mead. 1971. $3.95
For the children in your family ages 8 to 12 or for any beginning sheller this book is an excellent introduction to the land, fresh-water and marine

shells. Put this on your Christmas list for the "little ones" in your family or even for you....it's one of the Wonder Books.

9. SHELLS OF NEW GUINEA AND THE CENTRAL INDO-PACIFIC. Alan Hinton. Jacaranda Pr. 1973. $7.95
An invaluable book for collectors of this rich faunal region. It contains superb photographs with descriptions on the opposite page for easy use.... has maps of collecting sites.... is an authoritative guide on gastropods... no pelecypods. The author is a specialist in the family Conidae.

10. HAWAIIAN SEASHELLS. Stephen Quirk & Betsy Harrison. Robt. Boom Co. 1972 $2.00
Natural color photographs by Jerry Kringel of shells found in Hawaiian waters and some unique to that area alone. Scientific and common names are given as well as the native names which is an interesting feature. This is an excellent handbook which presents 137 shells both common and rare which live in the coastal waters of our 50th state.

11. HOW TO CLEAN SEASHELLS. Eugene Bergeron. Great Outdoors Pub. Co. 1971 $1.00
Over a period of about 55 years the author has developed and perfected cleaning techniques for all types of shells whether it be by boiling, freezing, alcohol, acid, bacteria or whatever. A very worthwhile book for all collectors of live specimens.

12. NEW ZEALAND SHELLS AND SHELLFISH. Glen Pownall. Seven Seas Pub. Co. 1971 $4.95
Anyone going to New Zealand or collecting from this area will find this book very useful. It contains a good taxonomic guide and also shell family charts, descriptions, the native names for the shells and finally how to find, prepare and enjoy the edible shellfish of that country....recipes may be easily adapted to our own seafoods.

13. SHELLS AND SHELL COLLECTING. S. Peter Dance. Hamlyn Pub. 1972 $4.95
The author, at present Assistant Keeper at the National Museum of Wales, has presented man's association with shells from the very earliest period known whether it was for food, for ornamentation, as a monetary unit, a religious symbol, as art....a history of shell collecting and display. Not just another "shell" book but a very knowledgeable volume covering many phases of conchology. Excellent reading.

14. INVERTEBRATES OF NORTH AMERICA. Lorus & Margery Milne. Doubleday. 1972 $9.95
Land, freshwater and marine invertebrates are the most numerous form of life in the animal kingdom....both useful and harmful to man and a very interesting group to study. The authors, both well-known for their books on animal life, have described all the important groups of invertebrates (except the insects) in North America....their life histories, habits, ecological relationships to each other and to us, etc. Excellent black and white photographs and color plates show living invertebrates in natural habitats.

15. SEASHELLS OF AUSTRALIA. Walter Deas. Rigby. 1971. $3.50
Over 100 rare and common seashells are photographed in full color and this book even includes some bivalves which so many of the recent books omit. There are many photos of the living shells in their native environments and all are described with scientific names, sizes, habitats, etc. The endpapers are maps of Australia with general locations of the shells marked. The author is a photographer and a guide on the Great Barrier Reef. This is a good inexpensive edition for your library.

THE NORTH CAROLINA SHELL CLUB

PRESENTS

North Carolina Sea Shells

BY

John H. Ferguson and Jack B. Upchurch

for The North Carolina Shell Club

1973

NORTH CAROLINA SEA SHELLS

The North Carolina Shell Club welcomes anybody who is interested in shells, and many children, as well as adults, enjoy the collecting trips, the shell displays, and the slide talk programs. This present talk is the sort of thing we've been giving at the Shell Club meetings, but is simplified to appeal to a more general and, perhaps to a younger audience.

When you go to the beach and collect sea shells it's fun to learn the names which identify them. Some seashore findings, such as sea-urchins, sand-dollars, barnacles, starfish, corals, and even the so-called Lamp Shells (or BRACHIOPODS) are not true shells, strictly speaking. It is best to limit the term shell to the hard supportive and protective structure formed by most, but not all, of those soft-bodied animals we call MOLLUSKS. Our first five slides (=figures) will show North Carolina examples of the chief big Classes of Mollusks. An APPENDIX lists full names of the figured species *numbered* by superscript.

The first Class is for the Chitons (pronounced kite-on) and their relatives. They are also called Coat-of-Mail Shells, and they are easily distinguished because their shell comes in eight bent plates, (or valves) which are held together at the sides by a fleshy girdle. This can be seen in SLIDE 1 , showing the outside and the inside of the Common Eastern (or Bee-) Chiton[1]. Since rocks are scarce on the sandy Carolina coast, this little Chiton is often to be found clinging to old dead shells near the low tide mark.

The second Class are more-or-less Snail-like and they crawl on their belly by means of an extended foot. The scientific name for belly-footed is GASTROPOD, and their shells are all in one piece (Univalve). Many of you are familiar with land and pond snails, but we are talking about sea-shells, so our illustration, in SLIDE 2 , will be the Atlantic Moon Snail [2] or Sharkeye. It crawls along just beneath the surface of the sand at low tide, and you can find it by following the little tracks until you reach the bump at the end where the shell is hiding. When frightened, the animal withdraws inside the shell and closes its little brown trapdoor (or operculum), as shown in the shell on the right. On the beach, you sometimes find Moon-Shell sand-collars like those shown below. The mother mollusk makes this sand-collar to protect her eggs. Inside the pieces of a larger sand-collar, at the lower right, you can see hosts of baby moon-snails hatching from these eggs.

The third Class of Mollusks is for the somewhat uncommon Tooth, or Tusk Shells, which are scientifically called the boat-footed ones, or SCAPHOPODA. Their shape makes them easy to identify. SLIDE 3 shows two groups of Tooth Shells from our Carolina beaches. Those at the top are swollen in the middle and are called Siphon-Tooth, or Cadulus, Shells [3,4]. Those below are the Ivory Tusk Shells [5], two of which have a little collar of extra shell growth.

The fourth Class is for the Bivalves, whose shell comes in two parts, or valves, which are hinged together at the top. When the shell is shut, the two valves are pulled together by strong adductor muscles which run from the inside of one valve to the other. SLIDE 4 shows three examples of the common Hard Clam, also known as the Littleneck or the Quahog. In the shell on the upper left, we've marked the front (ant.) and back (post.) adductor muscle scars, on the inside of the left valve. The beautiful purple edging on the valve interior tells us that this shell is the Northern Quahog, or Hard Clam[6]. The shell on the right has an all-white interior and is a young specimen of the Southern Hard Clam[7]. The still younger shell in the middle, below, is a variety [6a] with pretty brown zigzag lines. Young Littleneck

Clams are called Cherrystones and their meat is very good to eat, whether fresh on the half-shell or cooked in a clam chowder. Many bivalves are popularly called Clams. Because they dig into the sand or mud with a hatchet-shaped foot, another scientific name for the Class is PELECYPODA. While looking at the Northern Hard Clam, we may recall that the early American Indians used to carve out the colored edge to make their purple wampum, which was much valued for shell jewelry and as a form of Indian money.

The fifth Class of Mollusks are the head-footed ones (or CEPHALOPODA), illustrated by the Common Octopus[8], a couple of baby ones being shown in SLIDE 5 . The octopus also serves to remind us that a few kinds of mollusk do not form any shell. Hundreds of species (or kinds) of mollusks live on our Carolina coast and the following selected photographs will just introduce you to some of the commonest, the prettiest, and the most interesting of their shells.

The largest living gastropod in the world can be found on our seashore and we recently obtained this fine specimen, shown in SLIDE 6 , as it was crawling along the water's edge at low tide in one of our Carolina inlets. It is the Giant, or Florida,Horse Conch[9]. Florida made it their official State Shell in 1969. Our own State Shell will be mentioned a bit later, after showing you some other pretty gastropod shells. Closely related to the Horse Conch are the Tulip Shells, the two common species of which are shown in SLIDE 7, namely, (a) the True Tulip[10]; and (b) the Banded Tulip[11]. In collecting the former, as in the case of the Horse Conch and a number of other shells, we try to save and show the operculum, or trap-door. This structure is attached to the top of the foot in the live animal and it is lost in dead beach shells, although you may sometimes find the operculum separately.

Our Carolina estuaries and sand flats are fine places to look for live mollusks, including the various kinds of Pear-(or Fulgur) Whelks which are shown in SLIDE 8. We won't take time to identify the different species [12-15*], but we will point out that some occur in either left-handed or right-handed forms, and that the spine formations and other shell features serve to separate the species. At the bottom, next to the whole shell on the left, we've made a vertical section of the Channelled Whelk [15] in order to show the central pillar, or columella, which supports the spiral turns, or whorls, of the shell. Our early American Indians used to carve out this columella to make their white wampum, that was not quite as valuable as the purple wampum, which we mentioned earlier. It is not quite correct to call these 'Conch' shells.

True Conchs are members of the Stromb family, one member of which, the Florida Fighting Conch [16], extends up to North Carolina, and three specimens are shown in SLIDE 9. A typical adult, complete with its operculum, is seen in the middle. The other two specimens, on the sides, are young, or juvenile, shells, which look different from the smooth-surfaced and knobby adult.

Another group of fine shells, to be considered along with the Conchs, are the Helmet and Bonnet Shells. SLIDE 10 shows: top left (a) the Queen, or Emperor, Helmet [17]; (b) top right, the King Helmet [18]; (c) bottom left, a couple of Scotch Bonnets [19], one with the operculum; and (d) bottom right, two Baby Bonnets [20]. In 1965 our Shell Club was instrumental in getting the North Carolina Legislature to designate the Scotch Bonnet as the official State Shell, thanks to State Representative Mr. Muncie Daniels.

*See APPENDIX.

Another pretty shell group, shown in SLIDE 11, , is for the Rock Shells, especially those in the top row which are, respectively, pairs of the Giant Atlantic Murex [21] and of the colorful Apple Murex [22]. The bottom row shows two kinds of Drills, which also belong in the Rock Shell Family. The three little shells on the left are the common Atlantic Oyster Drill [23], and the two on the right are the Thick-lipped Drill [24]. These small mollusks do big damage to oysters and other shell-fish when they drill a little hole in their victim's shell and thus suck out the meat inside. You'll find many dead shells on the beach with a neat little hole drilled into them. Various kinds of mollusks can drill these holes, mostly by the filing action of a sharp-toothed little tongue, or radula. The Moon Snail, which we showed in our second slide, is a very destructive shell driller.

Some very nice shells, shown in SLIDE 12, belong to the Family which includes the larger Olive Shells and their smaller cousins, the Olivellas. The three shells on the top are the Lettered Olive [25], named for its typical brown markings. The rare white one in the middle is an albino sub-species [25a]. In the lower row, left, are five variegated specimens of the Variable Olivella [26], while on the right, are an equal number of the little Floral Olivella [27], or Rice Shell. The tiny white ones do look like grains of rice.

Juno's Volute [28], shown in SLIDE 13, is a rare and precious shell, mostly obtained by off-shore dredging and occasionally brought in by the shrimp trawlers. Offshore dredging is the way to secure many commercial seafoods, including oysters and scallops, which we'll take up with the Bivalves later. While mentioning dredgings here, we'll show two more slides of shells which are seldom found on the beach, but which are not at all uncommon offshore. SLIDE 14, shows the very unusual Carrier Shell [29], named for the way in which it carries old shells and shell-fragments, cemented to its back, in order to give a protective camouflage. You'd hardly know what to make of its outside appearance, on the left, but the underside view, on the right, reveals a typical gastropod shell, complete with a brown operculum. SLIDE 15 shows, on top, a pair of Giant Tun, or Barrel, Shells [30], and, below, two specimens of the Noble, or Granular, Sundial Shell [31]. These are nice to have in your Carolina shell collection. Our last illustration, in the Gastropod Class, will be the fairly common beach shell in certain locations, such as the Northeast end of Topsail Island along the grassy edge of the tidal inlets, where you may find this Chestnut Turban [32], SLIDE 16. It has a shelly operculum.

The Pelecypod, or Bivalve, Class is an even bigger shell group, in terms of Carolina beach specimens, so our introductory selections must be even more limited than in the case of the Gastropods.

SLIDE 17 shows just a few of our very common Ark Shells, including: (a) top left, two pairs of the Zebra Ark, or Turkey Wing [33], (b) top right, three pairs of the Mossy Ark [34]. Note the oval hole in the bottom view, which is to allow for the passage of a byssus, consisting of a bundle of threads by which the animal anchors itself to rocks, pilings, other shells, and the like. We'll say more about the byssus later. The blackish diamond in the top view of the Mossy Ark Shell, on the extreme upper right, is the hinge area. In the bottom view, left, is the Blood Ark [35], and, on the right, the more triangular Ponderous Ark [36]. Both these animals have red blood, much like our own, but this is quite unusual in mollusks. The two shells also show the dark hairy outer covering, which is scientifically called the periostracum.

SLIDE 18 is the Giant American, or Atlantic Bittersweet [37], which has a fuzzy brown periostracum, before this gets rubbed off in beach-worn specimens. Single valves of this shell may be found on Cape Lookout, but our live specimen came from the shell beds offshore. This shell was much more common in the Carolinas some 15 million years ago, as judged from the finding of many fossil specimens, like the pair

on the right, from the Lumber River and Cape Fear River basins, now far from the present shore. You can have a lot of fun digging up fossil shells, and you'll be surprised how well-preserved many of them are, even after millions of years. Some fossils are found on the beach, washed up from old deposits offshore.

SLIDE 19 shows a selection of the numberous pretty Cockle Shells from our Carolina shores. If you want to know their names, they are: (a) the Giant Atlantic Cockle [38], whose single valves make nice candy trays, or ash-trays for your beach cottage; (b) the colorful Prickly, or Egmont's, Cockle [39], shown from the inside as well as an outside pair; (c) the pretty Yellow Cockle [40], also showing the inside, as well as a closed pair; (d) on the lower left, the smooth-surfaced Common Egg Cockle [41]; and (e) lower right, the delicate Spiny Paper Cockle [42] whose purple-hued interior is seen in the single valve, on the extreme lower right.

Seafood Scallops, as we mentioned earlier, are commercially dredged from extensive beds offshore. SLIDE 20 shows: (a) the Atlantic Deep-sea Scallop [43], which is rare off our coast, but which supplies the large, luscious scallops from off the coasts of New England and Nova Scotia; (b) two specimens of the Atlantic Bay Scallop [44], which is the chief seafood scallop from the Carolinas and Florida; also (c) four specimens of the Calico Scallop [45], to illustrate its many color variations. The other scallops may also be dredged, but are not used for seafood. They are valued by the shell collector, however, and include: (d) x3, the handsome Lion's Paw [46]; (e) X2, the Zigzag Scallop [47]; and (f) X2, the very similar Ravenel's Scallop [48]. These last two shells have a flat upper valve. Single valves can be found on the shore.

Oysters are an even more important seafood than scallops. There are various edible oysters all over the world, but our Eastern seaboard provides one of the best, namely, the Virginia, or Eastern Oyster [49], several specimens of which, including a clump of young attached valves, are shown in SLIDE 21.

Marine Mussels are still another kind of seafood, much eaten in Europe, but not popular in the U. S. A. SLIDE 22 shows several kinds of Carolina mussels, including: (a) top left, the Blue Mussel [50], with a rare brown-rayed variant below. The Blue Mussel is the chief edible mussel and is most common on the rocky coasts of the North Atlantic; (b) top center, the Atlantic Ribbed Mussel [51]; (e) top right, the Tulip Mussel [52], whose pearly interior is shown in the pair below; (d) lower left, the little Yellow Mussel [53], and (e) lower right, the similar Scorched Mussel [54], with which it is easily confused. Mussels form extensive, closely-set colonies of shells, which are firmly attached to rocks, pilings, and to each other, by the thread-bundle called the byssus, which we mentioned earlier in connection with some of the Ark Shells. Another group of Mollusks with a conspicuous byssus are the Pen Shells, one common species of which, the Rigid Pen Shell [55], is shown with the byssus in SLIDE 23.

Offshore, many interesting mollusks live attached to seaweeds, sea-whips, coral, and other such objects. SLIDE 24 shows, for example, the Atlantic Winged Oyster [56], attached by a byssus to the colorful Sea Whip, toward the bottom of our picture. Incidentally, these Sea Whips come in a variety of colors, and when you find a fresh specimen you should look it over carefully, especially for the curious little *Simnia* snails [57,58], several of which are included in our picture. You'll notice how these little gastropods adapt their color to the particular type of Sea Whip, so that they are exceedingly well camouflaged.

SLIDE 25 shows a number of specimens of the common Atlantic Jingle Shell [59], single outer valves of which are very plentiful on our beaches. To obtain the complete double shell, including the fragile, flat bottom valve, with the hole in it for the byssus, you should

wade around inlets and estuarine waterways at low tide, carefully examining old shells, like the example in the top left or discarded bottles, cans, and similar trash. Notice in the shell at the top right, how this Jingle has become ridged to match the old Cockle Shell surface on which it is growing.

SLIDE 26 shows some of the many Venus Clams, which live in shallow water on sand and mud flats. Thus, (a) at the top left, is the large, handsome Sun-ray Venus [60], together with a small pair next to its cousin (b) right, the Checkerboard Clam [61]; (c) at the bottom left, is the common Cancellate Venus [62] and, next to it, three small pairs to show the variously-colored interior (purple, yellow--or pink in the case of a rare sub-species [62a]); (d) next is the ivory-white, flattened Common Disc Shell [64], whose tough pairs are frequently found on the beach; and (e) at the extreme lower right, the interesting broad-ribbed Imperial Venus [63], obtained from the scallop beds offshore.

SLIDE 27 shows several bivalves, from two different Families, which can all be found burrowing into mud or soft rock. First, and finest, is (a) left, the beautiful Angel Wing [65], whose pair of valves is here shown with all the accessory plates; (b) top center, is the Campeche Angel Wing [66], which, like the true Angel Wing, is uncommon in our State; (c) top right are two brown-stained valves of the Fallen Angel Wing [67]. These three shells are in the Piddock Family. At (d) bottom center is a piece of hardened mud-rock, washed up on Topsail beach, which contains two pairs of the False Angel Wing [68], a free specimen of which is shown to the right. The top burrow, incidentally, contains a shell which is not a Rock-borer, but is just a little Ark Shell [68a], which has taken shelter in a vacant burrow. At (e) middle and lower right are a closed pair and open-valve interiors of the Atlantic Rupellaria [69], which is often found burrowing into the same rocks. The true Rock-borers form the Family: *Petricolidae.*

Many Bivalves live close to the water's edge in soft sand. At low tide, you can see the holes for their siphons, for breathing tubes, but they dig down with such agility that you can rarely get hold of a living specimen. SLIDE 28 shows just a few members of the great Tellin Family, namely, (a) top row, the Alternate Tellin [70]; (b) middle row, the Speckled, or Interrupted, Tellin [71]; (c) lower left, three specimens of the Northern Dwarf tellin [72]; and (d) lower right, a like number of specimens of De Kay's Dwarf Tellin [73].

As the waves recede at the outgoing tide, you'll find exposed in enormous numbers, the multi-colored little Coquinas, or Variable Wedge Shells [74], some typical examples of which are shown in SLIDE 29.

SLIDE 30 shows several Carolina members of the large Surf Clam Family, namely, (a) top left, the solid Atlantic Surf Clam [75], which has a Southern representative; (b) top right, the Fragile Atlantic Surf Clam [76], which is particularly common; (c) middle and bottom right, the fragile, white Channelled Duck Clam [77], and (d) lower left, the Common Rangia Clam [78]. Rangias occur in great beds in Albemarle and Currituck Sounds, where they are now being commercially harvested, since their meat makes a fine Clam Chowder.

SLIDE 31 is our last group of Bivalves and it shows several of the so-called Razor or Jackknife Clams, from two different Families. Thus, (a) top, is the Straight Razor, or Atlantic Jackknife Clam [80]; (b) left center, is the little Green Jackknife Clam [79]; (c) right center is the Purplish False Razor, or *Tagelus;* [82] and (d) bottom is the Stout False Razor, or *Tagelus* [81]. The False Razors are now re-assigned to a separate Family.

Finally, we'll mention just a couple of Cephalopods, with interesting and very specialized kinds of shells. The last SLIDE 32 shows (a) top, the beautiful and very fragile Common Paper Nautilus [83], which is occasionally washed up at Nag's Head and on other

Carolina beaches. Actually, this so-called shell is the egg-case formed by the female *Argonaut* in order to hold her eggs.
Because of a big air bubble inside the coils, it floats on the surface of the sea, and the mother mollusk nestles inside the shell, cradling the eggs and the shell among her tentacles. At the bottom (b) are two chambered coils, looking like little ram's horns, which, in fact, are the internal shell of a peculiar type of Squid, called the Common Spirula [84].

Besides the open-air, healthy pleasure of hunting for shells on the seashore, there's a great deal to be learned about them, when you get back home or to school. Shell-collecting is a fascinating hobby for many nature-lovers, and to the Life-Scientist (=Biologist) it is a challenging field for specialized study, whether of the whole mollusks (=Malacology), or perhaps just of their shells (=Conchology). The North Carolina Shell Club welcomes fellow shellists and, for those who may become more seriously interested, we've appended a complete list of the scientific names for all the specimens in our little presentation.

APPENDIX. SCIENTIFIC NAMES OF CAROLINA MOLLUSKS

SLIDE NO.	(FIG.)	
		Class: AMPHINEURA (nerves on both sides), Sub–Class: Polyplacophora (bearing many (8) plates):
(1)	1.	**Chaetopleura apiculata** (Say), The Common Eastern (or Bee) Chiton. (Pron. KI-TON)
		Class: GASTROPODA (belly-footed ones, or Univalves):
(2)	2.	**Polinices (Neverita) duplicatus** (Say), The Atlantic Moon Shell, or Shark-eye.
		Class: SCAPHOPODA (boat-footed ones):
(3)	3.	**Cadulus (Polyschides) carolinensis** (Bush), The Carolina Cadulus, or Siphon Tooth.
	4.	**Cadulus (Polyschides) quadridentatus** (Dall), The Four-toothed Siphon Tusk.
	5.	**Dentalium (Graptacme) eboreum** (Conrad) The Ivory Tusk, or Tooth Shell.
		Class: PELECYPODA (hatchet-footed ones), or BIVALVIA (Bivalves):
(4)	6.	**Mercenaria mercenaria** (Linné), The Northern Quahog, or Hard Clam, or Littleneck,
	6a.	**Mercenaria mercenaria** var. notata (Say), with brown zigzag lines.
	7.	**Mercenaria campechiensis** (Gmelin), The Southern Quahog, or Hard Clam.
		Class: CEPHALOPODA (head-footed ones):
(5)	8.	**Octopus (Octopus) vulgaris** (Lamarck), The Common Octopus.
		More GASTROPODA:
(6)	9.	**Pleuroploca (Triplofusus) gigantea** (Kiener), The Giant (or Florida) Horse Conch.
(7)	10.	**Fasciolaria tulipa** (Linné), The True Tulip.
	11.	**Fasciolaria hunteria** (Perry), The Banded Tulip.
		The Fulgur, or Pear, Whelks, Family: **Busyconidae, (or Melongenidae,** named from a related group):
(8)	12.	**Busycon (Busycon) carica** (Gmelin), The Knobbed Pear-Whelk, and variety:
	12a.	**Busycon (Busycon) carica eliceans** (Montfort), Kiener's Whelk.

SLIDE NO.	(FIG.)	
	13.	**Busycon (Busycon) contrarium** (Conrad), The Lightning Whelk, including the original fossil form (Conrad), the usual left-handed (sinistral), and occasional right- handed (dextral) forms, presently living or recent.
	14.	**Busycon (Busycon) spiratum** (Lamarck), the true Pear Whelk, and its sub-species.
	15.	**Busycon (Busycotypus) canaliculata** (Linné), The Channelled Whelk.
(9)	16.	**Strombus (Strombus) alatus** (Gmelin), The Florida Fighting Conch. (Fam. **Strombidae**)
		The Helmet and Bonnet Shells, Family: **Cassidae:**
(10)	17.	**Cassis (Cassis) madagascariensis** (Lamarck), The Queen, or Emperor Helmet.
	18.	**Cassis (Cassis) tuberosa** (Linné), The King Helmet.
	19.	**Phalium (Semicassis, or Tylocassis) granulatum** (Born), The Scotch Bonnet.
	20.	**Cypraecassis (Cypraecassis) testiculus** (Linné), The Baby Bonnet, or Reticulated Cowrie-Helmet.
		The Rock Shells, etc. Family: **Muricidae:**
(11)	21.	**Murex (or Hexaplex) (Muricanthus) fulvescens** (Sowerby) The Giant Eastern Atlantic Murex.
	22.	**Murex (or Hexaplex) (Phyllonotus) pomum** (Gmelin) The Apple Murex.
	23.	**Urosalpinx cinerea** (Say), The Atlantic Oyster Drill.
	24.	**Eupleura caudata** (Say), The Thick-lipped Drill.
		The Olive Family: Olividae:
(12)	25.	**Oliva (Ispidula) sayana** (Ravenel), The Lettered Olive, and varieties
	25a.	**O. s. citrina** (Johnson)
	26.	**Olivella (Dactylidia) mutica** (Say), The Variable Olivella.
	27.	**Olivella (Olivella) floralia** (Duclos), The Floral Olivella, or Rice Shell.
(13)	28.	**Scaphella (Scaphella) junonia** (Shaw), The Junonia, or Juno's Volute. (Fam.: **Volutidae**)
(14)	29.	**Xenophora conchliophora** (Born), The Atlantic Carrier Shell. (Fam.:**Xenophoridae**)
(15)	30.	**Tonna (Tonna) galea** (Linné). The Giant Tun (=Barrel) Shell. (Fam.: **Tonnidae**)
	31.	**Architectonica (Architectonia) nobilis** (Röding), The Noble, or Granular, Sundial. (Fam.: **Architectonicidae**)
(16)	32.	**Turbo (Marmarostoma) castanea** (Gmelin), The Chestnut Turban. (Fam.: **Turbinidae**)
		More BIVALVIA:
		The Ark Shells, Family: Arcidae:
(17)	33.	**Arca (Arca) zebra** (Swainson), The Zebra Ark, or Turkey Wing.
	34.	**Arca (Arca) imbricata** (Bruguière,) The Mossy Ark.
	35.	**Anadara (Lunarca) ovalis** (Bruguière), The Blood Ark.
	36.	**Noetia (Eontia) ponderosa** (Say), The Ponderous Ark.

SLIDE NO.	(FIG.)	
		Family: **Glycymeridae,** the Bittersweets:
(18)	37.	**Glycymeris (Glycymeris) americana** (Defrance), The Giant American (Atlantic) Bittersweet.
		The Cockle Shells, Family: **Cardiidae:**
(19)	38.	**Dinocardium robustum** (Lightfoot), The Giant Atlantic Cockle.
	39.	**Trachycardium (Trachycardium) egmontianum** (Shuttleworth), The Prickly (Egmont) Cockle.
	40.	**Trachycardium (Trachycardium) muricatum** (Linné), The Yellow Cockle.
	41.	**Laevicardium (Laevicardium) laevigatum** (Linné), The Common Egg Cockle.
	42.	**Papyridea (P.) soleniformis** (Bruguière), The Spiny Paper Cockle.
		The Scallops, Family: **Pectinidae:**
(20)	43.	**Placopecten magellanicus** (Gmelin), the Atlantic Deep-Sea Scallop.
	44.	**Aequipecten (Plagioctenium) irradians** (Lamarck), The Atlantic Bay Scallop.
	45.	**Aequipecten (Plagioctenium) gibbus** (Linné), The Calico Scallop.
	46.	**Lyropecten (Nodipecten) nodosus** (Linné), The Lion's Paw.
	47.	**Pecten (Euvola) ziczac** (Linné), The Zigzag Scallop.
	48.	**Pecten (Euvola) raveneli** (Dall), Ravenel's Scallop.
		The Oysters, Family: **Ostreidae:**
(21)	49.	**Crassostrea virginica** (Gmelin), The Eastern (or Virginia) Oyster.
		The Mussels, Family: **Mytilidae:**
(22)	50.	**Mytilus (Mytilus) edulis** (Linné), The Blue (Edible) Mussel.
	51.	**Modiolus (Arcuatula) demissus** (Dillwyn), The Atlantic Ribbed Mussel.
	52.	**Modiolus (Modiolus) americanus** (Leach), The Tulip Mussel.
	53.	**Brachidontes (Brachidontes) citrinus** (Röding), The Yellow Mussel.
	54.	**Brachidontes (Hormomya) exustus** (Linné), The Scorched Mussel.
		The Pen Shells, Family: **Pinnidae:**
(23)	55.	**Atrina (Atrina) rigida** (Lightfoot), The Rigid Pen Shell. The Winged Oysters, Family: **Pteriidae:**
(24)	56.	**Pteria (Pteria) colymbus** (Röding), The Atlantic Winged Oyster, on Sea Whip (**Gorgonia**), (with GASTROPOD Simnia Snails):
	57.	**Neosimnia uniplicata** (Sowerby) The Single-toothed Simnia.
	58.	**Neosimnia acicularis** (Lamarck), The Common West Indian Simnia.
		The Jingle Shells, Family: **Anomiidae:**
(25)	59.	**Anomia (Anomia) simplex** d'Orbigny, The Atlantic Jingle Shell,
		The Venus Clams, Family: **Veneridae:**
(26)	60.	**Macrocallista (Macrocallista) nimbosa** (Lightfoot), The Sunray Venus.
	61.	**Macrocallista (Macrocallista) maculata** (Linné), The Checkerboard Clam.
	62.	**Chione (Chione) cancellata** (Linné), The Cancellate (or Cross-barred) Venus, and variety
	62a.	**Chione (Chione) cancellata mazycki** (Dall).

SLIDE NO.	(FIG.)	
	63.	**Chione (Lirophora) latilirata** (Conrad), The Imperial (Broad-ribbed) Venus.
	64.	**Dosinia (Dosinidia) discus** (Reeve), The Common Disk Shell.
		Mud—and Rock—boring Bivalves: The Piddocks, Family:Pholadidae::
(27)	65.	**Cyrtopleura (Scobinopholas) costata** (Linné), The True Angel Wing.
	66.	**Pholas (Thovana) campechiensis** (Gmelin), The Campeche Angel Wing.
	67.	**Barnea (Anchomasa) truncata** (Say), The Fallen Angel Wing.
		The True Rock-Borers, Family: **Petricolidae:**
	68.	**Petricola (Petricolaria) pholadiformis** (Lamarck), The False Angel Wing, in mud-rock, (with a vacant burrow occupied by a White Bearded Ark,
	68a.	**Barbatia (Barbatia) candida** (Helbling), in Family: **Arcidae.)**
	69.	**Rupellaria typica** (Jonas), The Atlantic Rupellaria.
		The Tellins, Family: **Tellinidae:**
(28)	70.	**Tellina (Eurytellina) alternata** (Say), The Alternate Tellin.
	71.	**Tellina (Tellinella) listeri** (Röding), The Speckled, or Interrupted, Tellin.
	72.	**Tellina (Angulus) agilis** (Stimpson) The Northern Dwarf Tellin.
	73.	**Tellina (Angulus) versicolor** (DeKay), DeKay's Dwarf Tellin.
		The Wedge Shells, Family: **Donacidae:**
(29)	74.	**Donax (Serrula) variabilis** (Say), The Coquina, or Variable little Wedge Shell.
		The Surf Clams, Family: **Mactridae:**
(30)	75.	**Spisula (Hemimactra) solidissima** (Dillwyn), The solid Atlantic Surf Clam, and varieties.
	76.	**Mactra (Mactrotoma) fragilis** (Gmelin), The Fragile Atlantic Surf Clam.
	77.	**Labiosa (Raeta) plicatella** (Lamarck), The Channelled Duck Clam.
	78.	**Rangia (Rangia) cuneata** (Gray), The Common Rangia Clam.
		The Razor, or Jackknife, Clams, Family: **Solenidae:**
(31)	79.	**Solen (Solen) viridis** (Say), The Green Jackknife Clam.
	80.	**Ensis (Ensis) directus** (Conrad), The Straight Razor, or Atlantic Jack-knife Clam.,
		The False Razors, Family: **Solecurtidae:**
	81.	**Tagelus (Tagelus) plebejus** (Lightfoot), The Stout False Razor (or Tagelus).
	82.	**Tagelus (Mesopleura) divisus** (Spengler), The Purplish False Razor (or Tagelus).
		MORE CEPHALOPODA:
(32)	83.	**Argonauta argo** (Linné), The Common Paper Nautilus.
	84.	**Spirula spirula** (Linné), The Common Spirula (Squid).

TITLES OF SLIDES

A. NORTH CAROLINA SHELL CLUB (presents):
B. NORTH CAROLINA SEA SHELLS
1. CHITON (Coat-of-Mail Shell)
2. GASTROPOD (Univalve)
3. TOOTH SHELLS (Tusks)
4. CLAMS (Bivalves)
5. CEPHALOPOD (Octopus)
6. HORSE CONCH
7. TULIP SHELLS
8. FULGUR – (OR PEAR–) WHELKS
9. STROMB (Fighting Conch)
10. HELMETS AND BONNETS
11. ROCK SHELLS AND DRILLS
12. OLIVES AND OLIVELLAS
13. JUNONIA
14. CARRIER SHELL
15. TUN AND SUNDIAL
16. TURBAN
17. ARKS
18. BITTERSWEET
19. COCKLES
20. SCALLOPS
21. OYSTERS
22. MUSSELS
23. PEN SHELL
24. WINGED OYSTER AND SIMNIAS
25. JINGLE SHELLS
26. VENUS CLAMS
27. ROCK-BORERS AND PIDDOCKS
28. TELLINS
29. COQUINAS
30. SURF CLAMS
31. RAZOR CLAMS
32. PAPER NAUTILUS AND SPIRULA

OF STARS AND SHELLS

Dorothy E. Beetle

Can a total eclipse of the sun be combined with shelling? Yes, certainly, if you sail to Africa to see the eclipse and climb around in the volcanic caldera on Tenerife. Along with 1800 eager eclipse chasers I sailed aboard the Canberra to see the long total eclipse of the sun on June 30.

The moon's shadow overtook us at sea off the coast of Mauritania at 10:35 A.M. Airborne dust off the Sahara produced a milky silver sky and sea which gave us the effect of being enclosed in a silver bowl. The light steadily lessened until, in a midnight blue sky, we saw the pearly luminescent coronal streamers surrounding the dark moon. . A totally different eclipse and suberb!

While the eclipse prevented me from attending the AMU meetings, it provided a bit of shelling on the side. Late one afternoon off the African coast, we saw about two dozen flying squid rise before the ship's bow and sail above the wave crests for a few seconds. Flying fish in great numbers could be seen on both sides of the Atlantic near the coasts, but this was the only time we recognized squid.

North of Dakar, Senegal we visited a village of thatched huts built on stilts over a stinking mud flat. The shore beyond was littered with cuttle bones. Some of the astronomers were not easily convinced these were internal shells of a mollusk and certainly not of something like an octopus. Nearby was a shell cemetary, the graves dug into fossil coquina, with large shells decorating the graves.

Wanderlust carried me on a swing around the United States where I photographed watermelon snow at 11,500 feet in the Medicine Bow Mountains of Wyoming. The snow is stained pink by the millions of pink algal cells that live, flourish really, in the warm sunlight on the surface of the permanent snow banks. A too brief stop in the Teton Mountains and along the sandstone ridges south of Casper, Wyoming turned up a few land snails, but that was about all the real collecting I did.

A LISTING OF SHELLING TRIPS AS DESCRIBED IN THE NEW YORK SHELL CLUB NOTES - 1949 to 1973

Hugh J. Porter

University of North Carolina, Institute of Marine Sciences

For some time, through the kindness of Dorothy Raeihle M. K. Jacobson and others of the New York Shell Club, that club has been sending copies of its notes to the North Carolina Shell Club in exchange for our bulletins. These copies are being placed in the library of the University of North Carolina's Institute of Marine Sciences in Morehead City for use by N. C. Shell Club members and other interested persons. Many early issues where duplicates were not available, were photocopied and donated by Dr. A. S. Merrill of the National Marine Fisheries Service Biological Laboratory, Oxford, Maryland. A complete series now exists except for the period 1970 - 1971 (#158, 163, 165, 171, 174, 175). The New York Shell Club Notes were first published in 1949; its last issue (June - July - August) was #193.

Since the N. Y. S. C. Notes contain a number of articles on the experiences of persons shelling in a wide variety of areas, it was felt that it would be a help to our club members in their future shelling trip plans if they knew what others have written about certain shelling areas. This list contains article title (arranged georgraphically), author, issue number, page numbers and date of publication. Those members interested in a particular article should write to me and I will either bring the issue to the next N. C. Shell Club meeting or make other arrangements.

NORTH AMERICA

Canada

Collecting shells in the Gaspe Peninsula, Mathilde Weingartner #19:1-2 1955.
Shells and slugs collected by members of New York Shell Club 1960 field trip, Lake Hertel, Mont St. Hilaire, Canada. Harold Feinberg #66:2 1960

New England

Listing of marine shells collected at Sheffield Island, off Norwalk, Connecticut July 9 - 10, 1955. Gordon Usticke #53:5-6 1959
Shells from fish stomachs (Boothbay Harbor, Maine). Catherine Anders #58: 4 1960
A checklist of marine molluscs of Woods Hole and vicinity. Edward M. Slater #58:5-6 1960
Dredging around Cape Ann, Massachusetts. Gladys McCalum #78:3 1962
Land Mollusks and noxious weeds of the Connecticut Valley. Milton Werner, Jr. $153:3-5 1969
To Cape Cod, on our first week-end field trip. Mark Hulswit #157:4-5 1969
Shelling down east - - the mollusks of coastal Maine. Dr. Kenneth J. Boss #167:4-5 1970

New York, Long Island and Staten Island

Account of first club field trip (Douglaston, Long Island). George B. Wilmott, #1:2 1949
Mollusks of New York City parks. Mrs. Allen L. Freas #2:4 1950
Field trip (near Annsville). Dorothy L. Freas #3:1-2 1950
Field trip to Bayville. Josephine Wickern #5:1-2 1951
Collecting in New York City. Roger Bretet #5:5-6 1951
Collecting land and fresh water shells in the Brooklyn Botanical Gardens. Michael B. Krassner #6-7:1 1952

A Staten Island field trip, May 10. Josephine Wichern #7:4-5 1952
Mollusks in Central Park. Morris K. Jacobson #7:5 1952
The mollusca of Van Cortlandt Park. Harold S. Feinberg 9:1-2 1954
June Field Trip (North Channel of Hamilton Beach). Unknown #15:2 1955
The field trip (Wards Point on Staten Island). Morris K. Jacobson, #24:1 1956
Exotic mollusks in the vicinity of New York City. Edward J. Karlin, #25:1-2 1956
Collecting shells in New York fish markets. Morris K. Jacobson, #45:4 1958
Exotic shells from Eastern Long Island. Roy Latham #51:4-5 1959
The field trip (Orient Beach State Park - Long Island). Dorothy Raeihle #63:2 1960
Club excursion (Orient Beach State Park). M. K. Jacobson #73:3 1961 and Marian M. Schroth #93:3-4 1963
Annotated check list of land gastropods of Bronx County, New York. Harold S. Feinberg #82:5-6 1962
Shells of the Palasades M. K. Jacobson #88:2-3 1963
Collecting at Jenning's Point, Shelter Island and nearby localities. Lawrence Potter #91:7-8 1963
Collecting on northeastern shores of Long Island. Lawrence Potter #97:6-7 1963
Shells of Ward's Point, Staten Island. M. K. Jacobson #102:2 1964
N.Y.S.C. field trip to Crotan Point State Park. Harold S. Feinberg #113:3 1965
N.Y.S.C. field trip to Orient Beach State Park. Dorothy Jensen #113:3-4 1965
Additional data on our local fauna - observations at Rockland Lake, N. Y. Harold S. Feinberg #114:7 1965
September shelling finds - Chaetopleura and Busycon (Southold, Long Island) Dorothy Raeihle #125:3-4 1966
Wintertime shelling in the New York City Area. Dorothy Raeihle #132:5 1967
Collecting on Bird Island. Cherita Shark #185:5-6 1972

New Jersey
N.Y.S.C.'s trip to Sandy Hook. M. K. Jacobson #83:6-7 1962
Shelling in New Jersey Dorothy Germer #95:3-4 1963
Garden State Field Trip (Milford-Montague Bridge in Sussex County). Harry G. Lee #96:2-3 1963

Virginia-North Carolina
Collecting Miocene fossils in Virginia. William E. Old #87:2-4 1962
A visit to Chincoteague Island (Virginia). Harold S. Feinberg #100:13 1964
Notes on the molluscan fauna off the coast of North Carolina (as told by H. J. Porter). Dorothy Raeihle #135:2-3 1967

Florida
Echoes from St. Petersburg. R. L. Alsaker #28:2 1957 & #29:4 1957
Excerpts from a letter dealing with collecting in Florida. Elayne Musnick #39:2 1958
A report on two shelling areas in the Florida Keys (Crawl and Grassy Keys). Mr. and Mrs. George Raeihle #63:6-7 1960
Untitled article on collecting in Florida's Keys.Leon Pequignot #70:3-4 1961

Florida (continued)
Beachcombing on Sanibel Island. Dorma P. Coley #91:5-6 1963
Everglades Liguus hunt. Leon S. Pequignot #109:7-8 1965
The Land shells of Big Pine Key, Florida Morris K. Jacobson #110:5-8 1965
Offshore Key Vaca with dredge and snorkel. Neal and Eva Seamon #126:3-6 1966

Texas
Search and seizure (concerned with an AMU land and fresh water field trip near Galveston). Constance Boone #186:3-5 1972

Washington
Shelling in the San Juan Islands (Puget Sound) with the North-west Shell Club. W. E. Old #74:3-4 1961

California
Hunting land shells in the west. Frank Henry Hausman #41:1-2 1951
Intertidal collecting near Los Angeles. Anthony D'Attilio #122:3 1966

CENTRAL AMERICA
Mexico
Shelling in the Sea of Cortez (Gulf of California) Dorothy Germer #109:4-6 1965
Shelling in Cholla Bay, Mexico. Albert Taxson #118:2-4 1966
On land shells from the Mayan ruins in Yucatan, collected by Edward Cowles. Morris K. Jacobson #120:5-7 1966
Return to the Sea of Cortez. Dorothy Germer #135:5-7 1967
Shelling at New Kino Bay, Sonora, Mexico, Gulf of California. Helen MacCaa #141:5-7 1968

El Salvador and Costa Rica
The shells of Lake Coatepeque, El Salvador. M. K. Jacobson #90:4-5 1963
Expedition to Costa Rica - as told by George and Mary Kline #122:1-2 1966

SOUTH AMERICA
Brazil
Shelling experiences in Bahia, Brazil. Harry G. Lee #161:2-4 1970

Chile
Shelling in Chile. Grace G. Eddison #101:6-8 1964

Uruguay
The marine shelling of Uruguay. Omar E. Sicardi #151:3-4 1969

ATLANTIC, GULF OF MEXICO AND CARIBBEAN SEA AREAS
General
Dredging in the East Gulf of Mexico. W. E. Old, Jr. #96:5-7 1963
Caribbean shelling. Ethelyn Woodlock #115:4-6 1965

Bahama Islands

Shelling in Grenada, British West Indies. Gordon Usticke #47:4-5 1958
Field trip to Barbuda, British West Indies. Gordon Usticke #66:4 1960 and #67:5-6 1960
The pink sands of Eleuthera. Dorothy Jensen #108:6-9 1965
From Eleutheran waters. Dorothy Jensen #121:4 1966
Shelling at Grand Cayman, B. W. I. Ethelyn Woodlock #127:5-7 1966
Shelling on Little Cayman Island, B. W. I. Ethelyn Woodlock #139:5-7 1968

Puerto Rico

An excursion to Beef Island. Gordon Usticke #81:7 1962
Land Shelling in the rain forest. Frank and Lee Nelson #191:5-6 1973

Virgin Islands

From our Virgin Island corresponent. G. Usticke #34:2-3 1957
Collecting shells in St. Croix, Virgin Islands. G. Usticke #35:3 1957
Collecting in the Virgin Islands. G. Usticke #36:2 1957
From our St. Croix correspondent. G. Usticke #37:2 1957; 40:2-3 1958
Reef collecting at St. Croix. Gordon Usticke #43:3-4 1958
Snailing in St. Croix, Virgin Islands. Gordon Usticke #44:1-3 1958
Shelling on the outer reefs of St. Croix. Gordon Usticke #45:3 1958
An old (Carib?) indian shell midden on St. Croix. Gordon Usticke #51: 2-3 1959
Dredging at St. Croix. Gordon Usticke #54:4-5 1959
Tropic holiday (about Water Isle). Mr. and Mrs. Albert Taxson #58:1-2 1960
The Ham Bluff splash pool zone at St. Croix Gordon Usticke #71:2-5 1961
Shelling in Salt River, St. Croix. Gordon Usticke #76:6 1961
A holiday shelling on St. Croix. Gordon Usticke #77:4-5 1961
Southgate Pond (St. Croix). Gordon Usticke #89:8 1963
Dredging operations in Christiansted Harbor, 1962-1963. Gordon Usticke #94:4 1963
Shelling at St. John, Virgin Islands. Ethelyn Woodlock #95:5-7 1963 and 106:6-7 1964
Water Isle shelling. Brace G. Eddison #105:6-7 1964

Lesser Antilles

Shelling in Martinique. Gordon Usticke #62:5-6 1960
A trip to the Isle St. Barthelemy. Gordon Usticke #72:5-6 1961
A glance at Martinique. Gordon Usticke #130:3 1967
Sojourn in the Grenadines. Kitti?? #138:5-7 1968
Collecting areas in Guadeloupe. Sandra K. Hunter #168:2-3 1971
Shelling on Banbuda. Frank and Lee Nelson #179:3-5 1972

Netherlands Antilles and Trinidad

From our West Indies correspondent. G. Usticke #42:4-5 1958
Shelling in the Dutch Antilles. Gordon Usticke #86:6-7 1962
Shelling in Trinidad. Gordon Usticke. #102:5 1964
Collecting in the Netherlands Antilles. Neal and Eva Seamon #134:3-5 1967
Geology and shell collecting in the Netherlands Antilles and Panama. Florentin J-M. R. Maurrasse #173 4-7 1971

EUROPE AND AFRICA

U. S. S. R.

Malacological notes on a trip to the U. S. S. R. Ernest Walton #130: 4-5 1967

Mediterranean

Shelling in Spain. M. K. Jacobson #59:2 1960
Shelling at the Lido, Italy. Ethelyn Woodlock #128:4-5 1967
Shell collecting in Spain and Portugal. Anne and Albert Taxson #145:3-6 1968
Strandline shelling in the Eastern Mediterranean. Larch S. Garrad # 147:7 1968

Mozambique

A dredging trip to Nacala Bay on the coast of Mozambique. K. J. Grosch #84:3-4 1962

Africa

Adventures in Africa. Francis Harmon #156:4-6 1969
Fernando Poo, molluscan land of Lilliput. Royce E. Hubert #164:5 1970

PACIFIC AND INDO-PACIFIC

Pacific Ocean Islands

Expedition to New Caledonia. Mr. and Mrs. George Kline #73:6-7 1961
Shelling in America Samoa. William John Christian #88:5-7 1963
Collecting shells in the Cook Islands in 1962 - as told by Richard W. Foster. #103:5-6 1964
Shelling in Hawaii. Neal and Eva Seamon #129:5-7 1967
Shelling in Taiwan. Adelaide C. Davis #136:3-7 1967
Seashell safari to the Solomons. R. Tucker Abbott #176:3-5 1971

South China Sea Area

Shell collecting in the limestone caves of Borneo. Mary Saul #125:5-9 1966
Shell collecting at Singapore. Mrs. Anne Firth Murray #139:2-4 1968
Sea gift (concerned with Borneo). Mary Saul #154:4-5 1969

Australia and New Zealand

From Wellington, New Zealand Frank Hausman #41:4 1958
Collecting land shells in New Zealand. Frank Hausman #48:5-6 1959
A letter from our wandering correspondent in Australia. Frank Hausman #52:5 1959
Our wandering correspondent takes a holiday (Australia) Frank Hausman #55:5-6 1959
A collecting trip out of Innisfail, Queensland. Mrs. B. R. Kinbacker #99:5-6 1964
Beaches where I have gathered shells: No. 2 - Western Port Bay, Victoria Australia. Vilma Wicks #105:7-8 1964
Beaches where I have gathered shells No. 3: The Gippsland Lakes - Lakes Entrance (Australia). Vilma Wicks #112:4-5 1965
Beaches where I have gathered shells No. 4: Mildura on the River Murray in Victoria. Vilma Wicks #127:3-4 1966
Beaches where I have gathered shells No. 5: Wilson Promontory - Victoria. Vilma Wicks #149:5-7 1969
Beaches where I have gathered shells No. 6: Twofold Bay at Boydtown New South Wales, Australia . Vilma Wicks #155:3-5 1969
Queensland odyssey. Francis Harmon #159:6-7; 160:6-7 1970
Collecting down under. Horst Bernhart #189:2-3 1973

RECORD SIZES OF NORTH CAROLINA MOLLUSKS

LIST NO. 3

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This third listing is a review of Lists Numbers 1 and 2, published in North Carolina Shell Club Bulletins, Numbers 5 and 6. Additional or more recent records have been included. No gastropod species of less than 6mm (0.25 inches) or bivalve species or less than 15mm (0.59 inches) have been included.

These listings were created partly because of their value to molluscan ecologista and/or taxonomists. More importantly, however, they were created to stimulate the amateur collector's interest in his North Carolina shells and to serve as a partial guideline for determining approximate shell values when merchandizing or bartering is involved. This later, of course, is important when one has shells in his collection or wishes to add unattainable specimens to it.

To be eligible for listing, specimens must have been found initially in North Carolina. Additional records will be kept of live taken specimens if these are not as large as a recorded empty shell. Measurements must be verified by a member of the North Carolina Shell Club's Executive Committee. It would be hoped that upon the dismantling of a collector's collection, recorded record-sized specimens would be offered to a well - known collection of North Carolina shells whether it be amateur or museum.

Measurements used are according to the Van Nostrand Catalogue, volume 2, page 276. Many of the IMS species measurements may seem small and possibly are; in regard to those species, the IMS Collection, which these listings were bascially developed from, may have had just a few small specimens.

NOTES CONCERNING LISTINGS:

H	=	Height of shell (hinge edge or apex to ventral edge in a perpendicular direction)
L	=	Length of a shell (maximum anterior to posterior measurement).
W	=	Width of a shell (maximum width).
SF	=	Offshore North Carolina Calico Scallop Fishery.
*	=	Live taken specimen

Specimens reside in the following collections: Cochran — Mr. F. C. Cochran, Sea Level, N. C.; Crews — Dr. J. M. Crews, UNC, Wilmington, N. C.; Dudley — Mrs. D. Dudley, Beaufort, N. C.; DMR — Duke Marine Laboratory, Beaufort, N. C.; IMS — Mollusk Collection, UNC, Institute of Marine Sciences, Morehead City, N. C.; Johnson — Mrs. Charlotte Johnson, Raleigh, N. C.; Laughinghouse — Mr. Billy E. Laughinghouse, Beaufort, N. C.; Piper — Mrs. E. H. Piper, Gloucester, N. C.; Porter — Mr. J. J. Porter, Morehead City, N. C.; Riggs — Mrs. Harriett Riggs, Swansboro, N. C.; Truckner — Mr. C. Truckner, Durham, N. C.; Tyler — Mr. J. Tyler, Morehead City, N. C.; Walton — Mrs. J. S. Walton, Jacksonville, N. C.; Wolfe — Dr. D. A. Wolfe, Beaufort, N. C.

LIST NO. 1 REVISION

CHITONS, GASTROPODS AND TUSK SHELLS

AMAEA RETIFERA Dall (Long - spined star shell)	1.02 inch (43mm)	Riggs	S. F. Beaufort
ARCHITECTONICA NOBILIS Roding (Common Sundial)	2.32 inch (59mm)w	DAW No.1762	Offshore Beaufort
	2.09 inch (52mm)w	Walton*	S. F., Beaufort
ASTRAEA PHOEBIA Roding (Long -spined Star Shell)	1.70 inch (43mm)	IMS No. 4035.1	S. F., Beaufort
	1.42 inch (36mm)	IMS No. 4035.2*	S. F., Beaufort
BALCIS CONOIDEA (Kurtz & Stimpson) (Conical Melanella)	0.43 inch (11mm)	IMS No. 467	Bogue Sound Beach
BALCIS INTERMEDIA (Cantraine) (Cucumber Melanella)	0.41 inch (10.4mm)	IMS No. 1032	Cape Lookout area
BULLA OCCIDENTALIS A. Adams (West Indian Bubble)	1.85 inch (47mm)	DAW No. 1532	Offshore Beaufort
BURSA BUFO (Bruguiere) (Chestnut Frog Shell)	2.44 inch (62mm)	Cochran	S. F., Beaufort
	2.24 inch (57mm)	Walton - now IMS No. —	S. F., Beaufort
BURSA THOMAE (Orbigny) (St. Thomas Frog Shell)	0.98 inch (25mm)	IMS *?	SE of Cape Lookout
BUSYCON CANALICULATUM (Linne) (Channeled Whelk)	8.42 inch (214mm)	Laughinghouse	Bogue Sound ?
	7.60 inch (193mm)	IMS No. 1534*	Off Shackleford Banks
BUSYCON CARICA (Gmelin) (Knobbed Whelk)	11.15 inch (283mm)	Piper*	Cape Lookout
BUSYCON CONTRARIUM (Conrad) (Lightning Whelk)	12.52 inch (318mm)	Laughinghouse -IMS	S. F., Beaufort
	11.70 inch (297mm)	Piper - IMS*	Cape Lookout
BUSYCON SPIRATUM (Lamarck) (Pear Whelk)	5.30 inch (135mm)	IMS No. 1015*	Off Drum Inlet
CALLIOSTOMA EUGLYPTUM A. Adams (Sculptured Top Shell)	0.89 inch (22.5mm)	IMS No. 1832*	SE New River Inlet
CALLIOSTOMA PULCHRUM (C. B. Adams) (Beautiful Atlantic Top Shell)	0.45 inch (11.5mm)	IMS No. 1648*	Morehead City State Port
CALLIOSTOMA YUCATECANUM Dall (Yucatan Top Shell)	0.47 inch (12mm) w	IMS No. 2286	Onslow Bay
CANCELLARIA RETICULATA (Linne) (Common Nutmeg)	2.28 inch (58mm)	Walton	S. F., Beaufort
	1.70 inch (43mm)	IMS No. 1824*	SE New River Inlet
CANTHARUS MULTANGULUS (Philippi) (False Drill)	1.38 inch (35mm)	IMS No. 1816	SE New River Inlet
CANTHARUS TINCTUS (Conrad) (Tinted Cantharus)	1.18 inch (30mm)	IMS No. 351	Shark Shoal Jetty
CASSIS MADAGASCARIENSIS (Lamarck) (Emperor Helmet)	6. 6 inch(157mm+)	DAW	Off New River Inlet
CASSIS MADAGASCARIENSIS SPINELLA Clench	10.60 inch (274mm)	IMS No. 2307*	Off Cape Fear
CERITHIUM FLORIDANUM Morch (Florida Cerith)	1.66 inch (42mm)	IMS No. 2277.1*	Bogue Inlet
CHAETOPLEURA APICULATA (Say) (Common Eastern Chiton)	0.71 inch (18mm)	IMS No. 383*	Back Sound
CIRSOTREMA DALLI Rehder (Dall's Wentletrap)	1.30 inch (33mm)	Laughinghouse	S. F., Beaufort
COLUBRARIA LANCEOLATA (Menke) (Arrow Dwarf Triton)	1.14 inch (29mm)	IMS No. 1844	ESE New River Inlet
CONUS FLORIDENSIS SOWERBY (Floridensis Cone)	1.38 inch (35mm)	IMS No. 1829.2*	SE New River Inlet
CONUS SOZONI Bartsch (Sozon's Cone)	4.06 inch (103mm)	Laughinghouse* now IMS No.	S. F., Beaufort

CORALLIOPHILA CARIBAEA Abbott (Caribbean Coral Shell)	1.02 inch (26mm)	Laughinghouse	S. F., Beaufort
CREPIDULA ACULEATA (Gmelin) (Spiny Slipper Shell)	0.95 inch (24mm)	IMS No. 1887.5*	SES New River Inlet
CREPIDULA FORNICATA (Linne) (Common Atlantic Slipper Shell)	2.48 inch (63mm)	DAW No. 598 f	Banks of Care Creek
	1.85 inch (47mm)	Piper*	
CREPIDULA PLANA (Say) (Eastern White Slipper Shell)	1.58 inch (40mm)	IMS No. 491*	Bogue Sound
CRUCIBULUM STRIATUM (Say) (Striate Cup and Saucer)	1.62 inch (41mm)	Piper*	Above Cape Hatteras
CYMATIUM KREBSII (Morch) (Krebs' Triton)	2.76 inch (70mm)	Cochran	S. F., Beaufort
	2.44 inch (62mm)	IMS No.	S. F., Beaufort
CYMATIUM PARTHENOPEUM (von Salis) (Von Salis' Triton)	6.18 inch (157mm)	Piper*	S. F., Beaufort
CYMATIUM POULSENII (Morch) (Poulsen's Triton)	2.76 inch (70mm)	IMS No. 1106.1	SE of Cape Lookout
CYPHOMA MCGINTYI Pilsbry (McGinty's Cyphoma)	1.22 inch (31mm)	IMS No. 518	Fort Macon Beach
CYPRAEA CERVUS Linne (Atlantic Deer Cowrie)	5.04 inch (128mm)	Piper*	SE Cape Lookout
CYPRAEA SPURCA ACICULARIS (Gmelin) (Atlantic Yellow Cowrie)	0.83 inch (21mm)	IMS No. 33*	Onslow Bay
CYPRAECASSIS TESTICULUS (Linne) (Reticulated Cowrie - helmet)	2.80 inch (71mm)	Laughinghouse	S. F., Beaufort
DENTALIUM EBOREUM (Conrad) (Ivory Tusk)	1.95 inch (49mm)	IMS No. 511	Bird Shoal
DENTALIUM LAQUEATUM (Verrill)(Panelled Tusk)	1.93 inch (49mm)	IMS No. 1213*	SE of Cape Lookout
DENTALIUM TEXASIANUM (Philippi) (Texas Tusk)	0.98 inch (25mm)	IMS No. 751	Fort Macon Beach
DIODORA CAYENESIS (Lamarck) (Cayenne Keyhole Limpet)	1.10 inch (30mm)	IMS	SE of New River Inlet
	0.79 inch (20mm)	IMS No. 480*	Bogue Sound
DISTORSIO CLATHRATA (Lamarck) (Atlantic Distorsio)	2.87 inch (73mm)	Truckner*	S. F., Beaufort
DISTORSIO MCGINTYI Emerson & Puffer (Florida Distorsio)	1.81 inch (46mm)	Walton	S. F., Beaufort
EPITONIUM ANGULATUM (Say) (Angulate Wentletrap)	0.90 inch (23mm)	IMS No. 574	Fort Macon Beach
EPITONIUM HUMPHREYSI (Kiener) (Humphrey's Wentletrap)	0.67 inch (17mm)	IMS No. 750	Fort Macon Beach
EPITONIUM MULTISTRIATUM (Say) (Many - ribbed Wentletrap)	0.36 inch (9mm)	IMS No. 1042	Just off Cape Lookout
EPITONIUM RUPICOLA (Kurtz) (Brown - banded Wentletrap)	0.55 inch (14mm)	IMS No. 742	Fort Macon Beach
EUPLEURA CAUDATA (Say) (Thick - lipped Drill)	1.14 inch (29mm)	IMS No. 559*	Holden's Beach
FASCIOLARIA HUNTERIA (Perry) (Banded Tulip)	4.53 inch (115mm)	IMS No. 1108*	Off Cape Lookout
FASCIOLARIA TULIPA (Linne) (True Tulip)	9.45 inch (240mm)	IMS No. 4597.1*	S.F., E. of Cape Lookout
FICUS COMMUNIS (Roding) (Common Fig Shell)	4.42 inch (112mm)	Laughinghouse	S. F., Beaufort
HALIOTIS POURTALESI (Dall) (Pourtales' Abalone)	0.59 inch (15mm)	IMS	SE Cape Lookout
ILYANASSA OBSOLETUS (Say) (Eastern Mud Snail)	0.85 inch (21.5mm)	IMS No. 1632*	Bogue Sound
LITTORINA IRRORATA (Say) (Marsh Periwinkle)	1.06 inch (27mm)	IMS No. 1654*	North River
LUNATIA HEROS (Say) (Common Northern Moon Snail)	4.25 inch (108mm)	IMS No. 1112.2	Off Oregon Inlet
FAVARTIA CELLULOSA (Conrad) LULOSA (Conrad)			
= MUREX CELLULOSA (Conrad) (Pitted Murex)	0.79 inch (20mm)	IMS No. 2431	S. E., of Cape Fear
MUREX DILECTUS A. Adams			
= M. FLORIFER ARENARIUS Clench & Farfante (Lace Murex)	2.84 inch (72mm)	IMS No. 2306*	Off Cape Fear
MUREX FULVESCENS (Sowerby) (Giant Atlantic Murex)	7.08 inch (180mm)	Piper*	Cape Lookout
MUREX LEVICULUS (Dall) (Thin - ribbed Murex)	0.75 inch (19mm)	IMS	S E Beaufort Inlet

MUREX POMUM (Gmelin) (Apple Murex)	3.46 inch (88mm)	Walton*	S. F., Beaufort
MUREX RUBIDUS F. C. Baker (Rose Murex)	1.33 inch (32.5mm)	IMS No. 1851*	ESE New River Inlet
NASSARIUS ACUTUS (Say) (Sharp - knobbed Nassa)	0.51 inch (13mm)	IMS No. 496	Bird Shoal
NASSARIUS ALBUS (Say)			
= N. AMBIGUUS (Pulteney) (Variable Nassa)	0.43 inch (11mm)	IMS	SE of Cape Lookout
NASSARIUS ALBUS (Say) form CONSESUS (Ravenel)	0.49 inch (12.5mm)	IMS	SE of Cape Lookout
NASSARIUS TRIVITTATUS (Say) (New England Nassa)	0.79 inch (20mm)	DML No. 358*	Off Oregon Inlet
NASSARIUS VIBEX (Say) (Common Eastern Nassa)	0.61 inch (15.5mm)	IMS No. 475*	Bird Shoal
NATICA CANRENA (Linne) (Colorful Atlantic Natica)	1.70 inch (43mm)	Piper	
NEOSIMNIA UNIPLICATA (Sowerby) (Single - toothed Simnia)	0.83 inch (21mm)	IMS No. 219*	Bogue Sound
NISO HENDERSONI Bartsch (Henderson's Niso)	1.38 inch (35mm)	IMS No. 1854	ESE New River Inlet
OLIVA SAYANA RAVENEL (Lettered Olive)	3.58 inch (91mm)	Cochran	S. F., Beaufort
PHALIUM CORONADOI CORONADOI (Crossi)	3.46 inch (88mm)	IMS No. 274*	Off Cape Fear
PHALIUM GRANULATUM GRANULATUM (Born) (Scotch Bonnet)	3.46 inch (88mm)	Porter	Off Wrightsville Area
	3.00 inch (76mm)	IMS No. 409*	Offshore Beaufort
PLEUROPLOCA GIGANTEA (Kiener) (Florida Horse Conch)	16.25 inch (412mm)	Piper*	Off Beaufort Inlet
POLINICES DUPLICATUS (Say) (Atlantic Moon Snail)	3.35 inch (85mm) w	DAW No. 44	Shackleford Beach
	3.02 inch (77mm) w	IMS No. 348*	Off Beaufort Inlet
POLINICES LACTEUS (Guilding) (Milk Moon Snail)	0.67 inch (17mm)	IMS No. 1728	SE Beaufort Inlet
	0.43 inch (11mm)	IMS*	SE Beaufort Inlet
SCAPHELLA DUBIA (Broderip)(Var. Georgiana Clench)	4.42 inch (112mm)	DML No. 2511*	ESE Cape Lookout
SCAPHELLA JUNONIA (Shaw) (Junonia)	5.28 inch (134mm)	Dudley	Fort Macon Beach
	2.76 inch (70mm)	Piper*	Offshore Beaufort
SINUM MACULATUM (Say) (Maculated Baby's Ear)	1.70 inch (43mm)w	DAW*	Offshore Beaufort
SINUM PERSPECTIVUM (Say) (Common Baby's Ear)	1.73 inch (44mm)	DML No. 2309*	Pivers Island
STROMBUS PUGILIS ALATUS (Gmelin) Florida Fighting Conch)	4.53 inch (115mm)	Piper	
	4.30 inch (112mm)	IMS*	South of Cape Fear
TEREBRA CONCAVA (Say) (Concave Auger)	0.90 inch (23mm)	IMS No. 1855*	ESE New River Inlet
TEREBRA DISLOCATA (Say) (Atlantic Auger)	1.75 inch (44.5mm)	IMS No. 401	Off Atlantic Beach
THAIS HAEMASTOMA FLORIDANA (Conrad) (Southern Oyster Drill)	3.81 inch (97mm)	IMS No. 238*	Ocracoke
TONNA GALEA (Linne) (Giant Tun)	6.18 inch (157mm)	Piper	
	4.92 inch (125mm)	DAW*	Offshore Beaufort
TURBO CASTANEA (Gmelin) (Chestnut Turban)	1.65 inch (42mm)	IMS No. 919	Onslow Beach
	1.54 inch (39mm)	IMS No. 2266*	Bogue Sound
TURRITELLA EXOLETA (Linne) (Eastern Turritella)	2.75 inch (70+mm)	IMS	SE Cape Lookout
UROSALPINX CINERA (Say) (Atlantic Oyster Drill)	1.50 inch (38mm)	IMS No. 1133	Bogue Sound
XENOPHORA CONCHYLIOPHORA (Born) (Atlantic Carrier Shell)	2.24 inch (57mm)w	Walton	S. F., Beaufort
	2.00 inch (51mm) w	IMS No. 1875*	S E of New River Inlet

LIST NO. 2 BIVALVES

AEQUIPECTEN MUSCOSUS (Wood) (Rough Scallop)	1.85 inch (47mm)L	IMS No. 1845*	ESE New River
AMERICARDIA MEDIA (Linne) (Atlantic Strawberry Cockle)	1.38 inch (35mm)H	IMS No. 1847	ESE New River
ANADARA BRASILIANA (Lamarck) (Incongruous Ark)	2.48 inch (63mm)L	IMS No. 762	Fort Macon Beach
ANADARA LIENOSA FLORIDANA (Conrad) (Cut-ribbed Ark)	4.36 inch (111mm)L	IMS No. 85	Atlantic Beach
	3.65 inch (92mm)L	IMS No 1103.3*	S.E. Cape Lookout
ANADARA OVALIS (Brugiere) (Blood Ark)	2.24 inch (57mm)L	IMS No. 546a*	Holden's Beach
ANODONTIA ALBA LINK (Buttercup Lucine)	2.76 inch (70mm)L	IMS No. 71	Atlantic Beach
ANODONTIA PHILIPPIANA Reeve (Chalky Buttercup)	3.74 inch (96mm) L	IMS No. 712	Cape Lookout
?ANOMIA ACULEATA (Gmelin) (Prickly Jingle)	1.97 inch (50mm)H	DML No. 856*	Off Cape Lookout
ANOMIA SIMPLEX (d'Orb) (Atlantic Jingle)	1.33 inch (32mm)H	IMS No. 708*	Cape Lookout
ANTIGONA RUGATINA (Heilprin) (Queen Venus)	1.77 inch (45mm)L	IMS No.2598*	S.E. Cape Lookout
ARCA IMBRICATA Brugiere (Mossy Ark)	2.60 inch (66mm)L	IMS No. 1880*	S.E. New River
ARCA ZEBRA Swainson (Turkey Wing)	3.55 inch (90mm)L	IMS No. 1879.9*	S.E. New River
ARCINELLA CORNUTA (Conrad) (Florida Spiny Jewel Box)	1.95 inch (49mm)H	IMS No. 2282*	Off Cape Fear
ARGOPECTEN GIBBUS (Linne) (Calico Scallop)	2.96 inch (75mm)L	IMS No. 782d*	Off Bogue Inlet
ARGOPECTEN IRRADIANS (Say) (Atlantic Bay Scallop)	3.46 inch (88mm)L	IMS No. 1791.9*	Bogue Sound
ASTARTE BOREALIS Schumacker (Boreal Astarte)	1.18 inch (30mm)L	DML No. 576*	Off Oregon Inlet
ASTARTE CASTANEA Say (Smooth Astarte)	1.10 inch (28mm)L	DML No.1646 *	Off Oregon Inlet
ASTARTE UNDATA Gould (Waved Astarte)	1.30 inch (33mm)L	DML No. 1225*	Off Oregon Inlet
ATRINA RIGIDA (Lightfoot) (Rigid Pen Shell)	9.18 inch (233mm)L	IMS No. 407*	Beaufort
ATRINA SEMINUDA (Lamarck) (Half-naked Pen Shell)	7.36 inch (187mm)L	IMS No. 529c	Holden's Beach
	5.91 inch (150mm)L	IMS No 1797*	Off Shackleford
ATRINA SERRATA Sowerby (Saw-toothed Pen Shell)	9.85 inch (251mm)L	IMS No. 973*	Bogue Banks
BARBATIA CANDIDA (Helbling (White-bearded Ark)	0.98 inch (25mm) L	IMS No. 2225*	S. E. Cape Lookout
BARBATIA DOMINGENSIS (Lamarch) (White Miniature Ark)	1.18 inch (30mm)L	IMS No. 2265*	S. E. Cape Lookout
BARNEA TRUNCATA (Say) (Fallen Angel Wing)	2.21 inch (56mm)L	IMS No. 1936	Newport River
BRACHIDONTES EXUSTUS (Linne) (Scorched Mussel)	0.79 inch (20mm)L	IMS No. 6*	Pamlico Sound
BRACHIDONTES RECURVUS (Rafinesque) (Hooked Mussel)	1.85 inch (47mm)L	IMS No. 560c*	New River
CALLISTA EUCYMATA Dall (Glory-of-the-Seas Venus)	1.18 inch (30mm)L	IMS No. *	S. E. Cape Lookout
CHAMA CONGREGATA Conrad (Little Corrugated Jewel Box)	1.34 inch (34mm)H	IMS No. 939*	Cape Lookout
CHAMA MACROPHYLLA Gmelin (Leafy Jewel Box)	1.46 inch (37mm)H	IMS No. 764	Fort Macon
CHIONE CANCELLATA (Linne) (Cross-barred Venus)	1.66 inch (42mm) L	IMS No. *	Middle Sound-Wrightsville Beach
CHIONE INTAPURPUREA Conrad (Lady-in-waiting Venus)	1.54 inch (39mm)L	Walton	S. F., Beaufort
CHIONE LATILIRATA Conrad (Imperial Venus)	1.34 inch (34mm)L	IMS No. 2295.1*	E.SS. E. Cape Lookout
CRASSOSTREA VIRGINICA (Gmelin) Easter Oyster	8.34 inch (212mm)H	IMS No. 883.2*	Cedar Island
CUMINGIA TELLINOIDES (Conrad) Tellin-like Cumingia	0.90 inch (23mm)L	IMS No. 763	Fort Macon
	0.63 inch (16mm)L	IMS No. 1937*	Newport River
CYRTOPLEURA COSTATA (Linne) Angel Wing	5.55 inch (141mm)L	IMS No. 532	Holden's Beach
	4.92 inch (125mm)L	IMS No. 241*	Peletier Creek

DINOCARDIUM ROBUSTUM (Lightfoot) (Giant Atlantic Cockle)	4.68 inch (119mm) H	Piper*	Cape Lookout
DIPLODONTA PUNCTATA (Say) (Atlantic Diplodon)	0.79 inch (20mm)L	IMS No. 3133	SSE Cape Hatteras
DIVARICELLA QUADRISULCATA D'Orb (Cross-hatched Lucine)	0.79 inch (20mm)L	IMS No.501*	Bird Shoal
DONAX VARIABILIS Say (Florida Coquina)	0.79 inch (20mm)L	IMS No.26051*	Bogue Banks
DOSINIA DISCUS (Reeve) (Disk Dosinia)	2.84 inch (72mm)L	IMS No.647a*	Shackleford Banks
DOSINIA ELEGANS Conrad (Elegant Dosinia)	3.90 inch (99mm)L	IMS No.396	Off Bogue Banks
	3.58 inch (91mm)L	IMS No.1104.1*	S.E. Cape Lookout
ENSIS DIRECTUS Conrad	5.00 inch (127mm)L	IMS No. 1342*	Newport River
EUCRASSATELLA SPECIOSA (A. Adams) (Gibb's Clam)	2.32 inch (59mm)L	IMS No.3956	Off Emerald Isle
	2.28 inch (58mm)L	DML No. 571*	S. Cape Hatteras
GLYCYMERIS AMERICANA (DeFrance) (Giant American Bittersweet)	4.02 inch (103)L	Piper*	Offshore Scallops'
GLYCYMERIS SPECTRALIS Nicol (Spectral Bittersweet)	0.98 inch (25mm)L	IMS No.2713.3*	Cape Fear
HIATELLA ARCTICA (Linne) (Artic Saxicave)	1.30 inch (33mm)L	Walton	New River Inlet
	0.63 inch (16mm)L	IMS No.2045*	S.E. New River
LABIOSA ANATINA (Spengler) (Smooth Duck Clam)	2.80 inch (71mm)L	IMS No.473	Bird Shoal
LABIOSA PLICATELLA (Lamarck) (Channeled Duck Clam)	2.72 inch (69mm)L	IMS No.732	Fort Macon
LAEVICARDIUM LAEVIGATUM Linne (Common Egg Cockle)	2.87 inch (73mm)H	Walton	S. F., Beaufort
	2.56 inch (65mm)H	IMS No.2734*	Off Oregon Inlet
LAEVICARDIUM MORTONI (Conrad) (Morton's Egg Cockle)	0.73 inch (18.5mm)H	IMS No.444	Bogue Sound
LAEVICARDIUM PICTUM (Ravenel) (Ravenel's Egg Cockle)	1.02 inch (26mm)H	IMS No.1895*	S.E. New River
LIMA SCABRA (Born) (Rough Lima)	2.60 inch (66mm)H	IMS No.2704	S.E. Cape Fear
LITHOPHAGA ANTILLARUM (d'Orb.) (Giant Date Mussel)	3.23 inch (82mm)L	IMS No.1064*	Off Cape Lookout
LITHOPHAGA ARISTATA Dillwyn (Scissor Date Mussel)	1.34 inch (34mm)L	DML No. 1160*	Off Cape Lookout
LITHOPHAGA BISULCATA (d'Orb) (Mahogany Date Mussel)	1.22 inch (31mm)L	Walton	Bogue Sound
LUCINIA PENNSYLVANIA (Linne) (Pennsylvania Lucine)	2.48 inch (63mm)L	IMS No.1065	Off Core Banks
	2.05 inch (52mm)L	DML No. 2508*	E. of Cape Lookout
LYONSIA BEANA d'orb (Pearly Lyonsia)	1.34 inch(34mm)L	Walton	Off New River
LYROPECTEN NODOSUS (Linne) (Lion's Paw)	4.72 inch (120mm)L	IMS No.1842*	ESE New River
MACOMA BALTHICA (Linne) (Balthic Macoma)	1.06 inch (27mm)L	IMS No.1130.1*	Adams Creek, N.C.
MACOMA BREVIFRONS Say (Short Macoma)	0.95 inch (24mm)L	IMS No. -	S.E. Cape Lookout
MACOMA PHENAX Dall	0.79 inch (20mm)L	IMS No. - *	Neuse River
MACOMA TENTA Say (Tenta Macoma)	0.67 inch (17mm)L	IMS No.1236*	Bogue Sound
MACROCALLISTA MACULATA Linne (Calico Clam)	3.39 inch (86mm)L	IMS No.2738*	S. of Cape Lookout
MACROCALLISTA NIMBOSA (Lightfoot) (Sunray Venus)	6.38 inch (162mm)L	IMS No. 390*	Cape Lookout
MACTRA FRAGILIS Gmelin (Fragile Atlantic Mactra)	1.97 inch (50mm)L	IMS No.1500*	Bogue Sound
MARTESIA CUNEIFORMIS Say (Wedge-shaped Martesia)	0.59 inch (15mm)L	IMS No.439*	Core Sound
MERCENARIA CAMPECHIENSIS (Gmelin) (Southern Quahog)	5.58 inch (142mm)L	Truckner*	Cape Lookout Bight
MERCENARIA MERCENARIA (Linne) (Northern Quahog)	4.42 inch (112mm)L	IMS No.98*	Hoop Pole Creek
MERCENARIA CAMPECHIENSIS - MERCENARIA HYBRID ??	5.94 inch (151mm)L	IMS No. - *	Bogue Sound
MODIOLUS AMERICANUS (Leach) (Tulip Mussel)	1.81 inch (46mm)L	IMS No.46*	Core Sound
	2.32inch (59mm)L	Walton	New River

MODIOLUS DEMISSUS (Dillwyn) (Atlantic Ribbed Mussel)	5.24 inch (133mm)L	IMS No. -	Radio Island
MODIOLUS MODIOLUS (Linne) (Northern Horse Mussel)	4.48 inch (114mm)L	IMS No.1111*	ENE Oregon Inlet
MULINA LATERALIS (Say) (Dwarf Surf Clam)	0.86 inch (22mm)L	IMS No. - *	Neuse River
MYA ARENARIA Linne (Soft-shell Clam)	3.65 inch (92mm)L	IMS No.1627	Cape Lookout
	3.18 inch (81mm)L	DML No. 2506*	Shackleford Banks
MYTILUS EDULIS Linne (Common Blue Mussel)	2.56 inch (65mm)L	DML No. 786	N. of Cape Hatteras
	2.23 inch (56.5mm)L	IMS No.693*	Kitty Hawk
NOETIA PONDEROSA (Say) (Ponderous Ark)	2.48 inch (63mm)L	IMS No.1121.5*	Off Shackleford
OSTREA EQUESTRIS Say (Crested Oyster)	2.05 inch (52mm)H	IMS No. 244C *	Bogue Sound
OSTREA PERMOLLIS Sowerby (Sponge Oyster)	1.66 inch (42mm)H	IMS No. -*	ESE New River
PANDORA TRILINEATA Say (Say's Pandora)	1.10 inch (28mm)L	IMS No.2549*	W. Wimble Shoals
PANOPE BITRUNCATA Conrad (Atlantic Geoduck)	7.56 inch (192mm)L	Walton	S. F., Beaufort
PAPYRIDEA SOLENIFORMIS (Bruguiere) (Spiny Paper Cockle)	1.50 inch (38mm)L	IMS No. 637	New Topsail
	0.94 inch (24mm)L	IMS No.2325.2*	SSE Cape Hatteras
PECTEN RAVENELI Dall (Ravenel's Scallop)	2.76 inch (70mm)L	IMS No.1885*	S.E. New River
PERIPLOMA LEANUM (Conrad) (Lea's Spoon Clam)	1.73 inch (44mm)L	IMS No. 1383	Southport
PETRICOLA PHOLADIFORMIS Lamarck (False Angel Wing)	2.21 inch (56mm)L	IMS No. 747p	Fort Macon
	1.77 inch (45mm)L	DML No.1845*	Harkers Island
PHOLAS CAMPECHIENSIS (Gmelin) (Campeche Angel Wing)	3.75 inch (96mm)L	IMS No.451b	Yaupon Beach
PITAR MORRHUSANA (Linsley) (Morrhua Venus)	1.46 inch (37mm)L	DML No.514	Off Oregon Inlet
	1.42 inch (36mm)L	DML No. 514*	Off Oregon Inlet
PHACOIDES FILOSUS (Stimpson) (Northeast Lucinia)	1.22 inch (31mm)L	DML No. 519*	Off Oregon Inlet
PLACOPECTEN MAGELLANICUS (Gmelin) (Atlantic Deep-Sea Scallop)	6.38 inch (162mm)L	Piper*	Above Cape Hatteras
PLICATULA GIBBOSA (Linne) (Kitten's Paw)	1.33 inch (32mm)L	IMS No. -	Off Cape Fear
PODODESMUS RUDIS (Broderip) (False Atlantic Jingle)	1.02 inch (26mm)L	IMS No.363*	S.E. Cape Lookout
POLYMESODA CAROLINIANA (Bosc) (Carolina Marsb Clam)	2.09 inch (53mm)L	IMS No.2601*	Calico Creek
PSEUDOCHAMA RADIANS (Lamarck) (Atlantic Left-handed Jewel Box)	2.21 inch (56mm)H	IMS No.1830*	S.E. New River
PTERIA COLYMBUS (Roding) (Atlantic Wing Oyster)	3.81 inch (97mm)L	IMS No.1881*	S.E. New River
RANGIA CUNEATA (Gray) (Common Rangia)	3.18 inch (81mm)L	Wolfe*	Neuse River
RUPELLARIA TYPICA (Jonas) (Atlantic Rupellaria)	1.10 inch (28mm)L	DML No.1221*	Off Cape Lookout
SEMELE BELLASTRIATA (Conrad) (Cancellate Semele)	0.83 inch (21mm)L	IMS No.2512	Off Cape Fear
	0.67 inch (17mm)L	IMS No.2210*	S.E. Cape Lookout
SEMELE PROFICUA (Pulteney) (White Atlantic Semele)	1.38 inch (35mm)L	IMS No.630b	New Topsail Inlet
SEMELE PURPURASCENS (Gmelin) (Purplish Semele)	1.10 inch (28mm)L	IMS No. 2513	Off Cape Fear
	1.02 inch (26mm)L	IMS No - *	S.E. Cape Lookout
SOLECURTUS CUMINGIANUS Dunker (Corrugated Razor Clam)	2.84 inch (72mm)L	IMS No. 1640	Offshore N. C.
SOLEMYA VELUM (Say) (Boreal Awning Clam)	0.79 inch (20mm)L	IMS No. 1350*	Bogue Sound
SOLEN VIRIDIS (Say) (Green Jackknife Clam)	1.38 inch (35mm)L	IMS No. - *	Atlantic Beach
SPENGLERIA ROSTRATA (Spengler) (Spengler Clam)	1.18 inch (30mm)L	IMS No. - *	Off Cape Fear

SPISULA RAVENELI (Conrad) (Southern Atlantic Surf Clam)	4.64 inch (118mm)L	IMS No.	Nags Head
	4.13 inch (105mm)L	IMS No. 1343*	Cape Lookout
SPONDYLUS AMERICANUS Herman (Atlantic Thorny Oyster)	3.23 inch (82mm)H	IMS No.	Off Cape Fear
	3.07 inch (78mm)H	IMS No.2596*	S.E. Cape Lookout
TAGELUS DIVISUS Spengler (Purplish Tagelus)	1.30 inch (33mm)L	IMS No.504*	Bird Shoal
TAGELUS PLEBEIUS (Lightfoot) (Stout Tagelus)	3.58 inch (91mm)L	IMS No.503*	Bird Shoal
TELLIDORA CRISTATA Recluz (White-crested Tellin)	0.95 inch(24mm)L	IMS No.929	Atlantic Beach
TELLINA AEQUISTRIATA Say (Lintea Tellin)	0.90 inch (23mm)L	IMS No.513*	Bird Shoal
TELLINA ALTERNATA Say (Alternate Tellin)	2.60 inch (66mm)L	Walton	New River Inlet
TELLINA LISTERI Roding (Speckled Tellin)	1.73 inch (44mm)L	IMS No.2316	SSE Cape Hatteras
TELLINA MAGNA Spengler (Great Tellin)	4.96 inch (126mm)L	Walton	S. F., Beaufort
	4.57 inch (116mm)L	Laughinghouse	S.F., Beaufort
TELLINA NITENS C. B. Adams (Georgia Tellin)	1.42 inch (36mm)L	IMS No. - *	S.E. Cape Lookout
TELLINA PROBRINA Boss	0.79 inch (20mm)L	IMS No.	S.E. New River
TRACHYCARDIUM EGMONTIANUM (Shuttleworth) (Prickly Cockle)	2.96 inch (75mm)H	DML No.2232	Cape Lookout
	2.80 inch (71mm)H	Piper*	Cape Lookout Bight
TRACHYCARDIUM MURICATUM (Linne) (Yellow Cockle)	1.66 inch (42mm)H	IMS No.	Middle Sound - Wrightsville Beach area
TUCETONA PECTENATA (Gmelin) (Comb Bittersweet)	0.86 inch (22mm)L	IMS No.644	Shackleford
VENERICARDIA BOREALIS (Conrad) (Northern Cardita)	1.33 inch (32mm)L	IMS No.1219*	Off Oregon Inlet
YOLDIA LIMATULA (Say) (File Yoldia)	1.66 inch (42mm)L	DML No.593*	Off Oregon Inlet
YOLDIA SAPOTILLA Gould (Short Yoldia)	0.86 inch (22mm)L	IMS No.1224*	Off Oregon Inlet

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