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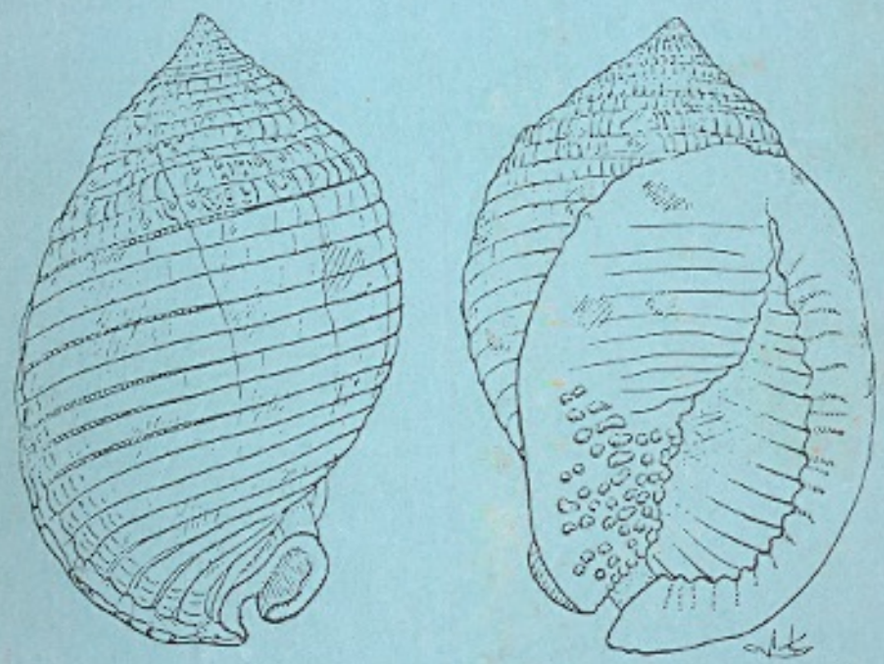
NORTH CAROLINA SHELL CLUB BULLETIN

1968

NO. 5



COVER:

Scotch Bonnet (Phalium granulatum Born)
official state shell for North Carolina.

Drawing by Mr. Jean Kane, Exhibits Designer,
N.C. State Museum of Natural History.

NORTH CAROLINA SHELL CLUB BULLETIN, 1968, No. 5
Editor - Hugh J. Porter
Committee: Ruth S. Dixon & James E. Wadsworth

1969 Officers

President	Mr. Hugh J. Porter
Vice-President	Mr. Walter Lowry
Secretary	Mrs. Ruth S. Dixon
Treasurer	Mrs. Elizabeth T. Mathews
Historian	Mrs. Charlotte Johnson

Executive Committee Members at Large:
Mr. William Hammnet Dr. John H. Ferguson

1969 Schedule

March 14 - 16	Myrtle Beach, S. C.
May 23 - 25	Wrightsville Beach, N. C.
October 3 - 5	Atlantic Beach, N. C.
December 6	Raleigh, N. C.

PRESIDENT'S MESSAGE

Hugh J. Porter

Organizations do not exist without purposes and goals. The North Carolina Shell Club's Constitution states only that the membership is open to all who are interested in the collection of shells or study of Malacology. From this I infer that our Club's purposes and goals are:

> The club is a means by which persons in the North Carolina area can get together to share their love and knowledge of shells and in so doing, increase both their understanding concerning the mollusca and the value of their collections. I would suggest that the club also has a responsibility to encourage and educate, where possible, the wise use of our molluscan resources.

During my period in office, I intend to keep tenets in mind so that our meetings can be not only constructive but also enjoyable and relaxing.

In addition to the elected officers of the club, I have made the following committee appointments:

Meeting registration - Elizabeth Grady
Door prizes - Wade Brown and Mrs. Doris Ferguson
Upchurch Memorial Collection - Dr. Jack Upchurch
Current literature - Marguerite Thomas
Publicity - Paul Jennewein

To Wade Brown, who served so capably these past two years as club president, I would like to express my appreciation for his leadership and accomplishments. I know we can continue to expand the value of the club to its membership and to the community, as in the past, if we will continue to work together.

ANNUAL FINANCIAL STATEMENT
Period 12-1-67 to 12-1-68
Elizabeth T. Mathews, Treasurer

Balance on hand 12-1-67		$420.71
RECEIPTS		
Dues from 12-1-67 to 12-1-68	$198.00	
1 Scotch Bonnet Hat sold	3.00	
Total Receipts	201.00	201.00
Total		$621.71
DISBURSEMENTS		
Postage, Paper & Envelopes	54.15	
Door Prizes	5.00	
American Malacological Union Dues	6.00	
Bulletin #4(350 copies)	158.00	
Rental of Films	3.00	
Travel Expense - Dr. Abbott	68.78	
Flowers	6.18	
10th Anniversary Banquet Expense	30.96	332.07

Total Funds on Hand Brought Forward		$621.71
Disbursements Brought Forward	$332.07	
Disbursements (Continued)		
Intangible Tax	.39	
Honorarium for Secretary -1967	25.00	
Total Expenses		357.46
Balance on Hand 12-1-68		$264.25

NORTH CAROLINA SHELL CLUB ACTIVITIES - 1968
Ruth S. Dixon, Secretary

Under the leadership of Mr. Wade Gillies Brown, President, assisted by Hugh J. Porter, Vice President and Program Chairman, our club had a most interesting and enjoyable year and a year of growth in membership. We gained 44 in new members.

The year was begun with another one of those fabulous meetings at Myrtle Beach with Clay Brittain as host at the Chesterfield Inn. It being our Spring meeting we met March 22-24 and once again enjoyed the Chesterfield's delicious South Carolina food. On Friday evening, Dr. John Ferguson's Workshop covered Fissurellidae, Acmaeidae and Lepetellidae (Carolina and world-wide keyhole limpets) illustrated by slides and exhibits. Saturday morning being cold, many hardy members collected and found a number of small, interesting shells, some alive. On Saturday evening following the business meeting slides were shown on Nancy and Wade Brown's trip to Incas, Peru to the "Lost City" and also movies on Mollusks and mysteries of the Deep by James Wadsworth.

The summer meeting (May 17-19) was held at the John Yancey Motor Hotel at Atlantic Beach. On Friday evening Capt. Josiah Bailey charmed the members with a detailed early history of Shackleford Banks which is part of the Outer Banks. The "Diamond City" motor and sail boat piloted by Captain Josiah Bailey shoved off Saturday morning at 8:00 a.m. with a boat load of enthusiastic shellers for Shackleford Banks. The Saturday evening meeting was held at the University of North Carolina

Institute of Marine Sciences in Coker Hall at Morehead City. Dr. A. F. Chestnut, Director, spoke on Molluscan research of Dr. Robert Coker. Our president, Wade Brown, presented a life membership to Carl and Bess Withrow who will be moving to Florida at retirement.

Fall meeting (October 11-13) was held at Topsail Beach, N. C. Many of our members had been away for the summer to the Caribbean. Jeanne Whiteside shared with us her experiences in Puerto Rico and Marguerite Thomas being the spokesman for the "6 babes," Ann Yelvington, Cornelia McInnes, Phoebe Meadows, Thelma Groves and Maxine Perrine, who vacationed at Bimini in the Bahamas, related their shelling experiences there, illustrated by slides. Saturday morning,there was an informal field trip on the island where every inch of shore line was practically occupied by fishermen. At the business meeting our president displayed a Cypraea cervus (Atlantic Deer Cowrie) found on Topsail Island by Mr. R. E. Rackley, local Chief of Police. He persuaded him to donate it to the N. C. Museum of Natural History instead of carrying out his plans to make a lamp out of it.

The Winter meeting (December 7, 1968) was held at the North Carolina State Museum of Natural History in Raleigh, N. C. The group had an early morning, informal get-together displaying shells in the family, Patellacea, and other N. C. shells. Dr. John Ferguson's Workshop entitled "Life of the Limpets" was in the Super-Family, Patellacea, world-wide and North Carolina. Credit is due to Dr. Ferguson and Dr. Jack Upchurch for burning much mid-night oil in preparing photographs for slides to illustrate each one of the Workshops. This being the annual meeting for election of officers, the following were elected: Hugh J. Porter, President; Walter Lowry, Vice President; Ruth S. Dixon, Secretary; Elizabeth T. Mathews, Treasurer; Historian, Mrs. Charlotte Johnson; Executive Committee members at large: Mr. William Hammnet and Dr. John H. Ferguson. It was voted to have an early spring shelling trip on the "Diamond City" boat to Cape Lookout.

The highlight of the day was the talk by our invited guest, Mr. Bill Old from the American Museum of Natural History in the Department of Mollusks in New York City. He spoke on "Around the World with Mollusks" which was illustrated with slides. At

the close of the meeting the members retired in a driving snow storm to the Downtowner Motel for a dinner. This may not be unusual for shell clubs in our Northern states, but before Christmas in North Carolina, let's say it was out of the ordinary.

BIOGRAPHY OF A N. C. SHELL CLUB MEMBER
---- CARL C. WITHROW ----

By- Paul Jennewein

The year 1965 might be considered something special in the life of a serious shell collector and North Carolina Shell Club member.

This was the year that Carl C. Withrow could relax and pursue his hobby of gathering shells from exotic places. For the past two years (1963 and 1964), he had been president of the North Carolina Shell Club -- and there was little time for relaxation during administrative duties in those two years, one in which the club decided on what later became the state shell. And 1965 was among his best years since he discovered the wide world of shells and became hooked (to use his own term) in 1957.

In 1965 he persuaded 16 NCSC and American Malacological Union (AMU) members and friends to join the Hawaiian Malacological Society, winning second prize in the HMS contest for new members, and --more important -- a fine selection of prize shells, among them Bursa affinis, Latirus nodus, Columbraria muricata, two specimens of Distorsio anus, and still rarer shells like Strombus helli, Conus pertusus and Cypraea sulcidentata.

By that time, too, he'd been acquiring a world-wide reputation as a collector of volutes, murexes, cones and conches -- or for the more learned, Volutacea, Muricacea, Conidae and Stormbidae.

There are other shell families now -- Lambis (of which he has all known species and sub-species), Mitres and Cypraea. Of the last, some may remember the three days of negotiations at Chapel Hill between him and Mrs. Ruth A. Craine of Norwich, N. Y., for a handsome Cypraea aurantium, Gmelin -- or Golden

Cowry. She finally traded and both were pleased.

In 1965, some might remember his suggestion to the Hawaiian Shell News that Dr. Palmer's paper on the Sowerbys be published (which it was in three parts, November 1965 through January 1966). Dr. Katherine V. W. Palmer, director of the Paleontological Research Institute, Ithaca, N. Y., had done considerable research on a family of five artist-scientists which spanned three generations from 1812-1897, providing earliest recorded names for hundreds of shells.

Carl was easy to spot at the Shell Club meetings. He usually wore a wild, shell-spangled shirt which matched the volute collection he'd spread out on a large table. After the organized parts of the meetings, you'd find him next to a cooler, from which he'd draw 16-ounce cans of beer.

It was under his leadership the club first started meeting at Myrtle Beach's Chesterfield Inn. And some may remember him as the donor of many shells -- with data -- they won as door prizes.

Carl C. Withrow was born on June 9, 1903, in Richmond, Quebec, Canada, and when about five moved to Island Pond, Vt. He attended grade and high shool there and on graduation in 1920, entered the University of Vermont.

After two years, he recalls, "the money ran out, so I taught school one year in the Chelsea (Vt.) High School." Subjects included French, Latin and business arithmetic. He also was basketball coach.

On the strength of that year's teaching, he obtained an assistant principal's post at the high school in Holden, Mass. He coached basketball and track, as well as teaching Chemistry, Civics and freshman English.

"When I flunked the county school superintendent's daughter in chemistry, I was not exactly encouraged to return the next year, " he recalls.

"Having saved $10, I returned to the University of Vermont

and graduated 'cum minima Lauda' in 1926 with the degree of Ph. B. (not Ph. D. !)."

There was one weak subject:

"In Zoology, I was second in a class of 150 in lab work, but flunked lectures and written exams for three straight years. (I never could remember those gosh-awful names like Mollusca, Gastropoda, etc.)." Carl finally passed Zoology the fourth year, when he needed the science to graduate. But, apparently, the experience soured him on a career in the educational fields.

He went to work for Hearst Magazines and traveled. Cities included Boston, Detroit, Atlanta and Baltimore. After a year, he was made manager of the Atlanta office, and stayed until 1940, when he was fired in a retrenchment program. He worked in Nashville, Tenn., in sales, and in 1942 was hired by Proctor & Gamble, which moved him to Charlotte.

He was there until he retired ("except for a four-year Siberian banishment to Columbia, S. C.") as sales representative for the Bakery, Restaurant and Institutional Food Sales Department, dealing in shortenings, oils and cake mixes. His territory included the Carolinas.

"Bess and I both became interested in shells purely by accident," he recalls. "On numerous beach vacations while our children were growing up -- we have two girls and a boy, and nine **grand**-children -- we might have picked up shells because they were pretty. But, when someone told us coquinas were 'periwinkles,' we adopted the name, and to this day are tempted to call them by that name.

"Finally, in 1957, we were able to take our first vacation without children. Casually, looking over an AAA book on Florida, Bess picked Sanibel and Captiva Island, because they sounded peaceful and remote.

"When we admired pretty shells in the motel lobby, we were told to see Mrs. Mary Cunningham, a dealer on Captiva, and from then on we were hooked."

"A bit later, our daughter in Goldsboro sent us a clipping from The Raleigh News & Observer, about the recently organized N. C. Shell Club. We wrote to the secretary, Miss Roberta Lytle, and joined the club as soon as we could scrape up the dues."

Bess and "Paw," as she affectionately calls him (and their dog, Nickey) moved to St. Petersburg, Fla., on his retirement, July 1, 1968. Within a few months, they were as active in the St. Petersburg Shell Club as they had been in the AMU and NCSC. They bought a home in St. Petersburg close to a main highway, undoubtedly as an inducement to NCSC members to visit them.

The attached garage is being converted into a storehouse of shells -- along with the antique bottles, also collected by both. If you should be in the Tampa-Sarasota-St. Pete area, they'd love a visit. The address is 4825 Ninth St., South.

* Editor's Note

Indicative of Carl's continuing interest in shell collecting is the fact that he entered the 22nd Annual St. Petersburg Shell Club Show (Feb. 26-March 2, 1969), and won the following: Honorable Mention in the Smithsonian Award (their top award) for his Mitridae exhibit, first place in the category - "Best display of any one Genus" for his Lambis exhibit. Carl's explanation: "Beginner's luck." I think most of us who know him will disagree with that statement.

SHELLS, AND HOW THEY GET TO BE THAT WAY
(PART III)

Dr. John H. Ferguson

(Talk to N. C. Shell Club, at the December 1966 meeting)

This last presentation in the series will deal with shell features of the Bivalves or PELECYPODA. If we loosely call all the Gastropods SNAILS, we may call the Pelecypods CLAMS, but this isn't very helpful or meaningful. Pelecypod means 'hatchet-footed', referring to the shape of the powerful extended foot by means of which the animal can burrow rapidly and often jump with surprising agility. It is usually easy to recognize a Pelecypod SHELL because it is in two pieces, the right and left valves.

Orientation. To appreciate the shell features of a bivalve, the first thing is to learn how to orient it correctly. Start by holding the shell with the hinge (that joins the two valves together) at the top. This then is the dorsal margin (where the hinge is), while the opposite edge, called the ventral margin, is where the valves are able to separate. If we can now say which end is in front (or anterior), the shell may be held with this end forward, so that now (looked at from above), the right valve is on the right, and left valve is on the left. Actually, it isn't always easy to be sure which is the anterior end. The following points may help, but none of them is infallible.

(1) The anterior (front) end is often more rounded or less pointed. A conspicuous example is seen in Tellina (Tellinella) virgata Linne', the Striped Sunset (Tellin) Shell from New Zealand, etc. An Elongate much more pointed posterior end is seen in many Tellins. Labiosa (Raeta) plicatella (Lamarck), our Carolina Channelled Duck Clam, is a much less extreme example. Looking at it this time from the inside (for practice), it is easy to distinguish between the rounded anterior end and the somewhat flaring and pointed posterior end. Incidentally, note also the chondropore or triangular hollow for the internal ligament at the center of the dorsal margin. We'll return to this later. Discors (Lyrocardium) lyratum (Sowerby), the Lyrate Cockle from Portugese East Africa, would be more of a problem except for its unique feature in having a conspicuous ridging or rib sculpture, which runs somewhat horizontally (concentric) at the anterior end while it is almost vertical (radial) at the posterior end.

(2) The tip or beak at the top of each valve is scientifically termed the umbo (plural: umbones). The umbo is usually pointed toward, or curves toward, the anterior end. This may be illustrated in our common Carolina Disc Shell, Dosinia (Dosinidia) discus Reeve, or in its elegant ridged cousin D. (D.) elegans Conrad. In these shells, I may call your attention to the hinge ligament and its position behind the umbo.

(3) When the ligament can be seen from the outside (external) looked at from above, the umbones are in front of it and the bivalve is easily oriented as to the right and left valves. The Discors (Lyrocardium) lyratum (Sowerby), above, or many other Pelcypods may be used as illustrations. It may also be noted

that the ligament often lies in an elongated hollow called the escutcheon (after the shield-like emblem in ancient heraldry). When the ligament is missing in a beach worn shell, you may still be able to recognize the escutcheon and use this for orientation in the same way. A triangular escutcheon behind the umbones is conspicuous, for instance, in our common Cancellate Venus, Chione (Chione) cancellata Linne'.

(4) Notice here, however, as a 4th point that you must distinguish between this escutcheon behind the umbones from another hollowed feature in front of the umbo, which forms the half of a little moon or lunule on either valve. When the two halves get together by the approximation of the dorsal margins of the two valves, the whole lunule appears somewhat heart-shaped, so it is usually easy to identify. Remember then the lunule is in front of the umbones, pointing toward the anterior ends of the valves. The lunule and the escutcheon (containing an external ligament) are clearly differentiated in the Chinese Venus, Callista (Callista) chinensis (Holten), which is also found in Japan.

A number of important identifying and orienting features are to be seen on the inside of the valves. Related to our common little Coquinas (Donax (Serrula) variabilis Say) is the giant South African Wedge Shell, Donax (Serrula) serra Röding. The mantle of the living mollusk, which secretes the shell (see Part I), is attached to certain areas of the valve interior in the Pelecypods. It becomes free along a line which is often marked by a visible groove or incised line near the ventral margin of the shell. This is called the pallial line, pallium being the scientific name for the mantle. Its precise location and shape can be very helpful in identifications, among the small tellins for instance.

In Part I, we talked about exhalent and inhalent siphons in gastropods. Pelecypods also have such siphons and they are often extended side-by-side (more-or-less) projecting from the posterior end of the shell. They extend when the valves open and can usually be retracted when the shell is closed. The mantle has to wrap itself around the siphon (or siphons) thus causing its attachment in this region to bend further inside the valve and thus form a U or V-shaped notch. This is called the pallial sinus.

(5) Remembering that the opening of the pallial sinus points backward, this feature can identify the posterior end of the valve. The pallial line usually extends to one or both of the adductor muscle attachments (see later). Typically, there is an anterior adductor muscle toward the front and a posterior adductor toward the back. They often make obvious muscle scars on the interior of each valve. Another good example of the pallial line and adductor scar features is in our brackish-water Rangia Clam, Rangia (Rangia) cuneata Gray, from Currituck Sound. This Pelecypod also has a marked chondropore for the internal ligament (see later).

Now for something about general features of Pelecypods. In a great many bivalves the two half-shells are almost equal in size. Hence the designation equi-valve, or with the diphthong 'ae'- in the Latin spelling. A good example is our Giant American Bittersweet, Glycymeris (Glycymeris) americana Defrance, from Cape Lookout. This shell is now rather rare and seems to be dying out. That it has lived in the Carolinas for millions of years is attested by the numerous specimens still to be found in our FOSSIL beds. Much prettier and stouter is the Giant Bittersweet from Lower Californai (Mexico), Glycymeris (Glycymeris) gigantea Reeve. Looking at the inside reveals the thickened dorsal margin with the slanting ridges that make up the very distinctive pattern of hinge teeth in the bittersweets. These shells are also equilateral, meaning equal sides, as measured from the umbo to the anterior and to the posterior ends, respectively.

Inequivalve (not-equal valves) means that one valve is larger and tends to overlap the other. This is very typical of oysters, for instance, and we may use Ostrea (Dendostrea) frons Linne', from Florida and the West Indies, as an illustration. In Ostrea it is the left valve which is the larger and many oysters secrete extra shell material to cause this left (or lower) valve to become firmly attached to pilings, mangrove roots, rocks, or to other oysters or different shells. The attached valve of an oyster then is the left valve. The Corbulas are other examples of inequivalve shells, e.g., Corbula (Solidicorbula) erythrodon (Lamarck), which is a rather large species from Japan. Viewed from above in the proper orientation, you can see that it is the right valve which is the larger here. Corbula is fairly equilateral, however, with a heavy central umbo. A great many bivalves are inequilateral

(unequal sides), with the umbones as a rule tending to be closer to the anterior end.

Term, PRODISSOCONCH, in a bivalve replaces the term, protoconch, which is reserved for the gastropods (Part I). You may remember that this is the first or embryonic part of the shell. In a bivalve, the prodissoconch becomes the beaks or umbones, but the original 'first shell' is often eroded away in adult shells. Sometimes, however, there are distinctive colorations or sculpture patterns at the beaks, which may be regarded as prodissoconch features. In the Indopacific Crowned Venus, Placemen tiara (Dillwyn), there is a splotch of such prodissoconch pink color on the umbones of the adult valves. The smooth original prodissoconch makes the umbones of the Australian Frilled Venus, Callanaitis disjecta, Perry, whereas the later shell body becomes beautifully sculptured by wavy, pink-tinted, concentric sharp ridges. Our common Southern Hard Clam (Quahog), Mercenaria campechiensis (Gmelin), shows many of the features we've been describing and it can also be used to illustrate the umbonal or prodissoconch region, in that this shows a more uniform and widely-spaced ridging that is clearly different from the more closely set and less regular concentric sculpture of the more mature shell. We often find young valves of both the Southern and Northern (M. mercenaria Linné) quahogs that look quite different from the older shells. Either may have the brown zigzag markings sometimes designated as the variant M. notata (Say).

In many of the scallops (Family: PECTINIDAE), especially in the Genus Chlamys Roding, the prodissoconch and early development present some characteristic features. Let us look at the Giant Rock Scallop, Hinnites multirugosus Gale (Syn: 'giganteus' Gray), which is a large rough scallop found attached by the right valve to rocks on the coast of California. If you look carefully at the prodissoconch area, it will be clear that the shape and radial ridge patterns here are very like those of a typical Fan scallop, e.g., Chlamys (Chlamys) irregularis (Sowerby), which is a Japanese shell. It has been learned that very young Rock Scallops wander round free, just like other species of Chlamys. The attachment to rocks by extra shell secretion (as in the case of the oysters) comes later in life. 'Hinnites', therefore, should be regarded as a SUB-genus of CHLAMYS. While the left

valve of Hinnites remains free, its shape is developed to fit the irregularities in the right valve.

In orienting a Fan Scallop (Chlamys), start as usual with the dorsal margin on top. Note that the hinge line is nearly horizontal and is extended into projections termed auricles (little ears), both in front and behind. The anterior auricles are larger and more rounded than the posterior auricles. Scallops are very interesting to watch in motion. They suddenly clamp the opened valves together and eject a jet of water from the posterior region near the hinge. This causes them to jump around in the water, often for remarkable distances. Sometimes they seem to be gobbling the water as they move forward, but actually they are being propelled by the jet subsequently ejected from the rear.

When a scallop lands and rests on the bottom, it is usually on its right side. It is this side, therefore, that may become attached. Only in Hinnites is there the special shelly attachment, however. Other species of Chlamys can form a byssus, however, which is a secretion attached to the body and hardened by the water into stout threads, by which the mollusk can anchor itself to coral, rocks, etc. The anterior auricle of the right valve of Chlamys is grooved and notched to permit egress of the byssus. We'll say more about the byssus later.

The HINGE MECHANISM, which joins the dorsal margins of a bivalve together, is most important. Hinge teeth are the series of ridges (and hollows) that interlock in order to keep the valves together in the closed position. Distinctions between hinge teeth patterns are of scientific value in broad classifications of the Pelecypod families. We'll only mention a few highlights at this time, starting with the statement that these teeth fall into two main groups: (1) the cardinals, located just below the umbo, and (2) the laterals, on either side of the cardinals, and these are subdivided into (a) anterior laterals and (b) posterior laterals, as you might guess.

The Venus Clams (Family: VENERIDAE) are perhaps the most typical of all Pelecypoda and are often used to illustrate the typical features of hinge teeth patterns. Besides those venerids we've already mentioned, some nice illustrations are afforded by (a) the West Mexican (Pacific) Frilled Venus, Chione

(Chionopsis) gnidia (Broderip & Sowerby), where the two cardinals of each valve can be seen to interlock beside each other, while the posterior lateral is well developed; (b) the Pacific Tapestry Shell, Circe (Circe) scripta (Linne), and its variety stutzeri (Donovan), also showing two cardinals and prominent anterior and posterior laterals. Cardium pseudolima, the very large and pretty pink Madagascar Cockle Shell, has prominently jutting hinge teeth that lock the valves together. Much the same pattern occurs in our common Giant Atlantic Cockle, Dinocardium robustum (Solander) (SYN: 'magnum' (Born), non Linné).

Another structural feature in the hinge area is present in a few Pelecypoda, and is located between (or close to) the Cardinal teeth. We noted it, in passing, in a couple of instances, under the term chondropore. It is a hollow, triangular or oval, and sometimes projecting as a shelf (maybe spoonlike), to accommodate an internal ligament, called the resilium. The triangular form is conspicious in the Surf clams (Family: MACTRIDAE), e. g., spisula (Hemimactra) solidissima (Dillwyn). The spoonlike (projecting) chondeopore on the left valve is typical of the New England Soft Clams (Long-neck or Steamer Clams), Mya (Mya) truncata Linne, and Mya (Arenomya) arenaria Linne. The latter is becoming extinct in North Carolina, but a few are still to be found in the upper part of Currituck Sound.

The hinge ligament is always composed of two parts, the horny ligament (which is rigid) and an elastic part, which is cartilaginous. The two parts are often blended together, but in some bivalves the elastic part is separate and is called the resilium. This is always internal, whereas the horny ligament, may be internal or (in part) external. The ligament not only binds the two valves together, but it can stretch to allow the teeth to separate. Even more important, it is attached in such a way that its pull causes the other margins of the shell to separate to some extent. A recently dead bivalve, as you may have noticed, always has the valves opened a bit. In life, it is the adductor (Latin: 'drawing together') muscles which overcome this action of the ligament in order to close the shell.

In some Pelecypods, the margins of the valves do not fit closely together all around, but show one or more openings or gapes somewhere along the ventral margin. In the soft-shell

clams (Family: MYACIDAE), just mentioned, the gape is at the posterior end, and is to permit the exterior of a large siphon tube. This posterior siphon, in fact, cannot be fully retracted (or barely). The biggest gape and largest 'long-neck' are in the giant Geoduck ("Gooey-duck") Clam, Panope generosa Gould, from our Pacific northwest coast. We occasionally find odd valves of its near relative, Panope bitrucata Conrad, on Cape Lookout, N. C. In the Razor Clams (Family: SOLENIDAE), both ends gape, the posterior for the siphon and the anterior for the foot, which is much used for fast digging-in by this mollusk. Ensis (Ensis) directus Conrad, is the common Razor Clam of our Atlantic Coast, although we have some other smaller species, e.g., the Green Jackknife Clam Solen (S.) viridis Say. Solen (Solen) grandis Dunker is an unusually-colored (orange) species from the Great Barrier Reef off Australia.

Among the Arks (Family: ARCIDAE), the Mossy Ark, Arca (Arca) imbricata Bruguiere (SYN: 'umbonata', Lamarck) has a big gape in the middle of the ventral margin. This is to allow the passage of a byssus (see above) or anchoring organ by which the mollusk attaches itself to rocks, etc. The gape is appropriately named the byssal notch. A byssus is a characteristic feature also in the Pen Shells (Family: PINNIDAE), e.g., Atrina (A.) rigida (Solander). The exceedingly fine byssus of the Mediterranean Pen Shell, Pinna (Pinna) nobilis Linne, is still woven by the Sicilians into the equisitely delicate 'tarentino' or cloth-of-gold. This may have been the golden fleece sought by Jason and the legendary Argonauts.

The byssus of the Mussels (Family: MYTILIDAE) is well-known. Mussels are extremely prolific mollusks, massing in the millions on rocks in the intertidal zone, especially in cooler oceans like our northern Atlantic. They resist the pounding of the waves by the firm anchoring of the Byssus. The byssal gland is at the base of the foot muscle and it can shoot out a series of filaments of a sticky gelatinous substance which quickly hardens in sea water. The muscle fibers at the other end draw the threads tight as they harden. The mollusk doesn't exactly pull himself up by the byssal threads. What happens is that he shoots out some new threads ahead of those already in use. Then he thrusts out his foot which is made rigid by blood flowing into it, and thus breaks off the attachments of the old byssus. Now the

foot is elongated forward in the direction he wants to go and so slides along a sticky slimy track of mucus secreted by other glands. It is this ordinary molluscan movement that changes the shell position, while the soft new byssus just permits it to happen and provides some steadying influence. Somewhat like that of a telephone pole worker or a lumberjack, the byssus acts as a sort of safety-belt, so the animal won't fall if the foot happens to slip during an upward climb. Traveling in this way can be a slow and tedious process. As to the mucus, you've all seen this in the tracks of a garden snail or slug.

In burrowing bivalves like the Razor Clams (above), there is no byssus but the movements can be very rapid. Here the foot shoots down into the mud or sand, then the leading end swells by the inflow of blood and this now serves as an anchor. As the muscle contracts it now pulls the whole shell toward the swollen end. These things are rapidly repeated and it is amazing how hard it is for a digger to catch up with the agile mollusk. One good trick is to use a metal rod with a partly projecting end. Thrust this down beside the hole into which he has just disappeared, and some of the time you can get ahead of him and hook him out with a quick pull.

We'll say just a final word about the adductor muscles, stretching from one valve to the other with permanent firm attachments, and so pulling the shells together when the muscles contract. These muscles vary in number and size, but in a great many Pelecypods there are two, i.e., (a) anterior adductor and (b) posterior adductor, and they are more-or-less equal in size. The Hard Clam (Quahog) Mercenaria mercenaria, Linne', may be cited as a typical example. In the mussels, which anchor themselves by a byssus attached near the anterior end (see above), there is little need for completely closing this part of the shell. Hence, nearly all the shell growth and the posterior adductor muscle develop toward the back of the shell. The umbones are very close to the front and the anterior adductor muscle is poorly developed. The Greek word for 'unequal muscles' is ANISOMYARIA, which is used to classify the mussel Families in a natural Order, based on this feature. Mytilus (Mytilus) edulis Linne' is the edible mussel all along the Atlantic Coasts of America, Europe and Africa. Among several other mussels in North Carolina, the common Atlantic Ribbed Muscle, Modiolus

(Arcuatula) demissus, (Dillwyn) may be cited and studied for all the features we have mentioned.

We will conclude by returning to the Scallops (PECTINIDAE) and mentioned that these have entirely lost the anterior adductor muscle. The remaining (posterior) adductor, however, grows very large and this is what makes the delicious scallop meat on our seafood platter. North Carolina harvests a lot of scallops commercially and many of them go into clam chowder. Most of them are in the Bay Scallop, Aequipecten (Argopecten, SYN: 'Plagioctenium') irradians (Lamarck). The biggest and best eating scallops are dredged off Nova Scotia, being the Atlantic Deep-sea Scallop which is properly named Placopecten magellanicus (Gmelin). Now that we've got our drool up, let's leave the shells to the scientist and join in good company at a seafood dinner. Bring on those oysters and scallops!

NAMING AND CLASSIFICATION OF SHELLS

Dr. John H. Ferguson
University of North Carolina, Chapel Hill

There are many aspects of our N. C. Shell Club programs that need to be fostered and developed in order to keep up the lively interest and future growth of our club. Members' encouragement and assurance of the success and worthwhileness of the semi-scientific presentations continue to support our Workshop programs as we begin our second 'ten years'. To keep them interesting is of vital importance so this article offers something of the historical background, dealing with names and classification, that may have a wide appeal.

A great many shells were first scientifically named over 200 years ago, when good scientists were few and seldom got together because of difficulties in travel and communication. One result was that a great many shells were independently restudied and renamed several times over, giving rise to a confusion of synonyms, which are different names for the same thing, or of homonyms, which are the same name for different things. Since 1889, there has been an International Commission for Zoological Nomenclature (ICZN, for short), now for a long

time with its headquarters in London, England. Any authoritative body is apt to run into criticisms, but this one was democratically established by the world's leading scientists, who agreed to accept the 'official' rulings and decisions. The ICZN first set up rules for nomenclature in the Animal Kingdom (and there's a similar one for Plants). These are based essentially on the rule of priority or first publication in the officially accepted form and in an approved scientific work. The officially accepted form and first approved work (ICZN Art. 26) were those of Carl Linnaeus (Linné) in the 10th edition of his great "System of Nature" (Lat. SYSTEMA NATURAE), published in 1758. For living things Linné insisted on two names, one for the Species and one for the Genus, that is, a binomial nomenclature, using the International language of Latin. Priority means that the first person properly to create such a name, according to these rules, gets it officially accepted and is duly entitled to have his own name appended in the case of the species. Genus names, however, often need to be changed as we learn new scientific facts about the classification (= taxonomy). When changing the genus name the species name must be retained, but the original author's name is now put in parentheses. Only in a listing of the TAXA, or classification groupings (genera, families, etc.), would the new author's name be mentioned. It's always wise to include the dates, since this can help the student to look up the original reference. It is surprising how often he is apt to find that there has been a citation or other error.

From time to time the ICZN makes and publishes specific decisions on problems, correcting errors, recognizing old or new taxa (especially genera), and in some cases settling what is an acceptable scientific work. Their first ruling, as stated above, excluded everything published prior to Linnaeus, 1758. Some fine old works were ruled out by this, but it was worthwhile to draw the line firmly and forever settle these arguments. A number of later works, however, had to be decided upon in a series of official Opinions, all of which are successively numbered as they are published by the ICZN. A good example is Opinion 96, in 1926, which officially recognized the 1798 work of P. F. Röding, entitled MUSEUM BOLTENIANUM, or the Catalog of the Bolten Museum. This German museum was a private collection and Dr. Röding's careful studies on its shells were very scientific, as were his Latin binomials, although he disagreed with

Linné's generic classifications. The main use of Röding's work, however, was to serve as a sales catalog when the Bolten collection was put up for auction. This book was thus published obscurely and in a limited edition, so that it came to the serious attention of very few naturalists of his day. This especially applies to Lamarck, the famous French naturalist and curator of the Paris Natural History Museum. He edited a monumental encyclopedia and many other volumes and scientific papers, in which he introduced a long series of shell namings starting, I believe, in 1799, or the year after Röding's work. The trouble was that a great many of Lamarck's names were widely used and respected for 100-150 years, while Roding's obscure catalog was overlooked or ignored. Another difficulty was that the Bolten shells were sold and scattered to the winds, so that opportunity to check the names against the original shells was lost forever. What the ICZN balanced against this was the merit of Röding's careful studies and descriptions, coupled with the supplementation of his own poor woodcut drawings by other references to specific figures in well-known illustrated scientific works. Recent critics, nevertheless, point out that these works were pre-Linnean for the most part and that a number of Röding's references (e.g., 4 on a certain Olive Shell, cited by Burch and Burch, 1967) have since been shown to cover several different shells. Despite such grumblings, however, Röding's names are now 'official' and are used in all modern shell works.

Again referring to the old standard illustrated books, which are still obtainable in various libraries, it was in fact one of the things that caused the scientific world of the 18th century to accept the great Swedish naturalist Linnaeus in that he supplemented his (shell) descriptions by these references. Some interesting things about Carl Linnaeus (later ennobled to the Count von Linné) will follow later, but let us first mention just one typical example of a well-known work that was rejected by the ICZN, and which particularly shows the severity of some of these rulings. I've selected Thomas Martyn's THE UNIVERSAL CONCHOLOGIST, published between 1784 and 1787. This beautifully illustrated 4-volume work was of a semipopular nature and was therefore rejected as insufficiently scientific by ICZN Opinion 456, in 1957, just about the time our N. C. Shell Club was founded. Martyn did in fact, for the first time, include a number of good descriptions and binomial terms of many new

shells, especially those from New Zealand, which was mighty far-away place in those days. Modern New Zealand malacologists were quite upset by the 1957 Opinion and, indeed, passed their own resolution stating that Martyn's names will continue to be recognized in New Zealand. All this is very human and, while it's not a new trend, it does seem that the present day world is in a period when certain vigorous minorities are trying to shout down the established majority. Democracies may not be perfect, any more than working dictatorships, but efforts to disrupt or overthrow the duly constituted 'in'-power can cause a heap of trouble. Respect for the individual and his personal opinions is fine, but so is recognition of responsibility and of the rights and needs of the society. Returning to Martyn, we should note that many of his new shell names were actually adopted just a few years later, in 1791, when Gmelin edited the final revision (or 13th edition) of SYSTEMA NATURAE, after the death of Linnaeus. His name, however, could be preceded by Martyn's (in parenthesis), as a courteous recognition without the sanction of official standing.

Let us now turn to Carl Linnaeus, who started this whole business of nomenclature in the first place. The Swedish naturalist was already eminent in the earlier part of the 18th century, largely because of the publications of a number of earlier editions of his great work on The System of Nature. Thus it was that, in 1751, he was commissioned to study and catalog the shell (and Insect) collections of Queen Louisa Ulrica, in the Swedish Royal Palace at Drottingholm. Linné completed the job in 1754, four years before the appearance of the all-important 19th edition of SYSTEMA NATURAE. In the Mollusk section of this great 1758 work, he frequently alludes to the manuscript (MS) notes which he had made in his studies of the Ulrica shell collection. He had not yet published this study, largely because he was waiting for the preparation of the illustrations. Many difficulties arose in this connection, the upshot being that they never did become available for publication in Linné's works. For this reason, he gave up waiting and substituted references to figures of the shells in several well-known illustrated works of the period, including Rumphius, Gualtieri, Martini, and others. The same problem persisted in 1764, when Linné finally published his palace studies under the title (translated from the Latin): "The Museum of her Royal Majesty Queen Louisa Ulrica". This included some new shell names and descriptions, again with bibliographic references

in lieu of illustrations. He had to prepare the final manuscript for publication rather hurriedly to meet a deadline, and not only under pressure and distraction of his busy duties at the University of Uppsala, but also with the strain on his memory because the studies were made over 10 years earlier. In Uppsala, he had his own shell collection but was far removed from the Queen's Palace Museum at Drottingholm. The result was a number of uncertainties and errors in the 1764 work. One of the intervening preoccupations was that of putting out the 10th and 11th editions of Systema Naturae, and he was now working on the 12th edition that was published in 1767 with some additional material on the Mollusca. As mentioned previously, it was after Linné's death, in 1778, that Gmelin edited the 13th (and final) publication of SYSTEMA NATURAE, in 1791. The new names here, however, are properly credited to Gmelin.

The Ulrica collection was eventually given to the University of Uppsala by King Gustavus IV in 1803. Here it is available to scientists even to the present day. The same is true of Linné's own private collection that is preserved at the London, England headquarters of the Linnaean Society. However, Tucker Abbott recently called my attention to the disturbing fact that there have been many replacements of shells that were broken or lost from these collections over the years so that it is not always possible to be sure that one is studying the original shell. For this reason uncertainties persist about such careful reinvestigations as that, for instance, in a 1958 "Review of the Genus BUSYCON and its Allies", by S. C. Hollister. In this reference, you'll find a more extensive account of many of the matters I've presented in this paper. While it is easy to become frustrated and discouraged by the nomenclature problems, there are many valuable results and successes on the whole to reward the serious student. The scientist is used to dealing with difficulties and tries to combine wisdom and humility in order to achieve ever advancing goals that widely benefit mankind. The scientific approach can greatly enhance the satisfactions of a shell hobby.

ROBERT ERVIN COKER

A. F. Chestnut*

Robert E. Coker Hall is named in honor of Dr. Robert Ervin

Coker, first director of the Institute of Marine Sciences and a distinguished pioneer in oceanography. His death in his ninety-second year on October 2, 1967, brought to a close a life of distinction in science that was dedicated to the service of scholarship, to his university and to mankind. He was the second of the distinguished South Carolina Coker family to make an international name in biology at the University of North Carolina.

He was graduated from the University of North Carolina with a Bachelor of Science degree in 1896 and a Master of Arts degree in 1897. In 1901 he entered the Graduate School of Johns Hopkins University to work towards the doctoral degree.

His first academic year in Baltimore was followed by a summer at the old fisheries station at Beaufort, N. C. From 1902 to 1904, while still a graduate student, he held the position of "biologist" at Beaufort for the North Carolina Geologic Survey and also Resident Custodian of the U. S. Fisheries Biological Laboratory of Piver's Island, located across the channel from Beaufort. While there he conducted many studies of the factors related to growth and productivity of marine life in the sounds and estuaries of the North Carolina coast. This data was used to demonstrate that shellfish could be grown in abundance, provided that environmental conditions could be kept in favorable balance. In 1905, a year before receiving the Ph. D. he presented the basic outlines of his studies to the North Carolina General Assembly which, attentive to his advice, passed legislation that permitted a thousand-fold increase in productivity in North Carolina's marine resources.

While serving as director of the U. S. Fisheries Biological Laboratory in Fairport, Iowa, he studied the biology and life history of the freshwater mussel in the Mississippi watershed. His monograph on this is still a classic. Later he served as Director of the U.S. Fisheries Laboratory at Woods Hole, Mass.

* The remarks that follow were condensed by the Bulletin Editor from a program presented to the club by Dr. A. F. Chestnut, Director of the University of North Carolina Institute of Marine Sciences, in May, 1968 during the Shell Club's first meeting in their new laboratory - Robert E. Coker Hall.

In 1922, at the age of 46 and while serving as Director for Research of the U. S. Bureau of Fisheries, he reassessed his primary goals and began a second career of distinction as Professor of Zoology at the University of North Carolina. In 1947, at the age of seventy-one, he retired as Chairman of the Department of Zoology and began a third career which may in the long view prove to include his most remarkable and enduring achievements.

In 1947 his book, "This Great and Wide Sea" was published. A second edition, published in 1949 has since been reprinted; a paperback form appeared in 1962. It has been published in German and is being translated into Spanish. The book, a general treatise on oceanography now twenty years old has earned a place in the enduring literature on marine science.

In 1954 a companion volume on freshwater biology, "Streams, Lakes and Ponds", was published. This also is being put into paperback form.

The Institute of Fisheries Research (now known as the Institute of Marine Sciences) was founded in 1947 following recommendations by a study committee of the University Board of Trustees on needs for a marine research facility in North Carolina. Dr. Coker, as chairman of the committee, played a leading part in obtaining this facility. Within a year of his official retirement as Kenan Professor of Zoology, he was recalled by the University to serve as the first Director for the Institute, 1947-1948.

With the Fisheries Institute clearly justified and firmly established as a continuing research activity of the University, Dr. Coker again retired. However, within less than a year and at the age of seventy-eight he had accepted an appointment at the University of Puerto Rico as Visiting Professor of Marine Science. In this position he played a dynamic role in the founding of a new laboratory, the Institute of Marine Biology, at Mayaquez.

In 1962, at the age of 86, Dr. Coker returned to his homes in Chapel Hill and Blowing Rock, N. C. Until a half year before his death, he was regularly in his departmental office and was never without a scholarly project before him. His last work, a historical review entitled, "Laboratory Work and Marine Biology at the University of North Carolina" was published posthumously in 1968

in the Journal of Elisha Mitchell.

CAPE LOOKOUT

By - Josiah W. Bailey*

Isolated, wave washed, windswept, Cape Lookout -- central cape of the hazardous three which form the notorious "Graveyard of the Atlantic"--is unfamiliar to present generations. Accessible only by boat or airplane, it has been by-passed by time and remains largely as it was when first observed by the English and Spanish explorers of the sixteenth century.

Though generally unknown today, this last outpost of the fabled North Carolina Outer Banks figured prominently and often in the early history of North Carolina and, indeed, North America.

During the pre-colonial period of American exploration, it is logically certain that Europeans frequented the natural refuge formed by the "bight" or hook of land that later was to become known as Cape Lookout. It was the best harbor between Charleston, S. C. and Hampton Roads, Virginia.

Here the early explorers could safely heave down (careen) their ships for repairs, replenish their fresh water supply and fill their stomachs and the ship's stores with the abundant fish, shellfish, and game. So fortified, they could then take up the arduous battle back across the North Atlantic to their European ports.

And, moreover, the Banks Indians who roamed these dunes were uniquely friendly toward the white adventurers.

* Mr. Bailey is the well known captain and owner of the ferry boat, "Diamond City", which runs during the summer between Harkers Island and Cape Lookout. This article (concluding part will be in the 1969 issue) was first published December 23, 1965 by the Carteret County News-Times and is used with their permission.

So friendly, indeed, were these native Americans, whose principal settlement was on Harker's Island -- only a few miles from Cape Lookout -- that by the time Sir Walter Raleigh sent out his first exploratory voyage in 1584, his Captain, Arthur Barlow, was compelled to report that the natives "are of color yellowish, and their hair black for the most part; and yet we saw children that had very fine auburn and chestnut coloured hair."

From this surprising observation, we may surmise that these auburn haired Indian children were the offspring of European fathers.

In addition to being used in preparation for the return voyage to Europe, Cape Lookout was, doubtless, the scene of many shipwrecks in those early years of New World exploration. In 1558, it is recorded that a European ship was lost near there; several survivors reached the beach and were befriended by the local Indians.

By 1585, European charts accurately depicted the principal physical characteristics of Cape Lookout. Though place names were only sparesely indicated, these old charts clearly show Harker's Island, Core Banks (labeled "Crotoan") and the sharp turn of the beach to the westward where Core Banks joins Shackleford Banks.

The extensive shoals to seaward were indicated and appropriately labeled "Promantorum Tremendum."

Cape Lookout can well claim the distinction of being the site of the first landing of English colonists in the New World! In April, 1585, Sir Walter Raleigh dispatched seven vessels and more than a hundred men under Sr. Richard Grenville to explore and establish a colony, if possible, in Virginia.

Ralph Lane became governor of this contingent of settlers which remained in the New World for nearly a year. Lane's report to Raleigh contains the following passage: "the 23rd (June, 1585), we were in great danger of a wreck on a beach called the Cape of Fear. The 24th, we came to anchor in a harbor where we caught in one tide so much fish as would have yielded us twenty pounds in London; this was our first landing in Florida

(i.e., North America). The 26th, we came to anchor at Wocokon (i.e., Ocracoke)."

From Ocracoke, these earliest colonist went on to establish their permanent base at Roanoke Island, but their first landing was very probably Cape Lookout. For there was no other harbor between Cape Fear and Ocracoke that could have been the scene of events Ralph Lane reported on June 24, 1585. It seems remarkable and regretable that this valid claim to major historical significance has been virtually ignored.

It seems likely also that it was from this group of settlers that Cape Lookout acquired its name. During the year that they were on this coast, it became their policy to send parties "down the beach" to lookout for both expected supply ships and possible Spanish raiders (for Spain claimed this part of the New World as well as Florida and Central America; she intended to keep the English completely out of the New World).

Cape Lookout was the logical point for such a vigil. Every ship moving northward from Florida bound for Ocracoke Inlet would first be seen from this strategic point. On early charts dated shortly after Sir Walter Raleigh's unsuccessful colonization efforts, it was designated "Point Lookout."

Failure of Raleigh's efforts consigned the Sand Banks of North Carolina to historical obscurity for the next century, as the successful settlements at Jamestown in Virginia and at Plymouth in Massachusetts became the focal points.

The Banks Indians continued to roam their dunes and sounds, taking a leisurely living from the natural abundance of the area, and, no doubt, succoring unfortunate shipwrecked mariners -- even, perhaps, assimilating on occasional castaway into their tribal life.

A SHELLING TRIP - PUERTO RICO

By - Jeanne Whiteside

Puerto Rico is a beautiful island two hours by air from

Miami. It is 100 miles long and 35 miles wide with a backbone of rugged mountains. There are also some lovely crescent sand beaches and strange rocky coastal areas. There are no Customs going, but agricultural restrictions and excess baggage charges coming back. Almost all the younger people speak English and relish an opportunity to use it, but a bit of Spanish is helpful and complimentary.

From San Juan, one may take city bus #20, from Stop 22, to Boca de Cangrejos, a funny public beach with a good reef running out from shore, and a safe place to snorkel. Food, soft drinks and beer can be bought at the kiosks. Further along are some little restaurants. I had quite good luck here on the reef and rocks.

A ferry runs from San Juan Antigua to Cataon across the harbor, where the shelling used to be particularly good.

An easy drive is to Playa Sorocco* and Las Croabas* at the N. E. corner of the island. A new Volkswagen, rented from Avis for two weeks, costs under $200. There should be an extra chain lock for the front hood - keep all valuables there and keep the whole car locked no matter where you leave it. I swooped in and out to the coast all around the island, didn't cross it once and drove almost 700 miles! There are also "publicos" running all over the island like our old "jitneys", and on no particular schedules.

There are many very nice resort hotels - $12 and up, single and without meals; double, $15 and up. The hotels in the small cities or towns are not much and neither are the prices; $3.50 - $5.00. Breakfasts were $0.50 - $1.00, dinners $1.50 -$3.50 (higher in the luxury places in San Juan). I got a little tired of french-fried fish! Another time, I would write for a list of Guest Houses - P. R. Dep't of Tourism, 666 Fifth Ave., NYC, 10010.

In addition to the places mentioned, I would follow the following route, extra good shelling marked * (I have 97 species and less than half classified):

Cuevas del Indio (E. of Arecibo) ancient rock carvings.
Isabela, Hotel Palmarino as a base.

Jobos Beach* (Punta Jacinto outside Jobos).
Punta Borinquen (N. of Aguadilla).
Rincon, Villa Cofresi, off-shore reefs.
Mani', Playa Sabaneto* and on the rocks to the south (N. of Mayagüez).
Mayagüez is a nice city with a good hotel (forgot the name) and the main agricultural and scientific branch of the University of Puerto Rico. The laboratory at La Parguera is administered from here.
Playa Bromadero and Punta Guanajibo (S. of Mayagüez) at the mouth of Rio Rosaria, black volcanic sand - look for Polinices hepatica.
Playa Joyuda - in rocks along shore, dozens of huge Cittarium pica washed ashore.
Boqueron, a sleepy, sloppy little town with a lovely government beach and cottages, $7/day for six, take own bedding, etc., make reservations at least 10 days ahead through the tourist bureau in S. J. A good base for a group but I wouldn't bother. Several different varieties of Neritas and others in the tidepool just inside the gate.
Cabo Rojo* (S. W. corner) good shelling all along here wherever you can get to the water, even across the salt flats (ask permission at the salt works).
La Parguera* - site of Univ. of Puerto Rico Marine Biological Laboratory, which is strictly for work and on its own island.
La Posade Porlamar is charming and so is its owner, Sra. Pura Platti, Lajas, P. R., zip 00667. She is a sheller and an artist. Room with shared bath, $7, breakfast on terrace, $0.75. This was my base for a week and I loved it. Need a boat of some sort to off-shore reefs, which are wonderful. Ten mile drive to Boqueron to swim.
Guanica* - go to the beaches just to the east (dead end road) and stop anywhere you can get to the shore.
Ponce is a lovely city with a beautiful art museum designed by Edward Stone.
Guardarraya* - between Hacienda San Isidro and Playa Mala Pascua (S. W. of Maunabo) a large reef complex that leads right out from shore. Wished I'd had my snorkel and more time to spend there.
Playa Humacao has an interesting looking "punta" just to the west but didn't want to go out there alone.
Rio Blanco - mouth of the river between Pla. Humacao and Naguabo.

CAUTIONS: Don't wade in fresh water - liver flukes (schistosomiasis) have been cleaned out of some streams and rivers, but not all of them. Always wear sturdy sneakers with thick soles around rocks and reefs, in the water especially. Good to have a stout rake or cane, to turn over rocks and help balance - diodemas (the long-spined purplish-black urchins) can give a nasty wound, poisonous infection. If you get enough broken spines in you, go to the nearest hospital. Don't put hands in holes in rocks-moray eels give a nasty bite and so do some small octopuses. Be careful about touching some of the greenish-mustard corals - they sting, in fact don't sit down on any live coral rocks. Use good sense and precautions about what you pick up, swimming alone, etc. HAPPY HUNTING!

SHELLING TRIP TO BIMINI, BAHAMAS

by

Marguerite Thomas, Cornelia McInnes, Phoebe Meadows, Maxine Perrine, Thelma Turnage and Ann Yelvington

After weeks of preparation which included reading all we could find about the area and gathering shelling equipment we thought might be useful, the "Six Bimini Babes" finally got off about noon on June 8, 1968 flying Eastern Airlines from Raleigh-Durham to Bimini via Atlanta and Miami.

When we left the Miami International Airport for the 20 minute hop to Bimini we flew low enough that we could see the wonderful blues and green in the water, the low coral reefs which looked like minature white forests from above and the six of us could envision hundreds of shells down there just crawling around waiting for us to get there and, believe me, we were not disappointed!

The Biminis are a group of islands but the two main ones are North Bimini where Alice Town and Bailey Town are located and where most of the native population lives and South Bimini which is mostly marshland except for the air strip and the part of the island where Sunshine Inn is and where there are many summer

homes.

Light summer rains haunted our days from the time we left home until we landed on that tiny South Bimini airstrip but it never once dampened our spirits nor slowed us down...not even the day we got soaked through and through while boiling shells down on the beach.

Since this was off-season for tourists we had our pick of rooms and took three air-conditioned bedrooms facing the Gulf Stream which was always a beautiful blue from our picture windows...even on cloudy days. Outside our rooms was a big cement terrace and below this sharp, jagged coral rocks which were literally covered with chitons, limpets, nerites, West Indian tops, etc. We even saw a big octopus crawling all over the rocks having himself a royal feast and we could hardly wait to get unpacked and down there with him to get our share of the goodies!

It was a sight to behold, us leaving our rooms each morning after breakfast. We all trekked out up that white beach on our shelling safari armed with all sorts of paraphernalia and covered with long sleeved shirts and big hats to protect us from that hot June sun. I'm sure the natives thought we were crazy!

We were fortunate to have very low tides while there and since the water was shallow and clear we were never afraid. If anyone had told us we would find such quantities of shells we wouldn't have believed them but there they were, ours for the taking! No wonder we were so greedy at first and picked up everything we saw. After a few days we learned to be more discriminating since we knew it would be utterly impossible to take back all the shells we saw. Sometimes we shelled on the rocks and other times we waded in the shallow water and searched in the turtle grass for murex, helmets, Queen conchs, huge starfish, olives, all sorts of sea urchins, amber pen shells, hawkwing conchs and many other lovely things.

From our advance reading we had learned to beware of the long-spined black sea urchins so none of us were stung by them but some of us got into fire coral without realizing just when or where and this caused a good bit of pain for several hours.

When the tide drove us in each day we would go to the beach and collect driftwood to build a fire under the half-drum the manager had fixed for us to do our "cooking". We filled this with sea water and boiled out our large shells using long tongs to fish them out of the hot water. Also we carried collapsible wire mesh salad baskets which were just ideal for lifting loads of shells in and out of the drum safely. A picnic table nearby served as our "operating" table. Some shells were so tough we had to boil them over and over and the helmets we had to hang until they gave up! We never gave up!

Thelma had carried a little contraption for heating water quickly and we soon purloined a big juice can from the kitchen so at night we cooked out some of the small things in our rooms. Needless to say, our rooms were not the most fragrant places in which to live but we soon learned to live with it rather than part with those precious shells. Some of the very tiny shells we put into plastic bottles of alcohol to bring home.

Other than the equipment which I have already mentioned we took with us plastic bottles, vials, bags and boxes of all sizes, tongue depressors to tie down the chitons, sharp knives to pry off limpets and chitons, string for tying down the chitons and for boxes, masking tape, dental tools, scissors, bug spray, rubber Boy Scout buckets, rubber-lined beach bags, small garden rakes, long tongs; and be sure to take Playtex gloves (we didn't but wished we had). We carried Abbott's AMERICAN SEASHELLS and Warmke and Abbott's CARIBBEAN SEASHELLS.

All of us enjoyed the native foods served to us in the dining room at Sunshine Inn.. particularly the lobster and the conch. We saw the natives cleaning boatloads of these beautiful Queens and it just about killed us to see those shells ruined but we enjoyed eating the meat in chowder, fritters and cutlets.

At night there was nothing much to do for excitement so we cleaned shells, read, talked and watched the beautiful summer storms over against the Florida coast. And, of course, we got plenty of rest and sleep so we could be up and at 'em early the next day.

There was absolutely no trouble coming back through

customs with our smelly boxes..they just asked what we had in those liquor boxes (the only kind we could find) and they took us at our word when we said "shells". Actually there was no smell because we took lots of those plastic dress bags from the cleaners and we wrapped each shell carefully in the plastic and then in newspaper before packing it. Some of them we even doused with alcohol before packing and everything came back in perfect condition.

We collected approximately 100 species. We have classified and labeled about 70. (List follows if space permits.) The weather was hot, and it rained frequently. The bugs caused us to use many cans of spray, but we'd all go again at the drop of a hat. We loved every minute of it and never had a more restful, real fun vacation!

A Compact Cabinet for the Storage and Display of Shells

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When I displayed one of my shell cabinets at the Morehead City Meeting of this Club in May 1968, a number of members expressed interest in building similar cabinets to hold their own shells. I built my first cabinet while still in high school,but it was not until I finished graduate school and moved to North Carolina that I built the one displayed. (Now both cabinets are overflowing and I am ready for another.) Before I describe the cabinet itself, I must tell its history, because it is an important facet of my whole interest in shell collecting.

The cabinet is not an original idea-- the clever design originated with Clyde B. King, who was Chief Ranger at the Mound City National Monument in Chillicothe, Ohio, when I first met him over 20 years ago. At that time Mr. King already had an

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[1] The Radiobiological Laboratory is supported jointly by the Bureau of Commercial Fisheries and the Atomic Energy Commission.

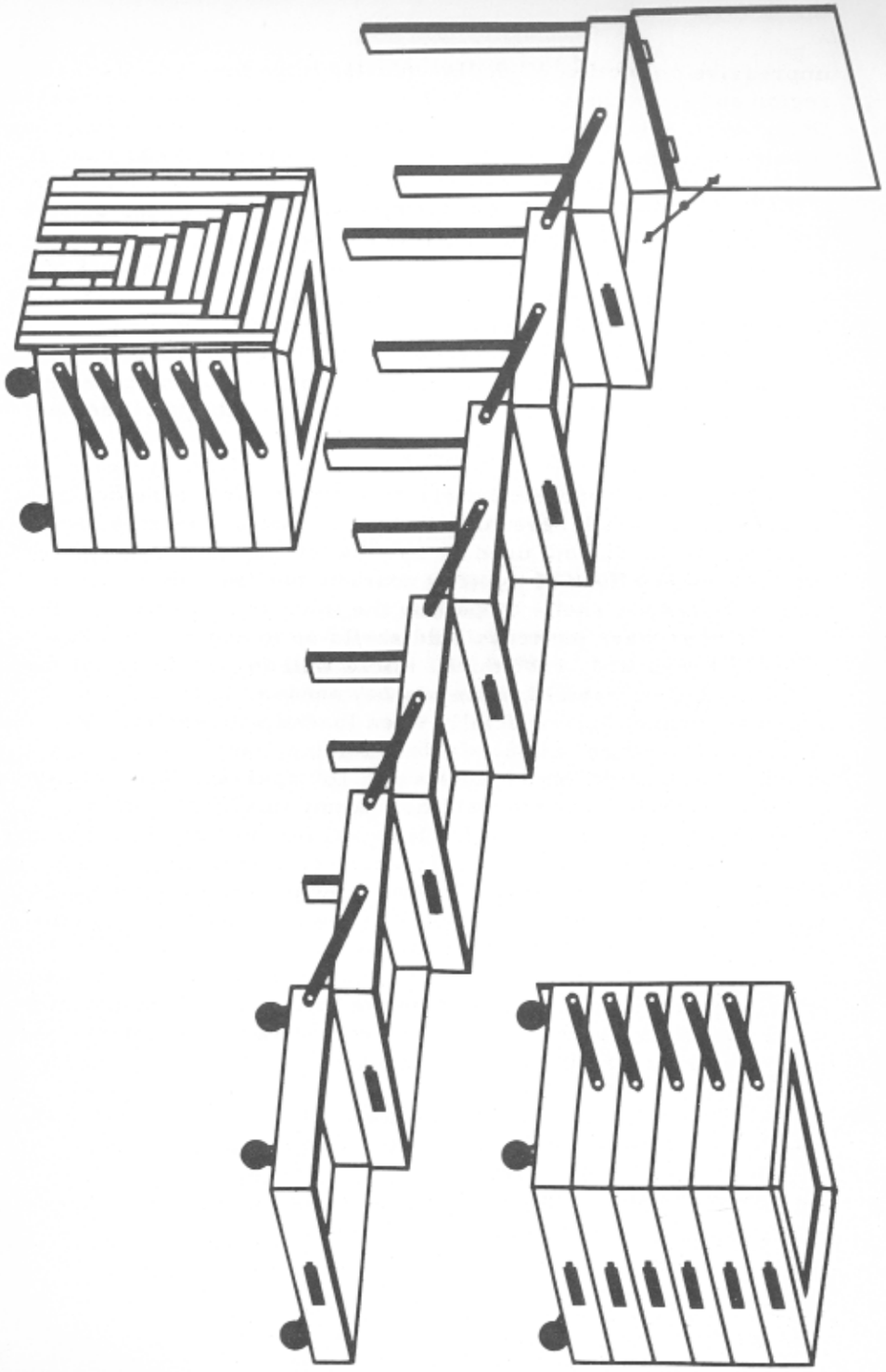
impressive collection of shells--mostly from the Cape Hatteras region and from the Scioto River and environs in South-central Ohio. He displayed several cabinets of shells to my eighth grade science class in 1953, and his enthusiasm for his shells and other aspects of natural history helped stimulate my interest in molluscs. I just recently re-established communication with Mr. King after I visited Mound City last spring and found him gone. The Kings left Chillicothe in 1960 and went to the National Monument at Harpers Ferry, West Virginia. He retired in 1965, and now resides in North Carolina. He has published descriptions of his cabinet design (see references), but since his publications might be difficult to locate, I will mention some of the construction details and variations that can be incorporated into the design.

My cabinets represent early prototypes of the King design (Figure 1), and lack several refinements that are included in his later models. We both used 1" by 4" wood for the trays and legs, but I placed the floor of the tray near the bottom, whereas Mr. King elevates his shells by putting the floor about midway in the tray. Either way, the trays hold shells up to about $3\frac{1}{4}$" high. Pressed hardboard, 1/8" thick, works well for the floors of the trays. My first cabinet, which is 24" square, is too big for convenient handling, especially when loaded with shells. My second, 20" square, is satisfactory for me, but for most people I would recommend Mr. King's size, 16" square. Larger trays are too heavy for routine handling. Along this line also, it is wise to use light weight woods, like fir, for the cabinet. For the pivot hinges, Mr. King used thin strips of aluminum concealed in slits in the side of the trays; I used external hinges of wood. Except for the bottom one, each tray has two legs which nestle snugly on the back when the cabinet is closed. The sides of the trays extend 3/4" behind the back edge to conceal the legs from the side (see Figure). Casters on the bottom tray facilitate moving the cabinets about at home. Further details may be obtained from me or by writing to Clyde B. King, Rt. 1, Box 226A, State Road, N. C. 28676.

References

King, C. B., 1964. Cabinet serves for display and storage. Shells and Their Neighbors. No. 21 (Feb. 1964), p. 8.

King, C. B., 1964. Shell display and storage cabinet. Park Practice Grist (Sept.-Oct.), p. 39.



BOOK REVIEW
By - Marguerite Thomas

THE SHELL
Five Hundred Million Years of Inspired Design
Marguerite and Hugh Stix, R. Tucker Abbott and H. Landshoff
Abrams Press. 1968. $25.00

It took four people to make this truly beautiful work of art!

For many years Marguerite and Hugh Stix traveled around the world collecting the most beautiful specimens of shells they could find for their Rare Shell Gallery in New York and finally were inspired to put them into a book for more people to enjoy. This they did with concise identifications and comments by none other than Dr. R. Tucker Abbott. The outstanding photographs, some in black and white and some in color, were done by H. Landshoff and whether you love shells or not you can still sit for hours and dream over this magnificent book. Personally I don't see how anything else can ever come up to it unless it is photographed all in color.

This book was not intended as a scientific treatise but rather as an introduction to a great world of beauty and as you turn the pages you will follow history down through the ages from prehistoric times to the present when the company of shell collectors increases with each day. You will come to realize what an important part shells have played in relation to man since he first used the animals for food and saved the shells for personal adornment, for dishes, tools, musical instruments, religious objects, dye for royal garments, money, even sex symbols and for many other uses.

Man has made many wonderful and inspired objects but nothing has ever come up to the perfection of these inspired creations from God.

Additional Publications of Note
Editor

Reprintings:

Johnsonia - Vol. 1 Monographs of the Marine Mollusks of the Western Atlantic by W. J. Clench 1941-1945 Price:$15.00

Sea Shells of the World by R. T. Abbott and H. S. Zim
Golden Nature Guide, Golden Press, New York Price: $1.25
(Book has been revised and has numerous changes.)

New Publications:

Seashells of North America, A Guide to Field Identification
by R. T. Abbott 1968. A Golden Field Guide, New York.
280 pages. Plastic coated paperback - $3.95
Clothbound - $5.95.
(This book may easily become a best seller.)

Van Nostrand's Standard Catalog of Shells, Second Edition
by R. J. L. Wagner and R. T. Abbott 1967
D. Van Nostrand Co., Inc., Princeton, New Jersey.
303 pages. Price: $6.00.

The Subfamily Tellininae in the Western Atlantic - The Genera Tellina (Part I). by K. J. Boss 1966. Johnsonia, Vol. 4 (No. 45) pp. 217-272.

The Subfamily Tellininae in the Western Atlantic - The Genera Tellina (Part II) and Tellidora. by K. J. Boss 1968
Johnsonia, Vol. 4, (No. 46), pp. 273-244.

The Subfamily Tellininae in the Western Atlantic - The Genus Strigilla. by K. J. Boss 1969.
Johnsonia, Vol. 4, (No. 47), pp. 345-368.

The Helmet Shells of the World (Cassidae). Part I
R. T. Abbott 1968. Indo-Pacific Mollusca, Vol. 2 (No. 9).

RECORD SIZES OF NORTH CAROLINA MOLLUSKS
List #1, Gastropods, Scaphopods and Chitons
Hugh J. Porter

Have you ever wondered how large some of our North Carolina shells grow? It may be natural for most of us when we first see something live to ask "Well, how big does it get?" For several years I have thought it would be interesting and worth while to keep track of maximum sizes of some of our North Carolina mollusks. Recently I noted in Van Nostrand's Standard Catalog of Shells, volumes 1 and 2, that a committee of World Record Editors has been established. Mr. William E. Old, Jr. of the American Museum of Natural History is the Editor for Eastern United States shells. In addition, volume two contains a preliminary list of world record sizes. I am proposing here, with this first list, that the North Carolina Shell Club keep as detailed a record as is possible of the largest known North Carolina collected shells of the many different molluscan species living in North Carolina. This is not meant to be in competition with Van Nostrand list since it is a world wide list and this list will include only specimens collected in North Carolina.

Measurements used would be the following as stated in Van Nostrand catalogue, volume two, page 276:

"Gastropod measurements, in most instances, are made from the apex to the end of the siphonal canal (length) and include any spines or protruding lips and knobs. Low, circular snail shells, such as some Trochids, Zenophora Carrier-shells and Haliotis Abalones, are recorded by their maximum diameter. Bivalve sizes are taken from their maximum dimension, whether it be the length (anterior to posterior end) or the height (hinge edge to ventral edge) and include any spines."

To be eligible, 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 club's Executive Committee. It would be hoped that upon the dismantling of a collector's collection, record sized specimens would be offered to one of the museum collections.

This first list includes primarily but not entirely those marine Gastropod, Scaphopod and Chiton species which I think might be collected by the amateur collector. I have also left out those species which probably do not reach $\frac{1}{4}$ inch in size.

This is a starter list. I hope that those persons with larger North Carolina collected specimens than I have listed will let me know so that a record may be made of their shell or shells. It is hoped that "List #2" will include not only the Bivalves but also corrections and additions to "List #1". If there is a desire to include land and fresh water records this might also be included in list #2 or a subsequent list.

Notes concerning following list:

"w" indicates a width measurement and not a length measurement.

"IMS" indicates a specimen in the collection of the University of North Carolina's Institute of Marine Sciences.

"*" indicates a live taken specimen.

"DAW" indicates a specimen in the collection of Dr. Douglas A. Wolfe.

"Piper" indicates a specimen in the collection of Mrs. E. H. Piper.

"f" indicates a fossil specimen.

Architectonica nobilis Roding	2.32 inch (59mm)w 1.46 inch (37mm)w	DAW#1762 IMS#2337*	Offshore Beaufort S. of Cape Hatteras
Balcis conoidea (Kurtz & Stimpson)	0.43 inch (11mm)	IMS#467	Bogue Sound beach
Balcis intermedia (Cantraine)	0.41 inch (10.4mm)	IMS#1032	Cape Lookout area
Bulla occidentalis A. Adams	1.85 inch (47mm)	DAW#1532	Offshore Beaufort
Bursa thomae (Orbigny)	0.98 inch (25mm)	IMS *?	SE of Cape Lookout
Busycon canaliculatum (Linne)	7.60 inch (193mm)	IMS#1534*	Off Shackleford Banks
Busycon carica (Gmelin)	11.15 inch (283mm)	Piper*	Cape Lookout
Busycon contrarium (Conrad)	11.70 inch (297mm)	Piper-IMS*	* Cape Lookout
Busycon spiratum (Lamarck)	5.30 inch (135mm)	IMS#1015*	Off Drum Inlet
Calliostoma euglyptum A. Adams	0.89 inch (22.5mm)	IMS#1832*	SE New River Inlet
Callistoma pulchrum (C. B. Adams)	0.45 inch (11.5mm)	IMS#1648*	Morehead City State Port
Calliostoma yucatecanum Dall	0.47 inch (12mm)w	IMS#2286	Onslow Bay
Cancellaria reticulata (Linne)	1.70 inch (43mm)	IMS#1824*	SE New River Inlet
Cantharus multangulus (Philippi)	1.38 inch (35mm)	IMS#1816*	SE New River Inlet

Cantharus tinctus (Conrad)	1.18 inch (30mm)	IMS#351	Shark Shoal Jetty
Cassis madagascariensis Lamarck	6.6 inch (157mm+)	DAW	Off New River Inlet
Cassis madagascariensis spinella Clench	10.60 inch (274mm)	IMS#2307*	Off Cape Fear
Cerithium floridanum Morch	1.66 inch (42mm)	IMS#2277.1*	Bogue Inlet
Chaetopleura apiculata (Say)	0.71 inch (18mm)	IMS#383*	Back Sound
Colubraria lanceolata (Menke)	1.14 inch (29mm)	IMS#1844	ESE New River Inlet
Conus floridensis Sowerby	1.38 inch (35mm)	IMS#1829.2*	SE New River Inlet
Conus sozoni Bartsch	3.67+ inch (93mm+) 3.35 inch (85mm)	DAW#1514 DAW#1400*	Offshore Beaufort Offshore Beaufort
Crepidula aculeata (Gmelin)	0.95 inch (24mm)	IMS#1887.5*	SES New River Inlet
Crepidula fornicata (Linne)	2.48 inch (63mm) 1.85 inch (47mm)	DAW#598 f Piper*	Banks of Core Creek
Crepidula plana Say	1.58 inch (40mm)	IMS#491*	Bogue Sound
Crucibulum striatum Say	1.62 inch (41mm)	Piper*	Above Cape Hatteras
Cymatium parthenopeum (von Salis)	4.57 inch (116mm)	DAW	

Cymatium poulsenii (Morch)	2.76 inch (70mm)	IMS#1106.1	SE of Cape Lookout
Cypraea cervus Linne	4.80 inch (122mm)	IMS#1114*	E of Cape Lookout
Cypraea spurca acicularis Gmelin	0.83 inch (21mm)	IMS#33*	Onslow Bay
Cypraecassis testiculus (Linne)	1.06 inch (27mm)	IMS	S.E. Of Cape Lookout
Dentalium eboreum Conrad	1.95 inch (49mm)	IMS#511	Bird Shoal
Dentalium laqueatum Verrill	1.93 inch (49mm)	IMS#1213*	S.E. of Cape Lookout
Dentalium texasianum (Philippi)	0.98 inch (25mm)	IMS#751	Fort Macon Beach
Diodora cayenesis (Lamarck)	1.10 inch (30mm) 0.79 inch (20mm)	IMS IMS#480*	SE of New River Inlet Bogue Sound
Distorsio clathrata (Lamarck)	2.68 inch (68mm)	DAW#871*	Offshore Beaufort
Distorsio mcgintyi Emerson & Puffer	1.54 inch (39mm)	IMS	SE of Cape Lookout
Epitonium angulatum (Say)	0.90 inch (23mm)	IMS#574	Fort Macon beach
Epitonium humphreysi (Kiener)	0.67 inch (17mm)	IMS#750	Fort Macon beach
Epitonium multistriatum (Say)	0.36 inch (9mm)	IMS#1042	Just off Cape Lookout
Epitonium rupicola (Kurtz)	0.55 inch (14mm)	IMS#742	Fort Macon Beach

Eupleura caudata (Say)	1.14 inch (29mm)	IMS#559*	Holden's Beach
Fasciolaria hunteria (Perry)	4.53 inch (115mm)	IMS#1108*	Off Cape Lookout
Fasciolaria tulipa (Linne)	8.3+ inch (210+mm)	DAW#907	Offshore Beaufort
	7.65 inch (200mm)	IMS#2366*	Offshore Cape Fear
Haliotis pourtalesi Dall	0.59 inch (15mm)	IMS	SE Cape Lookout
Littorina irrorata (Say)	1.06 inch (27mm)	IMS#1654*	North River
Lunatia heros (Say)	4.25 inch (108mm)	IMS#1112.2	Off Oregon Inlet
Favartia cellulosa (Conrad) =Murex cellulosa Conrad	0.79 inch (20mm)	IMS#2431	S.E., of Cape Fear
Murex dilectus A. Adams =M. florifer arenarius Clench & Farfante	2.84 inch (72mm)	IMS#2306*	Off Cape Fear
Murex fulvescens Sowerby	7.08 inch (180mm)	Piper*	Cape Lookout
Murex leviculus (Dall)	0.75 inch (19mm)	IMS	SE Beaufort Inlet
Murex pomum Gmelin	2.96 inch (75mm)	Piper*	
Murex recurvirostris rubidus F. C. Baker	1.33 inch (32.5mm)	IMS#1851*	ESE New River Inlet

Nassarius acutus (Say)	0.51 inch (13mm)	IMS#496	Bird Shoal
Nassarius albus (Say) =N. ambiguus (Pulteney)	0.43 inch (11mm)	IMS	SE of Cape Lookout
Nassarius albus (Say) form consensus (Ravenel)	0.49 inch (12.5mm)	IMS	SE of Cape Lookout
Nassarius obsoletus (Say)	0.85 inch (21.5mm)	IMS#1632*	Bogue Sound
Nassarius trivittatus (Say)	0.75 inch (19mm)	IMS#494	Bird Shoal
Nassarius vibex (Say)	0.61 inch (15.5mm)	IMS#475*	Bird Shoal
Natica canrena (Linne)	1.70 inch (43mm)	Piper	
Neosimnia uniplicata (Sowerby)	0.83 inch (21mm)	IMS#219*	Bogue Sound
Niso hendersoni Bartsch	1.38 inch (35mm)	IMS#1854	ESE New River Inlet
Oliva sayana Ravenel	2.68 inch (68mm)	Piper	
Phalium coronadoi coronadoi (Crossi	3.46 inch (88mm)	IMS#274*	Off Cape Fear
Phalium granulatum granulatum (Born)	3.43 inch (87mm)	Piper	Cape Lookout
	3.00 inch (76mm)	IMS#409*	Offshore Beaufort
Pleuroploca gigantea (Kiener)	14.4+inch (364+mm)	DAW	

Pleuroploca gigantea (Kiener)	8.30 inch (210mm)	Piper*	
Polinices duplicatus (Say)	3.35 inch (85mm)w	DAW#44	Shackleford Beach
	3.02 inch (77mm)w	IMS#348*	Off Beaufort Inlet
Polinices lacteus (Guilding)	0.67 inch (17mm)	IMS#1728	SE Beaufort Inlet
	9.43 inch (11mm)	IMS*	SE Beaufort Inlet
?Polinices uberinus (Orbigny)	0.81 inch (20.5mm)	DAW#1417*	Offshore Beaufort
Scaphella junonia (Shaw)	3.58 inch (91mm)	DAW#675	Offshore Beaufort
	2.76 inch (70mm)	Piper*	Offshore Beaufort
Sinum maculatum (Say)	1.70 inch (43mm)w	DAW*	Offshore Beaufort
Sinum perspectivum (Say)	1.70 inch (43mm)w	Piper	
	1.30 inch (32mm)w	IMS#694*	Kitty Hawk
Strombus pugilis alatus (Gmelin)	4.53 inch (115mm)	Piper	
	4.30 inch (112mm)	IMS*	S of Cape Fear
Terebra concava (Say)	0.90 inch (23mm)	IMS#1855*	ESE New River Inlet
Terebra dislocata (Say)	1.75 inch (44.5mm)	IMS#401	Off Atlantic Beach
Thais haemastoma floridana (Conrad)	3.81 inch (97mm)	IMS#238*	Ocracoke

Tonna galea (Linne)	6.18 inch (157mm)	Piper	
	4.92 inch (125mm)	DAW*	Offshore Beaufort
Turbo castanea Gmelin	1.65 inch (42mm)	IMS#919	Onslow Beach
	1.54 inch (39mm)	IMS#2266*	Bogue Sound
Turritella exoleta (Linne)	2.75 inch (70+mm)	IMS	SE Cape Lookout
Urosalpinx cinera (Say)	1.50 inch (38mm)	IMS#1133	Bogue Sound
Xenophora conchyliophora (Born)	2.0 inch (51mm)w	IMS#1875*	SE of New River Inlet

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1969

*Denotes Charter Member
( ) Denotes wife's maiden name

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New Member Voted in at May Meeting

Davenport, Miss Becky, 335 E. Park St., Cary, N. C. 27511.

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