Of Sea and Shore
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# of Sea and Shore

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our covers

Front cover, top row, left to right: Oliva carneola from the Philippines (also Fiji); O. species, also from the Philippines; Oliva ispidula from Guadalcanal, Solomon Islands. Second row: Olivancillaria brasiliana from Uruguay; Oliva mustelina from the Philippines; and Oliva ornata from the Philippines as well. Third row: Oliva carnicolor, Philippines; Oliva spicata, rare golden color form, La Paz, Baja California, Mexico; Oliva spicata pindarina form III, Concepcion Bay, Baja California, Mexico and Oliva spicata hemphilli also from Concepcion Bay. Bottom row: Oliva incrassata from San Felipe, Baja California, Mexico; Oliva species from the Philippines and Ancilla velisiana from Australia. Know you'll learn more about olives in the article by Dr. Rowland Zeigler on page 76.

Our back cover is a collection of Neritina chameleon (?) from the Philippines. The number of patterns which appear on thia very common species boggle the mind!

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Editor: THOMAS C. RICE

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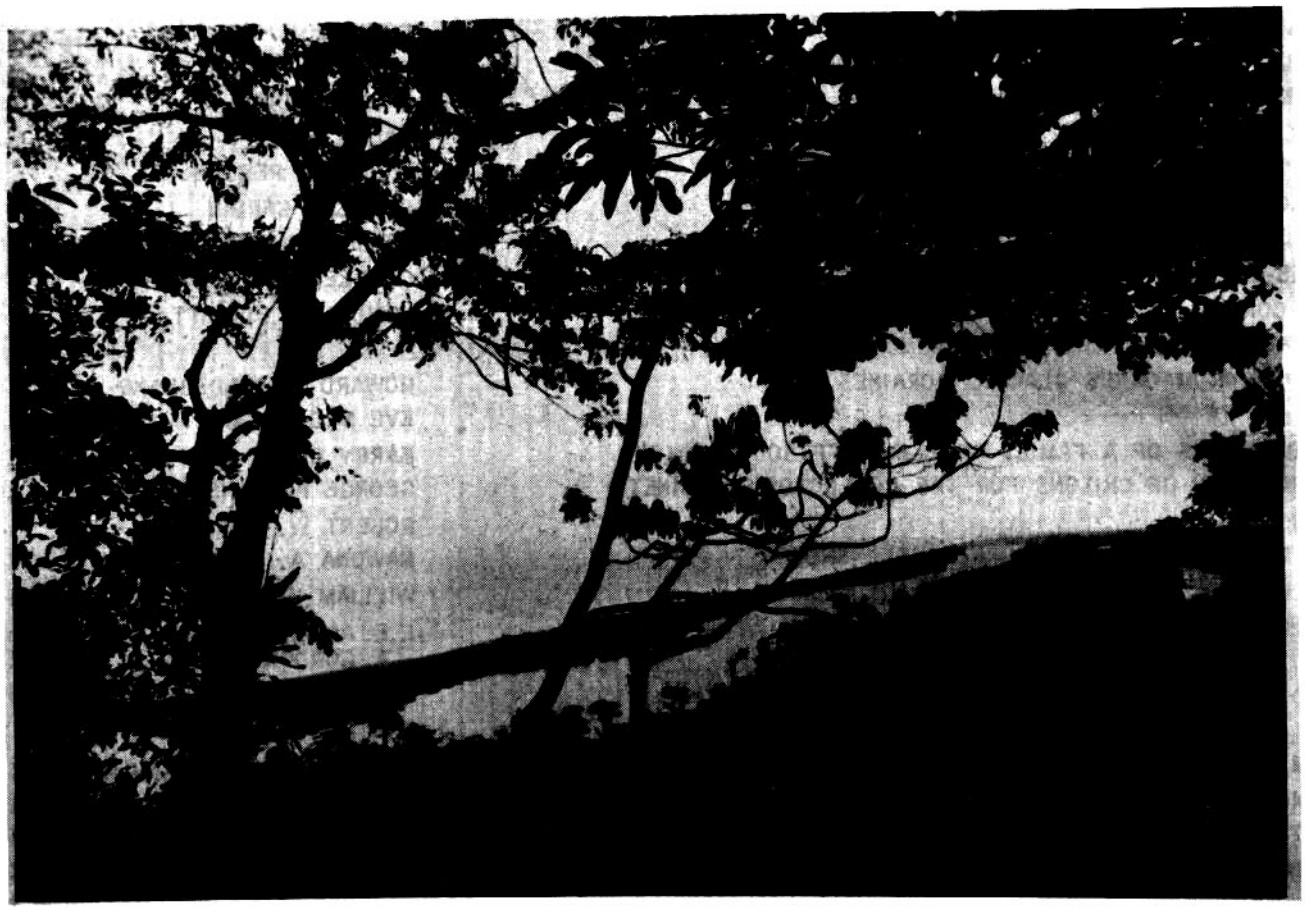


Seen from a low hill on the jungle's edge, Totuguero's lagoon parallels the beach for its full, 22-mile length. The lagoon's brackish waters are fed both by the Caribbean breaching the sand barrier at the left, and by jungle streams looping in at the far right. This photograph appears in Central American Jungles, the latest volume in THE AMERICAN WILDERNESS series published by TIME-LIFE BOOKS.

IN MEMORIUM

ROBERT P. L. STRAUGHAN

From the Editor's Desk

Normally, on this page, one expects to find my editorial. Such were the plans for this issue, until our composing typewriter threw its letter "i" and necessitated some fancy slipping of paper into the works each time an "i" was needed - adding additional time for the set-up of the magazine. So no editorial. My apologies - see you next time. Tom

I Remember Irish Moss

By LT. COL. CORINNE E. EDWARDS

I remember gathering that red-purple, short, rubbery-like seaweed off the rocks at Scituate, Massachusetts on family outings. I remember my mother drying it and I know it was made into a pudding which we liked and, spelling it phonetically, called it "Blamonge". My memory bank puts forth no recollection of the sight or taste of this pudding of my childhood.

Arnold's Sea Beach At Ebb-Tide (page 80) of my college days' edition, informs me that it is in the Order Cigartinaceae, Genus Chondreus, species crispus and gives no author as our shell books do. We called it Irish Moss and this, now reprinted, shell and sealife book calls is "Carrageen". The dictionary tells us that the word comes from "Carragheen" an Irish Free State, so it must grow in Ireland's waters and Irish immigrants discovered it off New England shores and harvested it here. It is also known and harvested off Nova Scotia and off Portugal. Its fronds begin with a flattened stem, which divides and subdivides, as do the points of our Basket Sea Star. It grows in tide-pools, but is stunted; that is where my family must have gathered it. In deep water, sheltered by rocks (New England's shores are very rocky) it grows in dense masses. It ranges from New York northward.

The August, 1975 issue of Yankee Magazine (page 78), in a fine piece of writing, takes its readers right off the rocky shores of Scituate with the Mossers as they go mossing for moss - Chondrus crispus or Irish Moss. The world supply is limited to a few coastlines in only four countries. In Massachusetts it is harvested off Scituate, Hingham, Cohasett, Hull - my home territory. There I gingerly waded in bare feet around barnacle-encrusted rocks doing a Girl Scout Merit Badge on sea life. In those days (1918-20) we really worked all year to study, learn and EARN a merit badge..

Moss is raked from the rocks in the two hours before and two hours after the extremely low tides (new moon time) of those months and days of the year when weather (wind and cold) permitted. There has been little change in a century of man and skiff bringing in a load of from 500 or more pounds of moss. There is a record of a Scituate man who, in 1914, pulled 2750 pounds into his 16-foot skiff. These men, who take their living from the sea, wear polaroid glasses now and often put a little "oil upon the troubled waters" so they can see through it to the moss on the rocks below. They rake it off. Once a cutting machine was devised, but it killed off the moss beds. A sea moss company purchases all the moss the five to twenty-man fleet of mossers can pull. They are paid three or four cents a pound and this back-breaking work nets a man with 700 pounds the sum of $21.00 to $28.00 for a day's work - when tide and wind and weather are right - many low tides come before daylight and a man can not work moss if he can not see through the water to know what he is doing.

The moss, dried and evenly bleached on all sides, is baled and sold to a refining company. Did you know that sea moss is used as an emulsifier in chocolate syrup? Look for the ingredient "carrageen" among those listed on your next carton of chocolate milk. Moss is used in hand lotion, cosmetics, beer, ice cream, puddings and medicines - I think it smooths it.

I have the sea in my blood (as well as seaweed and shells) so when I spent two months in Japan, all by myself, a lot of time was at the seashores of little villages. I saw the grown ups and little children gather a small net bag full of some kind of seaweed. When I bought little boxes (made of very thin wood) of food out of the train or bus windows, I often got a little seaweed. I think it was sometimes pickled or dried and sprinkled over rice, fish or noodles. The Japanese call seaweeds, which they eat and enjoy, by the poetic name of "the grass of the sea". At one seaside village I saw girls spreading seaweed out on mats to dry in the sun.

Get a copy of August 1975 Yankee at your library and read and enjoy Jack Hoey's fine article and the beautiful photography of Doug Tatreau.

*Coconut Grove, Florida

Family Olividae: Dilema of Generic Differentiation

By DR. ROWLAND F. ZEIGLER

The OLIVIDAE (Swainson, 1840) evolved during the Late Cretaceous or Early Paleocene periods probably from the Volutacea branch. Olsson, however, feels that placement in Volutacea Superfamily is unrealistic and arbitrary. This well-defined family has maintained its unit characteristics since Cretaceous times. Olsson (1967) stated that "The Olives arose in Late Cretaceous times through Pseudoliva and Agaronia-like species akin to those of the Recent dominant in the Miocene".

Members of this family are active snails which crawl about on top of sand, but more commonly below the surface with only the tip of the siphon showing. They are predators and scavengers, more active at night, and leave behind a characteristic trail in search for food. One genus has been known to prey upon another. Oliva will ingest Olivella (Olsson 1956) and there have been reports that some species are capable of swimming. Wilson (1969) described this behavior in Ancilla cingulata Sowerby, 1830. The propodium (large forepart of the foot) was the propelling organ. With a "repeated up and down motion of the propodium at regular intervals of a little more than a second (maintained for about 45 seconds), the animal was propelled to the surface of the water in a large dish and around in an erratic manner - swimming occurred spontaneously or as a result of agitation". Other species are said to swim by flapping the side flaps of the foot. This may be an escape reaction. The Oliva undoubtedly have a keen sense of smell as well as sight, as they will surface from hidden positions under sand when bait is placed in the vicinity. Apparently the evolvement of Oliva has exceeded that of other members of the family.

The radulae (lingual ribbons) of Olividae are those of a rhachiglossate prosobranch, being 2-4 mm long and containing up to 100 rows of teeth, each row with 3 teeth, the central tooth being bow-shaped.

Burch (1960) stated "It is far easier to identify a specimen to species in many families than it is to solve the maze of taxonomic confusion surrounding the assignment to a proper genus". In Olividae, this well applies to the genera Olivancillaria and Agaronia. When one goes beyond the type species of a genus in this family, the variations, inconsistencies and overlapping seem to be as much the rules as the exceptions; hence, just where is the line to be drawn for generic classification? In a given genus, just what characteristics of which organs are the deciding factors? This problem applies to the shells as well, and conversely, shells almost identical in appearance are found oceans apart! Thus the quandary continues in spite of the scholarly and labrious works of prior investigators. The confusion in historical toxonomy, contributed by various writers in different locales, and using individual criteria (some apparently without the availability or knowledge of previous reports) - has therefore resulted in countless names being applied to the same genus. Space will not permit their listings. Majority opinion is that they must go into the synonymity of one of the five genera listed below. In the light of the meager present day knowledge, there must necessarily be some compromise in attempting to separate the genera of this fascinating group.

Family: OLIVIDAE Swainson, 1840

Genus: Oliva Bruguiere, 1789
Olivella Swainson, 1831
Ancilla Lamarck, 1799
Olivancillaria d'Orbigny, 1839
Agaronia Gray, 1839

The following notes are an effort to point out a few established differential characteristics of each genus.

Genus: Oliva Bruguiere, 1789
55-60 species, many forms. True Olives. Worldwide.

Type species: Oliva oliva Linnaeus, 1758. Indo-Pacific. A very variable species. (Since the study of the Linnaen olives in 1966 by Olsson and Dance, this name also replaces that of O. Ispidula of most authors. The consistent handsome Tent Olive, O. porphyria Linnaeus, was previously considered the type of genus.) See figure 1.

Shell: Solid, cylindrical, low spire, long narrow aperture with several columellar plaits, extremely glossy, very variable in color and pattern. Body whorls usually uniformly colored. No periostracum. Channelled sutures on the spire, though occasionally nacre covered (as in species lignaria, carneola and athenia).

Animal: No operculum. Head and foot large and and muscular. Powerful foot exceeds length of shell when crawling. Foot used in enveloping and smothering prey. Mantle, tentacles, proboscis and eyes present. Sexes separate.

Microscopic: Radula has about 100 rows of teeth, each with three teeth. Bow-shaped central tooth equipped with 3 cusps, the central cusp generally smaller.

Genus: Olivella Swainson, 1831
Several hundred species. "Dwarf Olives". Metropolis - Americas.

Type species: Olivella dama (Wood, 1828, ex Mawe M.S.) West America. (Olivella purpurata Swainson, 1831 is a synonym). See figure 2.

Shell: Small, slender, high-spired, glazed.

Animal: Operculum usual - thin, horny and not large enough to close aperture. Some species (nivea, lepta, etc.) lack the operculum. Animal similar to Oliva, but tentacles and eyes are wanting. Foot shorter, rounded behind and does not extend beyond the spire tip.

Microscopic: Radula short and wide with fewer rows of teeth (usually less than 50). Rhachidian teeth multicuspidate, the cusps being small and numerous.

Genus: Ancilla Lamarck, 1799
About 100 species. Worldwide.

Type species: Ancilla velesiana Iredale, 1936. Southern Australia. (Closely related to Ancilla cingulata Sowerby, 1830 of Northern Australia.) See fig. 3.

Shell: Frail, thinner, less glossy, higher spire, wider aperture than preceeding genera. All sutures usually covered with callus. Columella twisted.

Animal: Small operculum frequently present. No distinct eyes or tentacles. Capable of swimming. Similar to Agaronia?

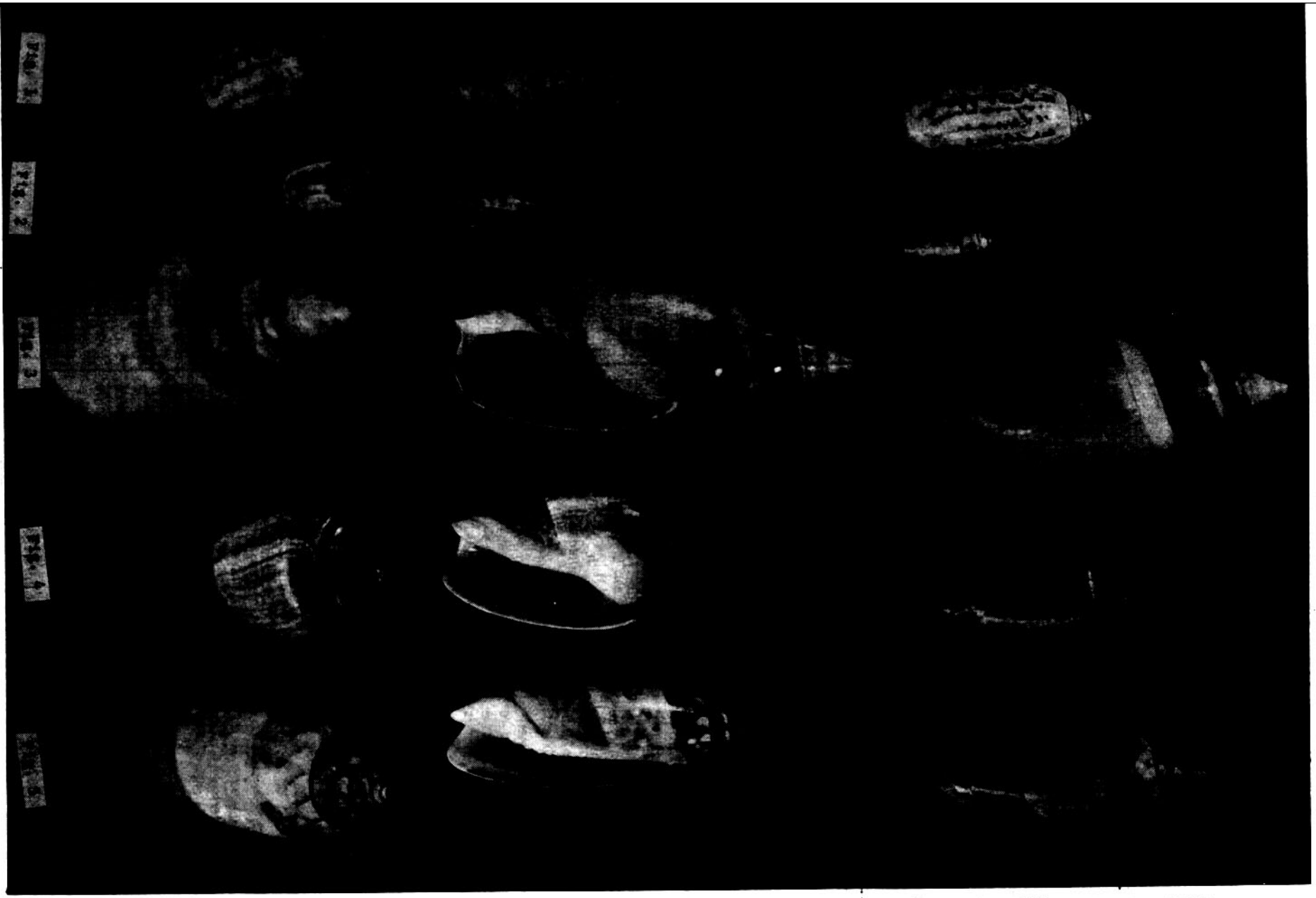
Microscopic: Radula has 95-100 rows. Rhachidian teeth tricuspate, but there are two strong lateral teeth which are simple and beak-shaped. Central teeth have 3 main cusps and 3-4 smaller accessory cusps on each side.

Genus: Olivancillaria d'Orbigny, 1839
Few species. Mostly Eastern South America.

Type species: Olivancillaria urceus Roding, 1798. Brazil. (Olivancillaria braziliana Lamarck, 1811, synonym by which it is better known.) See fig. 4.

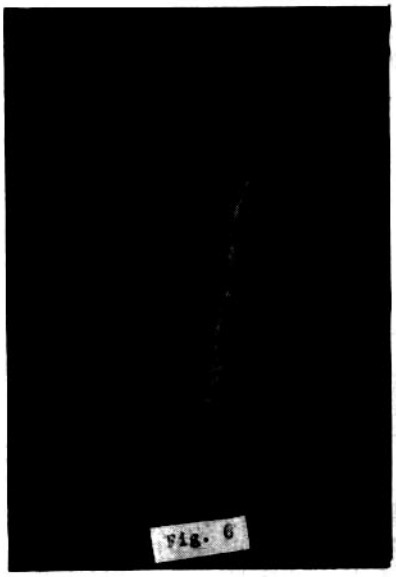
Shell: Smooth, oblong, short-spired, wide aperture. Sutures of spire usually completely filled and covered with heavy callus deposit, but suture line between body whorls and apex remains distinct. Sutures not caniculated to apex. Columella with 2 or 3 oblique plaits anteriorly, and a large callosity posteriorly.

Animal: Operculum distinct, half-ovate. Hind part of mantle ends in a large thick



1. *Oliva oliva* Linnaeus, 1758. 2. *Olivella dama* (Wood 1828, ex Mawe M.S.)
3. *Ancilla velesiana* Iredale, 1936. 4. *Olivancillaria urceus* Röding, 1798.
5. *Agaronia hiatula* Gmelin, 1792.

6. *Agaronia gibbosa* Born, 1778
Note flaring aperture, large callosity on posterior columella and heavily calloused spire (but suture lines distinct) as in *Olivancillaria*, and glossiness of *Oliva*.



Agaronia gibbosa Born, 1778. Note flaring aperture, large callosity on posterior columella and heavily calloused spire (but suture lines distinct) as in Olivancillaria and glossiness of Oliva.

fleshy process which partly covers the spire. Eyes?

Microscopic: Rhachidian teeth tricuspidate. Small denticles on the sides that are not present in Oliva. Very similar to Agaronia.

Genus Agaronia Grau, 1839
? Many species. West Africa, Americas, Malaysia. (Closely related to Olivancillaria and considered by some authors to be a subgenus of it. Others place them in synonymy, but the opinions of most authors is that they deserve separate rank; largely because of gross shell anatomical differences)

Type species: Agaronia hiatula Gmelin, 1792. West Africa. (Very similar to Agaronia testacea Lamarck, 1811 of West Americas and Agaronia subulata Lamarck, 1811 of Thailand.) See fig. 5.

Shell: Thin, unglazed, pointed spire, aperture wide anteriorly, columellar twisted but not thickened posteriorly. Callus does not cover the spire and the sutures of the spire are distinct. (The species gibbosa, with its sutures distinct on a well calloused spire, seems to connect the genera Agaronia and Olivancillaria.) See fig. 6.

Animal: Distinct operculum (except the species gibbosa). No distinct eyes or tentacles. Foot long and pointed behind with side lobes. The front lobe has a longitudinal slot.

Microscopic: Rhachidian teeth tricuspidate, with small denticles on the sides (as in Olivancillaria) that are not present in Oliva. Central teeth have 5 cusps.

Photographs by Dr. Waddy G. Baroody, MD.

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Except for publications by Olsson (1956) and the Burches (1963) on Olivella, Olsson and Crovo (1968) on Oliva, and Wilson (1969) on Ancilla, there seems to be very little recent information available pertaining to the family: OLIVIDAE. Hopefully, there will be more data forthcoming from malacologists and conchologists. This writer would certainly welcome any observations, reports or references

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Puzzlers

Contributed by Ann Smiley

(See answer for last issue's puzzle page 135)

From the following three lists, match the shells with the countries; second match the collecting areas with the countries and third match the shell to the collecting area.

Shells
Argalista kingensis
Alcithoe fusus
Alcithoe arabica depressa
Altivasum flindersi
Amphidesma ventricosum
Argonauta nodosa
Conus aurora
Cottonia nodiplicata
Cympiolacca complexa
Cypraea cernica tomlini
Harpovoluta vanhoeffeni
Melo miltonis
Neptuneopsis gilchristi
Philobrya subpurpurea
Pterospira roadnightae
Pyrazus ebeninus
Sabia conica
Tolema australis
Trophon stuarti
Volutoconus grossi

Countries
South Africa
Canada
Australia
U.S.A.
New Zealand
Antarctica

Collecting Area
Ninty Mile Beach
Back Stairs Passage
Poor Knights Island
Spirits Bay
Table Island
Major Island
Lakes Entrance
False Bay
Still Bay
Deception Pass
Tin Can Bay
Botany Bay
Gaussberg Mountain
Swan River
Broken Bay
Bay of Islands
Tottnest Island
Sea Elephant Bay
Surprise Bay
Ninty Mile Beach

I have used type localities, range extensions one end of the range, areas particularly noted for the species and sometimes have had to choose a species typical of the area. The same collecting area listed twice may mean that two countries have places with the name.

Journey to the Bay of Angels

By GARY GORDON

Bahia de los Angeles

Mountains rising behind the village of Bahia de los Angeles.

As I sit here at my desk all safe and comfortable, it is hard to believe that I ever went to that strange and wonderful place called Baja. It all came about slowly, over a couple of years time. My father, who lives in Garden Grove, construction of the paved road that would stretch from Tijuana down the Baja peninsula to La Paz.

Baja California is a peninsula, 850 miles in length, on the western coast of Mexico. The salt water sea separating Baja from the main portion of Mexico is called the Sea of Cortez, or by us northerners the Gulf of California. A fantastic number of shells are found here, such favorites as Murex erythrostomus, Murex nigritus, Patella mexicana (the world's largest limpet), Spondylus princeps, Mitra belcheri and the world's largest and loveliest olive, Oliva porphyria - to mention just a few. Dad is a rock-hound and Baja has a wealth of minerals such as copper, iron, salt, red aggregate, sulphur, turquoise, silver onyx, gold and a long list of others. I am a shell collector, so between the two of us we were planning a trip to Baja as soon as the road was completed.

After two years of careful planning I found myself on a Boeing 747 winging my way from Atlanta, Georgia to Los Angeles, California. We left Los Angeles, heading south in my dad's Dodge pickup with a camper-shell on back. We also pulled his camping trailer. A good friend of dad's, Bill Dossinger (a fellow member of the Compton hunting and fishing club) came along to do some sight-seeing and fishing. We were equipped with everything we could think of for shell collecting and rock hunting. We had to take all our food and drinking water - the peninsula is a dry desert with few people or places to get supplies. Bill turned out to be a great cook and good conversationalist, we spent many nights talking about our adventures as the desert wind slammed dirt and dust against the side of the trailer.

As we followed the highway south that first day, I saw a sign that read "San Clemente next exit". I thought to myself that the name rang a bell, but all these coastal cities have names I've heard before.

If you're in southern California be sure to drive down to Ensenada, Mexico, the trip is fantastic! At about ten PM we were south of San Quintin, Mexico, and it had been a long day. We decided to find a place to pull over for the night. We were on a two-lane blacktop with sandy dirt on both sides. It was pitch-black and we could not find a place to pull off the highway. When we did see a good spot we would zoom past before we could stop. Then we'd slow down, very slow, for a long way and not see a single spot. We then became impatient and would speed up - zooming past the next good spot! We finally found a large pull-off and stopped on a sandy flat spot. Dad decided to pull ahead just a little more and (you guessed it) the truck sat there as the wheels dug themselves into the sand. We had a snack and spent the first night stuck in the desert.

At first light of day, I dressed with excitement and went off to explore the country and possibly find some land snails. It was a cool morning with a light fog drifting in from the Pacific. The land is sandy and very flat, there were many clumps of seemingly dead bushes. Here and there I could see rows of trees planted by man. The foliage of the trees reminded me of tamaracks. Possibly they are some kind of pepper tree. As the mist lifted I could see several small primitive houses.

After a hearty breakfast we had to tackle the problem at hand - the stuck truck. We decided to jack up the truck's wheels, put rocks and limbs under them and drive out. An old car drove up and two young men got out to help us. They could speak no English, but understood our problem and gave us assistance in getting the truck out of the sand.

(Photographs by the author)

Further and further into the barren waste we travel. The desert is full of surprises. Over a hill the desert would be covered with cactus five to twenty feet tall - as far as the eye could see. Imagine a cactus forest so thick we had trouble walking between the giants without getting pricked. I had never been too interested in cactus, but these were fascinating. After driving for an hour the cactus were gone and the desert a vast empty, dry plain.

Murex erythrostomus

Towards evening we came upon an area of large weather-rounded boulders, some as big as houses. It looked as if a giant had tumbled

Whale bones on rocky beach near village.

A rare golden color form of Oliva Incrassata

them over the land. Here and there great piles of these boulders stood, like monuments in the desert.

We traveled on into the high country of Baja, enjoying every mile of this strange and beautiful land. There were great mountains and high plateaus with strange vegetation. We drove on into the night, winding our way through the mountains.

Around ten o'clock we came over a rise and there before us in all its splendor and glory was Bahia de Los Angeles (Bay of Angels) shining in the moonlight. You could see the outlying islands with their steep mountains, like sailing ships on a sea of silver. The view was breath-taking and promised great adventure. The road started the long descent to the Bay shore and the small town.

The Bay has an interesting history. It was first explored by a Jesuit Padre in 1746. The Padre gave the Bay and the islands their names. In 1759 the Jesuits constructed the first buildings and, eventually, dams and irrigation ditches. Later the Franciscans came and built a new adobe church. The Dominicans came and constructed San Boryamission with huge stones. These buildings and the Mission were not built on the Bay, but were built about twenty miles from it.

As we pulled into the town we found the main street is a dirt landing strip. The small houses were all dark, except for a few candles, as the town's generator was off for the night. We found a nice parking spot at the edge of town, just above the bay's high tideline. We quicklyset up camp so we would have some time to look around before we went to bed.

Dad and I took some lights and started down the beach to look for shells. The Bay was having one of those famous Baja tides - when the tide goes way down. We were too far from shore, walking on dark sand that was covered with small tide pools. There seemed to be few shells, not even many broken ones. I was becoming rather disappointed when Dad found a nice pink-mouthed Murex erythrostomus that seemed to be out there all by itself. Soon the tide turned and was coming back in - fast. We started the long trek back to shore. We only had one good shell, be we had high hopes for the morning.

The desert wind was quiet and after a good night's sleep, we were up before dawn. Bill made one of his delicious breakfasts while Dad and I did the camp chores. The darkness soon gave way to light and we found we were at the foot of a large mountain which stood watch over the Bay. There was just enough room between the foot of the mountain and the shore of the Bay for the small town. Across the Bay we saw a number of small islands. One at the north end of the Bay has a very large volcano. What a sight that volcano must have been when it erupted - I could visualize a great fountain of fire coming out of the blue sea. Protecting the mouth of the Bay is an island 45 miles in length, covered with volcanic mountains rising to 4315 feet. This island is called Angel de la Guarda (Guardian Angel) and is often mistaken for the Mexican mainland, as it sets a good way out in the sea. To the south we saw the most breathtaking sight of all, a beautiful peninsula of land stood across the south end of the Bay - covered with tall, spell-binding mountains, marching to the south. These mountains had sharply pointed peaks and were cast in the most lovely shades of gray, like proud soldiers in grey uniforms, they stood in sharp contrast to the deep blue of the Bay. I scanned them with binoculars and could not see a single green plant. Our charts and maps told us that these steep peaks reach heights of 3525 feet. We just knew there were some exciting shelling areas on the far side of the mountains. The decision was made to try to get there by motorcycle some time before we left the Bay area.

The morning sun exposed a nice low tide that promised shells and more shells. Bill was the first to find some large sand dollars shaped like arrow-heads. In the days ahead we would learn that Bill had a sharp eye for finding shells - this beach seemed limited to these notched sand dollars. We decided to look for better shelling grounds.

So dad and I loaded the motorcycles with tools, food and water and started north along the beach. Bill headed towards the boat docks to do some fishing and sight-seeing. We soon found a place where the tide had exposed rocks covered with plant life. I turned over a rock and found the area teeming with sea life and lovely shells. There were limpets, tops and turbans. Soon I was working in deeper water finding little Trivia, some Cypraea annettae and cute Olivella sp. Dad was having a "hay day" at the high tide line finding giant-size cup-and-saucer shells along with some excellent dove shells. We found several bubble shells with canary yellow apertures. The bivalves seemed to reach a new glory here. They were not very large, but each had lovely displays of rays, blotched and other color patterns that only Mother Nature can produce. Each shell seemed a prize in itself, a real treasure for my collection.

Time marched on and the sun was far overhead. I looked across the Bay at those lovely mountains. The sun was showing new gray colors in the cliffs and the blue Bay seemed even bluer. I suddenly realized that the motorcycles were completely out of sight. We had come over a mile on hands and knees, picking up and sorting shells.

We soon had the motorcycle saddlebags full of seashells. There was still plenty of time so we ate lunch on the beach. After lunch we drove along the shore to a small fishing camp. Many of the campers were from the U.S. The fishermen had dolphin (not to be confused with porpoise), big sea bass and planned a large fish fry that night.

Not far from the village we found a large pile of Pecten shells that the natives had dis-

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SNAIL TALES

By VIVIAN ABREU ; Tampa, Florida

As the land emerged from the seas that once covered most of the earth, rivers and lakes of freshwater formed on the low lands. The retreating salt water left sunny mud flats where simple aquatic forms of plants survived and drew moisture from the soil. Over the eons they changed into the shore plants and trees growing in the marshes, swamps and woodlands of today. From the sea, into the freshwater streams and lakes, many living things crept, crawled or were transported by tidal waves and windstorms. So, the freshwaters of those ancient times became the gateways to the land for many creatures of the sea.

Crabs and snails gradually altered their gills for breathing air and learned to live in the swamps and woodlands of the drying land. The freshwater became the habitat of turtles, alligators, aquatic lizards, fish and some gastropod mollusks. Later on in time, pelecypod mollusks and other forms of invertebrates found their way into the freshwater, too. Land and freshwater flora and fauna became established on earth, multiplied greatly, flourished in their new environments and were represented by many and various forms long before Man existed or walked on the land of the prehistoric world.

The snails that left the sea to live on land and in the freshwater are spread all over the world of today and live most everywhere. In rivers, lakes and ponds, on mountain tops and in the jungle, deserts, swamps and forests, snails of many, many species are abundant. The creatures have adapted themselves to almost every climate, but most snails live in temperate, sub-tropical and tropical regions.

Snails of freshwater and land-living species are interesting to observe and study. And as you become aqualnted with them and discover what remarkable animals they are, all but a few of the disease-carrying and destructive species will assume appealing personalities.

A very large and diversified group of animals, snails belong to the Phylum Mollusca, and include slugs, which are snails without external shells. A typical snail has a spiral shell which helps to protect the animal from injury, predators, desiccation and other unfavorable environmental conditions. The soft parts of the body contain the vital organs and always remain within the shell, twisted to conform with the spiral coil of the structure. A thin, tough skin, the mantle, surrounds the vital organs and secretes calcium carbonate with which the animals build their shells.

(See "The Snails That Left The Sea" by V. Abreu in Of Sea and Shore, Summer 1973)

Drawings are by the author.

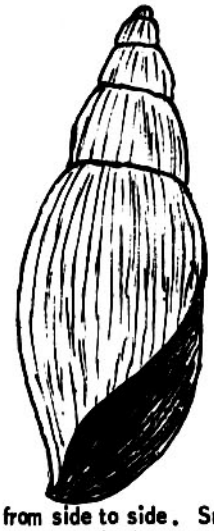
THE SWIFT AND FEARLESS HUNTER

In the summer twilight, the tender foliage of coleus and caladiums displayed beads of crystal scattered among the deeply colored leaves. The delicate, beautifully coiled and lacy fronds of ferns were sprinkled with tiny glistening diamonds that caught the last of the fading light. The garden was refreshed and smelled sweetly of the damp earth and the perfume of flowers after the late afternoon rain shower.

As the evening darkness deepened into night, a garden snail began its search for dinner among the lovely plants. Seeking foliage that appealed to it, the garden snail was unaware of the danger lurking nearby.

From under the damp mulch around the crotons, about a foot or so away from the snail, a handsome rose-colored creature came forth. The rose-colored creature was a fearless hunter in search of meat and glided along the damp earth alert for any prey that might be found among the miniature jungle of plants.

On a partially uncoiled frond of fern the garden snail blissfully scraped food into its mouth as it devoured the tender plant. Unknowingly, the fearless hunter had chosen a path that led toward the dining garden snail. Ever so often, the hunter would lift its head and the front part of its foot up into the air, moving



them slowly from side to side. Suddenly the sensitive antenna on its head picked up the scent of the fern eater several inches away. Gliding rapidly and smoothly, the hunter closed in on his prey until the garden snail was within striking distance. Swiftly the hunter lunged and seized the unfortunate garden snail's exposed neck. The victim struggled to withdraw, but the hunter did not relax its vise-like grip and within a very short time the garden snail resisted death no more. Relentlessly, the hunter chewed away upon the soft meat of the garden snail's body until only the empty shell remained

and then the hunter glided away in search of another tasty morsel.

Euglandina rosea (Ferussac) is the hunter's name, a member of a family native to tropical and sub-tropical America. It is a very common snail in Florida, but it is so little known that it had no common name. Euglandina snails also live in South Carolina, Georgia, Alabama, Mississippi, Louisiana and Texas, having slightly different forms and colors in various areas.

In general, the shell of Euglandina is usually large to moderate size, ranging up to 2 or 3 inches in length. Some species of Euglandina, native to Guatemala, grow to 4 inches and have quite nice shells of very rich color. All of the Euglandina shells deserve a place in shell collections and the animals are very worthy of protection, especially from senseless destruction by gardeners who are unaware of how valuable the snails are to the ecology of the south.

Florida's Euglandina rosea have solid, oblong shells, higher than wide, with narrow ovate apertures more than twice as long as wide, thickened and pink within. The spires are regularly tapering with blunt apexes and are rosy colored. The surfaces of the shells are glossy, with the first three whorls smooth and the three or four remaining whorls irregularly sculptured with fine lines and deeper grooves of growth lines running up and down the shell.

When the snails are alive they are beautifully tinted in shades of pink, but after the animals die and the shells dry, the color fades to almost white. Variations of Euglandina rosea have thinner shells of paler color and some differences in shapes of the shells. The large, solid forms are found in moist, protected places around the bases of shrubbery, under leaf mould in forests and gardens, in damp crevices of stone walls, in and around piles of rocks and under dead branches and other trash. The smaller, thinner forms are found in dry places such as shell mounds and areas with sandy or rocky ground.

The foot of Euglandina animals is rather long and narrow with a smooth sole, the entire surface of the foot being very sensitive to touch. The heads of the animals have greatly elongated lips which flare out on each side of the rather large mouths. In the mouth of the snails are the radulas and these flesh-tearing organs are perfectly equipped with long, curved teeth to shred meat and tissue. The snails have no jaws so the food is rasped directly into their digestive systems. In laboratory examination, the stomachs of Euglandina rosea frequently contain entire shells of small Helix which have been swallowed whole. The snails have been described as very greedy eaters with ravenous appetites and usually seize any other snail or slug that appeals to their taste.

On the head of the animal are two pairs of tentacles, one pair shorter than the other. Scientists have established that little knobs on the ends of the longer tentacles close to the eyes are organs for the sense of smell. The sense of smell is extremely acute in the Euglandina and is used by the snails for locating food.

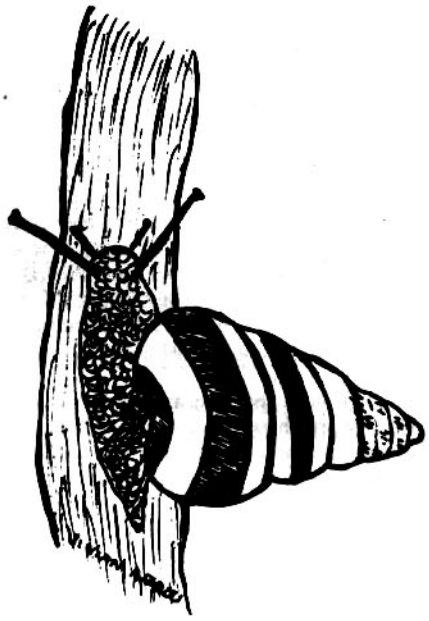
Like most land snails, Euglandina rosea are hermaphroditic, each individual having both male and female sex organs. The sex organs are located one on each side of the right eye retractors, on the snails' heads. The mature snails indulge in caressing and courtship before mating, and each of the mating pair impregnates the other. Little nests are prepared in the leaf mold and soil at the base of plants, and there the small oval eggs are deposited. The eggs are of uniform size with white shells that are brittle and hard. They have no inner membrane. The exterior of the eggs is extremely rough and is quite porous. When the egg laying is completed, the little clutch is covered over with loose humus and soil.

When the embryo snails are ready to hatch, they use their tiny radulas to first file a small opening in the egg shells. The baby snails fill the interiors of the eggs except for very small spaces, so it is necessary for about a third of the eggshells to be cut away in order for them to get out. After the initial openings are made the process of cutting away the larger openings requires about six hours of hard work for the little snails.

The newly hatched baby snails resemble tiny bubble shells and do not have elongated shells like the mature snails, but in a short time the shells of the babies grow into oblong structures exactly like their parents. Once out into the world, the Euglandina young seek the moist haunts where land snails live and like others of their kind, they must have moisture to survive.

On rainy days and at night Euglandina snails are very active creatures and glide about the gardens and woodlands, across soil, grass or stones, forever searching for food. When the weather is too dry, hot, cold or wet, the snails form a film of mucous to seal up their apertures and rest until conditions are more favorable. Often, when other snails are still asleep in their sealed shells, the Euglandina are out hunting. Their appetites urge them to seek out herbivorous relatives for the flesh-eating Euglandina live entirely on the meat furnished by the bodies of other snails and slugs.

Because of their carnivorous habits, the Euglandina rosea are of considerable value in the cultivated gardens of Florida. They are excellent pest snail destroyers as they readily attack and devour any that may be found. For this reason, if for no other, Euglandina rosea, the handsome rose-colored snails of Florida, should not be destroyed or molested when found in gardens or woodlands. The swift and fearless hunters should be protected and welcome residents in your back yard.

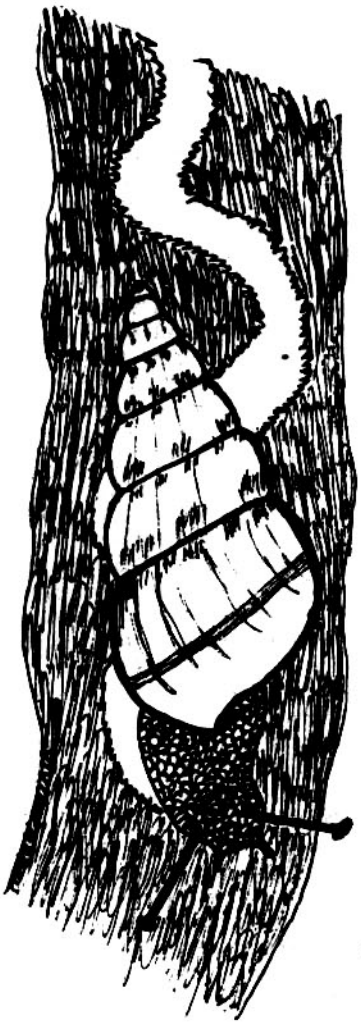


AN ODESSY OF SURVIVAL

Across the blue Caribbean skies, about a million years ago, dark clouds scudded low and fast, forewarning of the great tropical hurricane approaching the island of Cuba. Along the coasts where the lush jungles grew profusely right down to the edge of the sea, the first onslaught of the terrible winds and torrential rains struck violently and continued to cross the island. Further inland on the slopes of western Cuba, in the unspoiled forests of tropical trees, the storm battered the landscape with maniacal fury.

As the winds increased to incredible velocity, the trees were lashed to and fro until their roots were torn from the earth and their trunks and limbs were split asunder, the pieces hurtling along with the force of the storm. Tons of rainwater deluged the forests, creating massive floods that rushed down the slopes and through the jungles. The flood crest bore whole trees along with broken and battered branches, whirling them down the mountain streams, through the valleys and into the raging seas. Swiftly borne along by the hurricane winds, the floating trees and branches were caught in the ocean currents flowing up the Yucatan Channel to join the Gulf Stream in the Florida Straits.

The great current swept against the lower part of Florida and driven by the winds of the storm, the sea surged completely over the string of rocky keys and far into the low-lying main-



land. Borne by the great current and driven by the exceptionally high tides, the debris from the mountains of Cuba was landed along southern Florida and across the Keys. In the debris, a wide variety of seeds from West Indian tropical trees, shrubs and plants were brought to land where they sprouted and took root in protected places.

The warm sea air and the abundant amount of rainfall in the protected places aided the tiny seedlings to grow into dense, jungle-like spots that were seldom in danger of flooding and had some protection from natural fires. Limestone outcrops, shell beaches and marl ridges along the coastal areas were soon covered with thick growths, and so, from the seeds which drifted ashore from the currents of the Gulf Stream, grew forests closely resembling the forests of Cuba, Jamaica and the Islands of the Antilles. These forests flourished and much later in time became known as the Florida hammocks.

Once the hammocks were established, the ocean currents no longer washed against shores that were stony or muddy. Soon, in the places where the hammocks grew and the tropical conditions were right, the stage was set for the entrance of the beautiful tree snails, Liguus.

Every year or so, the great hurricanes continued to sweep across the West Indies, and almost as often, across the Keys and mainland Florida where the tangled wreckage of trees and shrubs from the tropical Islands landed among the hammocks along the shore. Clinging to the branches of uprooted and broken trees, and under the bark of dead limbs, small creatures had managed to survive the fury of the hurricanes and the storm lashed sea. The survivors found themselves in a strange, but friendly land.

Among the refugees of the storms there were many brightly colored tree snails from the island of Cuba. Unmolested in the hammocks, they soon formed colonies and multiplied, spreading out across the Keys and most of southern Florida became abundant and developed many new colorful and striking patterns on their shells. Today, because of the destruction of the tropical hammocks and the greediness of shell collectors, the beautiful tree snails are among the rarest inhabitants of the Florida Keys and the Everglades.

Liguus snails live mostly on smooth barked trees and prefer the drier hammocks to the brackish or swampy areas. They have porcelain like shells, delicately banded in an outstanding array of colors. The snails are so richly colored that there has been 52 color forms named, each form distinctly decorated and no two alike. Why the snails developed so many color forms, no one can say. The gleaming color bands and patterns do not serve as camouflage, defensive warning to enemies, or to lure mates. Perhaps, beauty for beauty's sake is enough, at any rate there are few land snails that can equal the gorgeous Florida Liguus.

The original Cuban castaways did not have the same coloring of the Liguus in Florida of recent times. Loss of one or more components of the color patterns has taken place in members of all main stocks by mutation, leading to the formation of new color forms. The change in the land surface and the spreading of the hammocks resulted in the mingling of colonies which were once isolated for long periods. Interbreeding of the seperated colonies resulted in the hybrids we find today. Though Liguus do not appear to have any preference when they select a sexual partner, the offspring have completely segregated color patterns.

Consistant and distinct color forms appear in the offspring of certain parents. For example, when the color forms alternatus and mamoratus are mated, the offspring are fuscoflammellus. By experimenting with genetics, some of the extinct color forms of the Liguus snails may be restored through selective breeding. The Rangers in the Everglades National Park have been working on crossbreeding for many years and have produced excellent results.

The periostracum of Liguus is very thin and the darker colors of yellow, brown, black or other dark colors are underneath the periostracum in the prismatic layer of the snail's shell. Yellow is usually strongest close to the growing lip and sometimes shades into red or orange. The most persistant color element of Liguus fasciatus is thin green lines circling the shell and the green lines, when present, are in the periostracum only. As this coloring is only skin deep, the lines may be faded be weathering or rubbed off by abrasion. Albinos occur

in all races and forms, but without color or pattern these shell forms cannot be placed in any named color form.

Most of the shells spiral to the right as the animals inside them grow, but very rarely a "left-handed" shell may be found. In 1946, Henry A. Pilsbry reported in his monograph on land mollusca that there were only nine sinistral shells of Liguus known at that time.

The little animal within the beautiful shell has a head with two pairs of tentacles that can be retracted. The longer pair of tentacles have small round eyes in the ends of each and the shorter tentacles are organs of touch. The foot is large and muscular, with slime glands on the bottom. They have no operculum, but form an epiphragm to close their apertures during dry, cold or other adverse weather conditions.

During rainy or damp weather, almost always at night, the snails are very active. They creep around on the tree trunks and limbs feeding on the fungi, algae and lichens growing on the bark. Liguus do not eat chlorophyll-bearing leaves and are very often found on dead trees with fungi growths. With raspy tongues, leaving a trail of clean bark behind them, the snails scrape off their food and do not injure living trees.

Liguus snails seem to like to live in certain trees better than others, prefering the trees with smooth bark. The wild tamarind, Jamaica dogwood and pidgeon plum trees are favorite homesites. Since Liguus have no liking for foliage, they do not harm the trees in any way and therefore can not be considered pests.

When the snails are ready for aestivation they fasten themselves firmly to the trunk or a limb of their tree home, usually in knot holes, crotches, under loose bark or other protected places and go soundly to sleep. After their long sleep they awaken as the rainy season begins and start to search for food.

Near the end of the rainy season, while the weather is still warm and the hammocks are damp, the snails are compelled by nature to seek mates. They have a courtship period during which time the pairs of snails lovingly caress their mates and then they freely copulate. The snails are bi-sexual and take turns fertilizing each other. It is probable that nearly all of the mature shells in any one colony become pregnant around the same time, but there seems to be no set mating season, as it all depends on the weather.

The mating impulse occurs during the late summer and six to eight weeks after the conception of the new Liguus generation the egg laying begins. Liguus snails never voluntarily leave their tree homes except to lay their eggs. Crawling downward to the ground near the base of the trees, the little creatures dig small holes in the damp leaf mould, removing debris and begin preparing snug nests. The task of nest building requires about twenty-four hours and the result is well constructed pear-shaped cavities about three inches deep. In the prepared nests, the snails deposit from fifteen to fifty pea-sized brown eggs, covering them with loose soil and leaf mould. Exhausted after the nest construction and the egg laying, the parent snails climb back into their tree homes to rest.

When the warm rains of the following spring dampen the earth coverings of the clutches of eggs, the tiny baby snails come forth into the upper world. Each baby carries a tiny spiral shell about one eighth of an inch in diameter and is expected to fend for itself. The babies find their way to the nearest tree and immediately start to climb and search for food. During the first portion of their lives, the baby snails add two or three whorls to their shells in about a year's time, one to one and a half whorls during the second year, and one half to three quarters of a whorl in the third year. The adult shells are between two and three inches long when the animals are mature. The life span of Liguus varies, usually from three to four years, but some of the snails live much longer. By counting the number of whorls a good estimate of their ages can be made.

Dr. Charles T. Simpson believed that the Liguus snails were compelled, every so often, into forced migrations to form new colonies. According to Dr. Simpson, the snails descended to the ground and moved off into new areas on migratory treks full of hardships and dangers. Many of the beautiful snails perished during these migrations and left their shells to show where they crossed from hammock to hammock, but some survived and overcame great obstacles to reach suitable spots and establish new colonies, thus spreading the Liguus population over a wide area of Southern Florida. Dr. Simpson believed that regardless of the number that perished in the search for new homes, the snails continued to migrate, obeying an instinct that had been inherited from thousands of generations of their ancestors over many thousands of years.

This theory is just romantic nonsence according to other scientists, and the reason for the spreading of colonies is the fact that the hammocks moved, not the snails. As the land surfaces altered, the hurricanes continued to wash ashore debris with Liguus snails clinging fast to the broken limbs and snuggled under the loose bark. The castaway snails landed in different areas from those already established and formed new colonies. Some of the hammocks were damaged by the storms and that debris washed further inland or on up the coast. And so, down through the ages, new colonies formed and older colonies disappeared, spreading the snail population into areas where there were no snails previously.

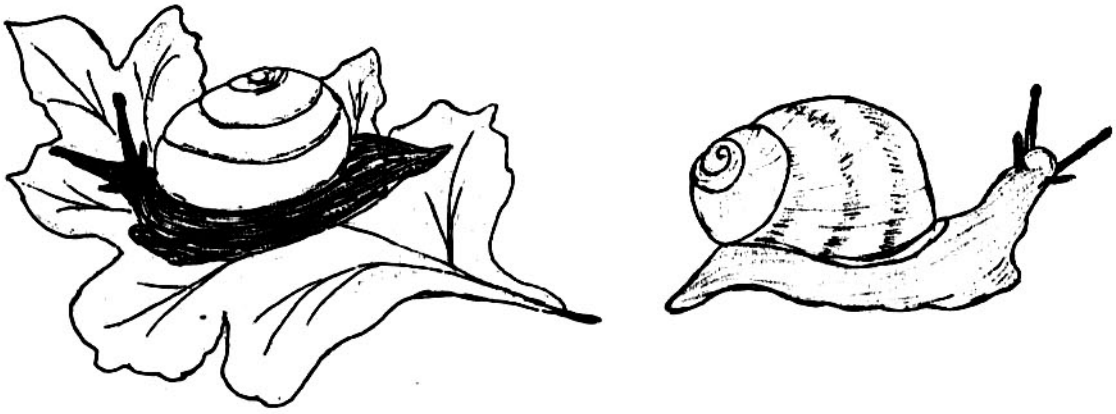
In either case, Liguus snails once lived on most of the Florida Keys and up both coasts to Marco Island on the west and across the lush Everglades to Pompano Beach on the east. The snails survived all the great hurricanes, floods, droughts and natural fires which raged through the hammock lands. Possums, rats, raccoons, birds and hermit crabs feasted on the beautiful snails, but still they were able to exist in sizeable colonies. Then, Man discovered the lovely creatures and the real slaughter began.

Collectors relentlessly gathered thousands of the small creatures, boiled them to remove the animal's bodies and then proudly displayed the gorgeously colored shells. As if that were not enough evil to befall the harmless beauties, "Progress" entered the drama with great machines that devoured the hammock lands to cut highways through southern Florida. Accessability to once isolated and natural areas invited humans to build houses and farms and it was not long before cities sprang up where once great hammocks grew and animals both large and small once lived. As the cities spread, more hammocks disappeared at an alarming rate. Commercial collectors found that the lovely tree snails' shells were in great demand by shell enthusiasts, so even more of the creatures were stripped from their tree homes along the Keys and throughout the Everglades, killed and sold to shell shops and shell dealers.

Most of the hammock lands have already been destroyed by mans' uncontrolled clearing of the habitats necessary for the existance of the Liguus, but inside the Everglades National Park, under the care and careful supervision of the Park Rangers, the three snails thrive. Here, in the many suitable hammocks, protected by the United States Government, the bulldozers cannot crush the remaining colonies of Liguus, and perhaps, there will remain a little of Florida's natural wild beauty for all visitors to the Park to enjoy. Along the Keys and in other unprotected places, the death knell of Liguus has been tolled and it will be but a short time until all of them outside of the Everglades National Park are gone forever.

Many color forms are already extinct and most of the remaining forms are rare, only a very few considered common. Under protection, the shells of snails that die naturally are collected and can be obtained by collectors. Uncontrolled collecting from unprotected areas wreck considerable havoc on the few remaining colonies. For an example, some suppliers of shell dealers go out and collect thousands of the endangered snails in just one night. The dead animals that created the beautiful shells cannot reproduce and therefore the Liguus population is steadily decreasing in areas outside the Park.

Will the Florida tree snails join the already extinct species? In a few years the answer will be only too apparent. If the timeless world of the Everglades hammocks and swamplands is destroyed, all the creatures and plants within them will die. Never again will the brilliant colors of the tree-climbing mollusks glorify the dimness of the still primeval forests, this ending the odyssey that began so long, long ago when, from the island of Cuba, the survivors of the hurricanes landed on the shores of Florida.



THE GENTLE CREATURES

From highland meadows to wooded lowlands and on stony desert sands, colonies of small shelled creatures live quietly and peacefully, perfectly adapted to homes that are far different from the seas of their ancestors' origin. Some of these creatures live only in a very limited area while others seem to be able to live most anywhere. Some mature early and are prolific breeders. This fact combined with their easy adaptability to new environments when transferred from their native lands either accidentally or intentionally, has made possible their spread into most areas of the world.

The common garden variety of snails, the Helicidae, have not proven to be formidable pests, though other types of land snails are, but they have established colonies in widely spread areas. Even their gentleness is overlooked by many people who have strong aversions to land snails in general, but garden snails are not repulsive and are interesting little creatures in the world of nature.

All land and tree snails are univalves with coiled shells, very similar to many sea shells. The great difference between land and sea snails is in the process of respiration. Land snails have lost their gills and have developed lung-like cavities, thus making them air breathers. The forms of garden snails differ but little from other land snails' conspicuous, spirally coiled shells that are carried on the backs of slug-like animals which crawl around on muscular broad feet.

The animals inside the coiled shells possess a head with two long, slender tentacles, each with an eye on its tip and two short, stout tentacles just below and in front of the long ones. They have organs for the senses of smell and touch, the typical snails mouth, radula, digestive and reproductive systems. Their simple lung cavity is lined with a network of respiratory vessels.

(Drawings by the author.)

Helicidae are vegetarians with a preference for the tender green leaves and juicy sprouts of plants. Most of them have clean habits and do not cause extensive damage in their natural environments.

Hidden away among the leaves and loose soil around the roots of plants and bushes, or in shallow depressions around stones and rocks, the snails rest by day and feed by night. If the air becomes moist enough, they will come out on cloudy days, but they are usually active at night, early morning and in the dawn hours, while foliage is still wet with dew, under normal conditions. The little creatures must have moisture to live and readily respond when the temperature and humidity are right. If they are immersed under water for too long they will drown, but they are able to withstand long periods with a very small amount or no outside moisture.

At times when they are forced to remain quiet in order to withstand the elements, or to protect themselves from attacks of insects or other creatures, most of the land snails have the ability to make a door which seals the aperture of their shells. The snails secrete a mucous mingled with calcareous grains to form a sealing membrane which is called an epiphragm and takes the place of an operculum which they do not possess. In hot, dry weather, the seal prevents the fleshy tissues of their bodies from losing too much moisture. To form an epiphragm, the snails withdraw into their shells and exude the mucous material, forming a film affixed to the margins of the shell aperture. There is always a slit or tiny opening in the film which permits sufficient air for the snails to breathe. In very severe weather the animals may pull back further and further into their shells, forming additional epiphragms each time they withdraw, until as many as six seals are formed. When environmental conditions improve, the snails cast off the seals and emerge to feed.

The rasping tongue, or radula, of the common garden snail has as many as 15,000 teeth arranged in regular rows, and all of them directed backwards. With a licking motion, tiny bits of vegetation are scraped off and into the mouths of the snails, leaving series of marks on the surface of the leaf or stem which plainly show how the snails move their heads from side to side as they feed.

Many of the family Helicidae are consumed by humans and are especially relished as nutritious food by Europeans and Orientals. They are also credited with being effective remedies for many ailments, including asthma, pulmonary problems, eczema and lumbago. The slick, slimy mucous being considered the main curative factors.

In cultivated gardens, the ravages of snails can be kept at a minimum by the many small animals and birds which eat them. Frogs, toads and lizards feed upon snails and ants attack them too. The snails can be controlled without the use of dangerous poisons by eliminating their hiding places such as low growing, dense vegetation, debris and trash, and piles of stones, rocks or wood. Picking the snails off plants by hand and hunting them at night are also effective controls.

Eight species of the Helicidae family have been introduced into the United States for food. These species are known to be edible in their native countries, but are not especially appealing to people in this country.

The garden snail with a yellow shell adorned by one to five continuous reddish brown bands and a white lip is the Cepaea hortensis (Muller). This species is widely distributed in Europe, but it has now become established in the states of Maine, Massachusetts and New Hampshire, where it was introduced during early colonial times. The adult snails have shells that are about one inch wide and one half of an inch high.

Another small snail species, about the same size as the one just discussed, is Cepaea nemoralis (Linnaeus). It was introduced into Canada from Europe and is now found in New York, New Jersey, Massachusetts, Virginia, Tennessee, Pennsylvania, Wisconsin, Colorado and California, but has not proved to be a destructive pest. The snails have a shell of bright yellow, olive or red with reddish brown bands and dark brown lips. The shells have apertures shaped like half-moons.

The green snails of the Mediterranean countries, Helix aperta (Born), have been reported in California and Louisiana where they seem to be no great threat to agriculture. These are burrowing snails and appear above the ground only during the rainy winter season. During the dry weather the snails burrow into the ground as deep as six inches, form very thick saucer-shaped, convex epiphragms and aestivate until the cool rains soften the earth. An average of 75 eggs are laid by each snail, once or twice a year, in small nests of soft soil. The adult shells are one inch wide and one half of an inch high. The apertures are more than two-thirds of the shell's height, oval-shaped and have smooth lips. The shells are thin, glossy and have finely raised lines on a greenish brown surface. There are no color bands. An odd and interesting descriptive detail is that the color of Helix aperta's foot varies with the seasons, being light in the Spring and dark in the Fall.

Most widely used as food by Europeans, Helix aspersa (Muller), has been introduced into nearly every country settled by the people of western Europe, Britain, the Mediterranean countries and into lands along the shores of the Black Sea. In the United States, the brown snail was introduced in the early 1800's and spread into Maine, Massachusetts, South Carolina, Louisiana, Texas, Florida, Arizona, Utah, Oregon, Washington and California. The brilliamtly mottled shells of H. aspersa are about one and one-half inches wide and one and a half inches high. The aperture has a half-moon shape and a turned-back lip of white. The shells are yellowish with bands of flecked chestnut brown. The snails are very common in flower and vegetable gardens and in citrus groves, inflicting considerable damage in these areas.

Helix aspersa are sun lovers and are not very active at temperatures below 40 degrees F. The severe cold weather of the more northerly states has kept the snails from becoming established there and, in fact, has caused their disappearance in Massachusetts and Maine. When the weather is cold the snails burrow into the ground and remain there until the sun warms the soil and surrounding air. When the snails emerge during warm weather, they mate and begin laying eggs. In little hollows of the ground around roots of grass and bushes, as many as 40 to 100 eggs are laid, as often as once a month in warm, sunny climates. The small, rounded eggs are enclosed in a membraneous envelope of a shelly nature and after they are deposited, the parent snails cover them lightly with loose soil. Sheltered spots are chosen by the parent snails for the deposition of their eggs, places where neither heat nor cold will be severe. This is the only parental care given to the offspring, but the babies must not have too difficult a time as the snails are very numerous in the areas where they have become established. The growth of the young snails, once safely hatched after 15 to 30 days, is rapid and full growth is reached in one to two years. H. aspersa live to the age of five years or longer.

Used extensively as food, the large snails Helix pomatia (Linnaeus) is cultivated in France abd shipped to markets all over the world. These snails have not become so widely known for the beauty of their shells, but are famous for their tasty flavor among gourmets and gusty eaters. Farms for snail cultivation are maintained in France, Italy, Spain and other European countries, with most of the snails cultivated being Helix pomatia. The large round snails are very expensive food items in this country so they must be lucrative commodities for the exporters in the countries where they are cultivated. The snails can be purchased the year around, in almost any place in the world. They are shipped alive while they are in aestivation and stored in cold compartments to ensure their staying alive, dormant and fresh. Canned and dried snails are also available, and also are very expensive. Crews of workers gather the snails from the open woodlands, fields and vineyards of France, Italy and Spain to be sold in the markets of the villages and towns of their own countries. Because the snails abound in the vineyards of France, they are sometimes called the Burgundy snails. The Italians call them Roman snails and claim they are superior to the French snails.

Whatever they are called and wherever they came from, they can do a lot of damage to vegetation. The snails have been brought to this country and are established in Michigan, Louisiana and Florida. The latest reports are that Helix pomatia population are increasing and spreading.

The snails have light buff colored shells with uninterrupted cinnamon brown spiral bands. The lip of the shells is thin, and sometimes, slightly expanded to border the ovate aperture. The snails do not have opercula, but they form epiphragms of gritty lime which are very thick and look like opercula. When necessary, the apertures are as efficiently closed with the convex seal as those of operculate snails.

After much preliminary love making, which may include circling one another, touching and caressing with their tentacles, and even piercing each other with sexually stimulating "love darts", the snails mate and fertilize their eggs. Mating occurs in early spring, midsummer and early autumn, depending on the weather conditions. A few days after mating, the parent snails dig small holes in loose soil and in the holes, deposit 30 to 50 small gleaming white eggs in a cluster. By mixing soil with sticky slime, the parent snails cover the eggs to a depth of one or two inches beneath the ground's surface. Egg laying may take up to two days and after the job is finished with the eggs safely covered, the parents do nothing further for their young. Cold weather delays the hatching of the eggs and warm weather speeds up the process, so usually 25 to 40 days are required for fertilized eggs to hatch. The little snails are miniatures of their parents and quite capable of feeding and fending for themselves. After the second summer of the young snails' lives, they are considered fully adult. The maximum size of adult H. pomatia shells is from one and one-half to two and a quarter inches high and slightly wider than their height. The snails have a natural life span of about eight years, but most have ended up fried, stewed or boiled long before they reach such a ripe old age.

From far off North Africa into southern Spain, South America and the United States, the little snail sometimes known as the Spanish snail, has traveled and spread with the aid of man. Otala lactea (Muller), the snail of Morocco, can survive in dry, hot deserts or steamy, humid tropical lands. They are timid little creatures, and have not become agricultural pests in Texas, Misissippi, Georgia or Florida where they have established small colonies. California had some problems trying to eradicate Otala lactea, but finally gave up the program because the snails did not develop into serious economic pests and they are not disease carriers.

The mature Otala lactea have moderately heavy, smooth shells about one inch to one and a half inches in diameter. The shells are white with rich brown markings and bands, or beige with brown markings. The apertures are half-moon shaped, colored bright chocolate or reddish brown, and are edged by wide, turned-back lips of the same color inside and white or beige outside. The younger the snail, the more fragile the shell, and some young snail shells are very thin.

The Otala lactea animals are soft bodied, typical garden snails, with the normal prgans and foot. They are air-breathers and inoperculate, but like other land snails, must have moisture to survive. Snails that inhabit desert regions, or prefer hot climates, have developed remarkable powers of aestivation. No one can say for sure just how long these snails can go without eating or drinking while in the state of aestivation. but there is a very interesting story concerning a desert snail collected in Egypt in about 1850. It seems that this particular little snail was so dormant that the collector thought the shell was empty, so it was pasted on a labeled card and mounted in a display case of the British Museum. Four years later, an attendant noted that the animal was emerging from its shell and was, indeed, very much alive! It was fed and watered and lived for a time longer, apparently none the worse for its long, long sleep.

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Shelling Port St. Joe After A Hurricane

By DR. W. SCOTT PERSONS**

Author at hurricane's "calling card".

Conch captures a Blue Crab

On Tuesday morning, September 23, 1975, hurricane Eloise hit the Florida panhandle at Panama City. While the television showed film of floods and destruction, I envisioned beaches strewn with junonias.* I remembered a conversation with Gary Gordon, past-president of the Georgia Shell club, during which we laid plans to take advantage of the next hurricane to come ashore along the Florida Gulf coast. Tuesday evening Gary called, but to tell me that there was no way he could make the trip. An influx of relatives was imminent and he had cash flow problems. Wednesday, another call. This time to urge me not to miss such an uncommon opportunity. The phone rang once again Thursday: Could I possibly drive from Atlanta to Gary's home in Macon, Georgia, that evening so we could leave for the panhandle early Friday morning? By midnight, I was in Macon.

Destination: St. Joseph Peninsula State Park, just outside Port St. Joe, Florida, a small paper-mill town 25 miles east of the commercial beaches that surround Panama City. The park is at the tip of a narrow peninsula, which hooks westward out into the Gulf of Mexico for 20 miles forming St. Joe Bay. A road runs the first ten miles of the peninsula to the park's campsites, then you're on foot ten miles up the beach on either the Gulf or the Bay side.

Gary has been here several times before, but it is all new to me. We turn onto the black-top peninsula road at noon, and immediately the unspoiled nature of the place is evident. No houses, no service stations, no cars coming the other way, just scrub pine on either side with occasional breaks to allow a view of the beach and ocean. Bright butterflies abound, bouncing yellow, blue and orange on the breeze. An osprey with a fish in its claws flies parallel to the road on our right, then crosses in front and continues on our left for several hundred yards. Three black vultures stand over a carcass in the middle of our lane. Two fly off as the car approaches, but the third holds his ground protecting his lunch defiantly. Gary, not believing the bird's audacity in the face of two tons of onrushing metal, hits the brakes belatedly and the vulture wisely takes flight just as we are upon him.

Only one fellow camper is in the park. The rangers tell us that Eloise has torn up the beach on the Gulf side and the beach is closed. We pitch a tent, eat a hurried lunch and head for the forbidden sand, ignoring the trails and taking a cross-country route through marsh and underbrush to avoid being turned back by the rangers.

Two ridges of dunes running parallel to the beach protect land from ocean. The first ridge we come to is anchored on top by spreading, knee-high live oaks and an occasional low scrub pine. The pines and stunted and twisted against the wind, like oversized bonsai trees. The trunk of a single dead pine, bare of all its bark and bleached silver-gray by the sun, branches upward out of a dune's downslope creating driftwood sculpture. We stop to take a picture.

In the valley between the two ridges, Eloise has left an ugly calling-card. She has swept clean the surface of the sea for hundreds of square miles and deposited everything useless and unattractive that floats in the midst of an otherwise lovely setting. Light bulbs of all descriptions, bottles, planks, plastic jugs, bits and chunks of styrofoam, flash cubes. All of this lies amidst a dried river of dirty brown foam and seaweed, two-feet thick in places, that winds through the valley. Step on the foam and it crunches to charcoal-brown powder. There are no shells nor any other marine life. Apparently, only debris that could ride on the wave's crest has made it past the outer line of dunes.

Plowing up the sand face of the outer ridge, I reach the top and view the beach. No awesome devastation. Tranquil waves break on smooth sand. Then I see that for the length of the shoreline the base of the dunes has been washed away, leaving a five-foot sheer drop to the beach. At a few openings in the ridge line, there are gulleys in the sand where the storm breached the outer dune defences. No doubt the flotsam washed into the valley through these passes.

No junonias in sight, but we hit the beach expectantly. Lots of broken shells, especially up against the base of the dunes, and numerous dead sea stars at the high-tide line. We trek up a wide beach for a mile or so as the crow flies, much farther as shellers travel, wandering from shoreline to the dunes, scanning the sand for a newly deposited specimen. Gary finds a Scotch Bonnet and a Carrier Shell, neither of exactly gem quality, and finally a scrap with the distinctive orange-brown squarish spots from a junonia's outer whorl.

* A junonia, Scaphella junonia technically, is a graceful three to six inch seashell once considered extremely rare and valuable when only a few would wash ashore each season during hurricanes. Now shrimp fishermen find them regularly and they are prized merely for their beauty.

** Atlanta, Georgia

And that's all! We turn back disappointed. Where are those great piles of shells others have reported after tropical storms? Well, we're here now, and it's a beautiful place. Seventy-five degrees. Not a cloud. Time for some serious shelling-as-usual.

On the way back to camp, Gary finds a bottle with a note inside. A no-deposit, no-return bottle half-filled with sand to keep the neck out of the water and the cork free from rot. An orange, faded-to-yellow business-reply card is encapsulated. Obviously no pirate's treasure map. The card is from a Mississippi oceanographic survey with instructions for return in both English and Spanish, anticipating a retrieval in Central or South America. They may be disappointed with a recovery just down the Gulf.

It is late afternoon, but there's time for wading over the flats on the Bay side of the peninsula. We strike out for a sand bar 400 yards from shore where the gulls seem to have good hunting. By the time we've sloshed out to the bar, the gulls are gone and the tide is washing across the sand. This is rare good fortune because Florida Cones and glossy, golden-brown Marginella begin to wash out of their hiding places in the sand right under my feet. The cones, in particular, please me. Less than an inch long, they are pale yellow with brown splotches on the outer whorl. Also revealed by the tide are two eight-inch lightning whelks that had buried themselves at the edge of the bar. The whelks have a graceful curve to their lips and are attractive cream color with typical violet-brown vertical streaking. As the tide continues to come in, the water gets deeper, the wind picks up, and the temperature drops. Reluctantly, we wade back across the flats to shore.

After a hot shower at the campsite's large, clean facility, we drive into Port St. Joe for a seafood dinner. Picking out the first likely looking restaurant, we walk in the door to one of those "small world" happenings. Henry Close, who, along with Gary, founded the Georgia Shell Club, is just finishing dinner. We join Henry for a few minutes and learn that he too has found beachcombing along the local coast disappointing. Henry has business in Atlanta the next day and has to leave, but his information confirms our tentative plans to forget about hurricane-delivered shells and take a boat out in the morning for some collecting in the bay.

Driving the peninsula road back to camp for the night, we spot a skunk waddling along in the grass beside the road. Further on a young raccoon, half-way across the road and out of danger, panics and bolts back under the wheels of the car. It's the only unpleasant incident on the trip (aside from Gary's snoring). I had thought raccoons were too smart to get themselves killed in such a senseless manner. This one's lack of smarts won't be inherited. At the tent, a possum is nosing around, but I'm too sleepy to pay him any mind.

The morning comes cold, and on the drive into town for breakfast, I greatly appreciate the car's heater. We nourish ourselves with steak and eggs, hashbrowns, hot chocolate and home-made biscuits, then head for Presnell's Fish Camp at the base of the peninsula on its Bay side. Three dollars rent a commodious, though slightly filthy, boat for the day. Gary's outboard motor comes out of my trunk, onto the stern and, as the sun begins to warm to its task, we churn out into the bay.

I've brought diving gear, but the water is too cool and too cloudy (probably Eloise's fault) to make snorkeling appealing. Wading is therefore again the method of search, and it is to prove effective.

First anchorage is a sand bar under two feet of water. Paying only polite attention to Gary's warnings about stepping on sting-rays, I jump over the side and quickly follow a sand trail to a handsome auger. More trailing and then, twenty feet away, I spot a horse conch, Pleuroploca gigantea. I've never collected one before, but its size is unmistakable and I shout the identity before I reach it. For me this is a collecting high. I have found a prize, and it is most definitely great to be alive on this beautiful day!

The foot of the Horse Conch is brilliant, striking scarlet, like the reflecting tape sometimes put on bicycle fenders. The intense red looks much out of place amidst the soft-toned greens and browns of the flats. The mollusk's heavy brown shell, however, blends well with its surroundings. Percy Morris, in his Field Guide to Shells of the Atlantic and Gulf Coasts, describes Pleuroploca gigantea as being brick-red with an orange-red aperture. For the specimens at Port St. Joe, brick-red is a considerable understatement and the aperture is not orange-red, but rather a light olive-brown.

Gary has collected here in the Bay several times and never seen a live Horse Conch; but, before this day is over we find over two dozen, most of which are still there for you to discover. Size ranged from 12 to 15 inches, and all were collected in less than three feet of water, usually half buried in the sand. Once, stumbling over one fellow, who turned out to be feeding on a Tulip Shell, I placed a hand down to right myself beside another who was ingesting a scallop. ... A note of warning for other fortunate collectors: Carrying more than a single Horse Conch for long distances over eel grass and sand flats creates, in the shoulders, pain, hurt and then agony.

Still searching at our first anchorage, Gary, despite poking the sand in front of himself with a long pole everywhere he walks, suddenly steps on one of the sting-rays he has been so careful to avoid. There is an explosion of sand and water. A looping slash of the tail and a winged shadow streaks away over the sand, urged on with heartfelt profanity. Fortunately, the ray's spike caught Gary's foot through the top of his tennis shoe and, though skin is broken, only an abrasion results. After satisfying himself that death is not imminent, he explains to me how his misstep was intentional: "I just wanted to demonstrate that the danger is real before your casual attitude caused you grevious injury." But I'm too enthusiastic about the moment to be much impressed.

Anxious to explore a different area, we lift anchor and motor off the bar. In route, the Bay's inhabitants put on a show for us. Fish break water all around, four dolphins loop in and out of the water fifty feet off the bow; even our nemesis, the sting-ray, makes a brief, dramatic flight over the swells.

The lowering tide exposes large sections of flats now. We anchor at a promising area where patches of eel grass are already breaking the surface. Wading, sloshing, tromping, we cover considerable distances. I do find myself paying more attention to where I put my feet, but no more missteps occur. Horse Conchs are here, resting in the sand or even strolling over the exposed grass. At one locality, dozens of Lightning Whelks lie scattered among the eel grass in six inches of water. True Tulips prowl in the grass, but their shells are inevitably worn and unattractive. I find single specimens of a Lettered Olive and an Egg Cockle. (A complete listing of species collected on the trip follows this article.)

You can't walk far on the flats without seeing something interesting. If you surprise a Gulf Scallop near the surface, he will do his imitation of a squid for you, propelling himself backwards in jerks by repeatedly snapping himself shut. Seeing them do this makes me hungry for the delicious muscle responsible for the odd locomotion. The eel grass is criss-crossed with trails straight as laser beams, Horseshoe Crabs make the trails as they travel, devouring all vegetation and leaving bare paths of sand the width of their bodies behind them. Horseshoe Crabs seem to be the ultimate hedonists, always either eating or making love. This primitive species has avante guarde sexual mores. Judging by size, the age of one's partner is no consideration and triads are not uncommon. Their behavior would probably be more shocking if I could tell the girls from the boys.

While we are stowing our catch in the boat, Gary discovers a final visual treat: a Horse Conch has somehow captured a large blue crab and holds the head between the folds of its scarlet foot. The crab's green shell and blue and white claws stand out against the red foot. A small sea star, lavender on deep purple, is wrapped about one claw contributing further contrast, and two tiny golden-brown Marginella climbing up the conch's inner lip to share the crabmeat feast, add a pair of jewels to the showpiece. I grieve for lack of color film in the camera.

Gary has family responsibilities that provide the impetus for cranking up and heading home. At the fishing camp, a venerable and friendly

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Shelling On Hachijo Island, Japan

By CHARLES CARDIN

Hachijo Island, Japan

underwater cliff, Hachijo Island

Hachijo Island is located 180 miles directly south of Tokyo, Japan in the Izu chain of islands. The Izu chain stretches from Oshima Island in Sagami Bay to Ogasawara Island near the Bonin Island group. This beautiful and lush volcanic island is accessible by regularly scheduled ships and aircraft out of Tokyo.

Traveling by air is the easiest way to get to Haichijo, but you are limited to 44 pounds of baggase, unless you want to purchase another $40.00 ticket. Flying time is 45 minutes. By far the most interesting way to make the trip from the mainland is by ferryboat. Ships leave from Hamamatsucho Pier, Tokyo proper, six days a week at 10 PM and arrive at Hachijo 12 hours later. The fare is half of the airfare and the trip is more enjoyable if you like boats.

I traveled 2nd class qnd took my chances on finding an empty space in the public sleeping areas. It is all strictly Japanese-style, in that you will sleep on the floor on Tatami mats (woven straw mats). If the ship is crowded it doesn't matter as the idea that "There is always room for one more", prevails. (Even if you must sleep head to toe.) Let's just say it's interesting for an American not accustomed to close quarters. Meals are available, but again Japanese-style. Hot coffee is available, but also Japanese-style, which is VERY strong!

Accomodations on the island range from luxurious western style hotels with every conceivable convenience to simple Japanese style inns, or ryokan. I prefer the less-expensive and more relaxing atmosphere provided by a simple Japanese-style inn.

There are a number of air stations on the islands to fill your scuba tanks. Beach or snorkel collecting will be fruitless.

I am afraid that this trip is not possible without some contact on the island who knows the air stations and dive spots and is ready to guide you and provide transportation. This would have to be arranged prior to the trip or you will find yourself stranded and up against a language barrier (unless you speak Japanese). I recommend that you attempt to write to one of the hotels through the Japanese Tourist Bureau and iron out these problems.

Rental equipment is available on the island, except for wet suits, which are required year 'round.

My choice of accommodations was made for me. My friends' family owns one of the Japanese inns on the island and his brothers-in-law are both divers and shell collectors. A most convenient situation, I agree. The address of that inn is: Sokodoso Hotel; Hachijo Jima, Tokyo-To, Japan. There was no language barrier here. This hotel does not cater to divers as a regular service nor do the owners provide a regular guide service. But, you never can tell what an inquiry may bring.

We were met at the docking area by our guides and friends to be while we were there. The water was much rougher than we would have liked, but we still went for our first dive that afternoon. One side of the island was extremely rough with 20-25 foot waves that crashed on the lava cliffs sending spray 100 feet into the air. The opposite side of the island was not as rough, but still there was a heavy and choppy sea. This was to be the condition of the sea until the day we left, at which time it became calm. On our first dive we entered easily down some concrete steps of a small abandoned harbor into water 15 to 20 feet deep. It was an easy entry and exit, but it would require some planning so as not to be caught having to swim on the surface in the harbor on the way back. We were happy to find many species of shells in good quantities. Bursa species such as: Bursa bufo Rod., Bursa rubeta Linne, Bursa dunkeri Kira etc., and Trochus species such as Tectus conus Gmel were found in the open directly under the steps. My first find was a beautiful Cypraea propinqua in a small crevice in the concrete pier. It was in plain sight. Cypraea capurserpentis was abundant in practically every crevice. Murex fourneri was also found. Cypraea fimbriata was fairly common too. We spent our first tank of air in the harbor because there were shells in abundance. Even with the pressure surges underwater, the clarity was still an excellent 50 to 60 feet.

The next night the sea calmed down a little and the winds subsided enough to try a night dive at the site of the ferry dock. Everyone except myself decided it was safe enough. I quickly came up with numerous valid excuses as to why I should stay on shore with a signal light. The waves were still a good six feet high that night. The only possible entry would be directly from the middle of the perpendicular pier. The level of the ocean was a good five feet below the pier and still rolling swells drenched my position. Entry was tricky even using steps that led into the water. I watched two pairs of lights find each other then wander off in their separate ways, in pairs. I kept a light on shore while I wondered if it would have been wiser to have gone diving rather than to be standing here alone in the chilly wind and darkness. I watched a pair of lights wander dangerously close to a sheer cliff that was being pounded by heavy swells. Luckily, though, they turned away before getting too close.

(Photographs by the author.)

The first two divers surfaced in 40 minutes with collecting bags bulging with loot. Conus catus, C. rattus, C. coronatus and C. fulgetrum were found in abundance crawling round the grasses and rocks. Again, many Bursa species and one large Conus morelleti and one Conus pauperculus plus a few Conus obscurus were collected.

Our dives were all similar to this as it was dangerous to dive off shore - that would require a long surface swim. One of the "secret" spots along a wide, rocky beach was totally inaccessible. This is where a number of very large Cypraea tigris have been found. The largest I saw was a fabulous 4 3/4" one that was almost totally black due to dense spotting. An 81 mm Cypraea arabica was found there too. I assume that there would be other big ones there and perhaps a 5" Tiger will be found some day. Tiger Cowries are very uncommon at Hachijo and all I have seen were over 4". The habitat there is 30 feet and deeper, in large crevices and between large algae-covered boulders.

My hosts took me to the city hall where a nicely arranged collection of local shells was prepared for our inspection. The collection contained a few hundred species of shells in various grades of beach-worn and dead collected. It was still useful, although I did not have time to have all the carefully written labels read to me.

I was presented with a government publication that contained a very detailed list of the flora and fauna of Hachijo Jima (Jime = island). It took me six months to translate the Japanese names to Latin due to my busy schedule and this is why this atricle is exactly one year late. The section on Mollusca contains 957 names of species. The list was prepared using the collections of Mr. Nichimura of Hachijo Jima, et al. All of the species listed were found on, or in the general vicinity of, Hachijo Island and only species as verified from waters in the immediate area are listed. I will list some selected families here and indicate with an asterisk (*) those we actually found or those I am certain were found on Hachijo by our hosts.

Polyplacophora: 5 species; Acanthochitona defilippi Tap. Can., Ischnochiton boninensis Berg., Chiton japonica Lischke, Onithochiton hirasei Pilsbry.

Haliotidae: four species.
Fissurellidae: 23 species.
Patellidae: 9 species.
Acmaeidae: ten species.
Lepetidae: one species.
Pectinodontidae: one species.
Trochidae: fifty-four species.
Stomatellidae: two species.
Angaridae: two species.

Turbinidae: thirteen species including Turbo argyrostomus Linne, Turbo stenogyrus Fischer, T. reevii Philippi, T. petholatus Linne, T. cornutus Solander*, Lunella coronata coreensis Recluz, Astralium rhodostoma Lam., Astralium haematragum Menke, Astralium heimburgi Dunker*, Homalopoma rubra laevicostatum Pils, H. nocturnum Gould, Guildfordia triumphans Philippi, Lictina semiclathratula Schrenck.

Neritidae: ten species.
Phenacolepadidae: one species.
Lucunidae: one species.
Littorinidae: nine species.
Rissoidae: ten species.
Tornidae: one species.
Architectonicidae: twelve species.
Orectospiridae: two species.
Vermetidae: two species.

Siliquariidae: two species - Siliquaria cumingi Morch and S. anguinva Linne.

Planaxidae: four species.
Modulidae: one species.

Mathildidae: one species - Opimilda quinquelirata Kuroda.

Potamididae: one species.
Turritellidae: two species.
Cerithiidae: twenty-nine species.
Triphoridae: forty-one species.

Epitoniidae: nine species, including Hirtoscala pyramidalis Sow., Nodiscala monovaricosa Kuroda & Habe, Glabriscala hayashii Habe, Amaea gazeoides Kuroda & Habe, Papyriscala latifasciatum Sow., Mazescala japonica Dunker; others I could not translate into valid species.

Janthinidae: five species.
Eulimidae: ten species.
Merlidae: five species.
Hipponicidae: five species.
Trichotropidae: single species.
Capulidae: two species.
Calyptraeidae: seven species.

Strombidae: fourteen species, including Conomurex luhuanus Linne, Doxander vittatus japonicus Reeve, Canarium dentatum Linne, Canarium microurceum Kira, Canarium mutabilis Swainson, Euprotomus aurisdiane Linne, Euprotomus vomer Roding, Tricornis thersites Swainson, Canarium fragilis Roding, Canarium terebellatum Sowerby, Lambis chiraga Linne, Lambis lambis Linne, Lambis crocata Link and one not translatable to valid species.

Naticidae: twelve species, including Naticarius alapapilionis Roding, Notocochlis gualteriana Recluz, Mamilla opacus Recluz, Polinices vavausi Reeve, Polinices pyriformis Recluz, Mamilla simae Deshayes, Eunaticina lamarckiana Recluz, Naticarius concinnus Dunker and four I could not translate.

Eratoidae: six species, including: Proterato callosa Adams & Reeve, Eratoena nana Sow., Trivirostra oryza Lamarck, Trivirostra exigua Gray, Trivirostra pellucidula Reeve and Trivirostra edgari Shaw.

Ovulidae: 18 species which I do not list as many are incorrectly named.

Cypraeidae: C. bistrionata mediocris Schild., C. cicercula Linne, C. globulus Linne, C. childreni samurai Schilder, C. limacina Lam.*, C. nucleus Linne*, C. staphylaea Linne, C. punctata Linne, C. fimbriata marmorata Schroter*, C. ziczac Linne*, C. clandestina monilaris Lam.*, C. artuffeli Jousseaume*, C. lutea Gmelin*, C. gracilis japonicus Schild.*, C. asellus Linne*, C. tomlini ogasawarensis Schilder*, C. labrolineata Gaskoin*, Cypraea boivinii Linne*, C. porcaria Linne*, C. helvola Linne*, C. erosa Linne*, C. millaris inocellata Gray, C. caputserpentis Linne*, Cypraea annulus Linne*, C. moneta Linne, C. felina pauciguttata Schilder*, C. caurica Linne*, C. chinensis Gmelin*, C. beckii Gaskoin, C. teres Gmelin*, C. cribraria orientalis Schild.*, C. hirunda neglecta Sow., C. coffea Sow., C. ursellus Gmel., C. lynx Linne*, C. vitellus Linne*, C. carneola Linne (only found propinqua, no carneola), C. tigris Linne*, C. talpa Linne, C. isabella Linne*, C. mauritiana Linne*, C. arabica Linne*, C. eglantina, C. maculifera Schilder*, C. mappa Linne, C. erronea Linne, C. cylindrica Born, C. margarita tetsuakii Kuroda. The total number of species listed is 48.

Cassididae: six species including areolata Linne, cornuta Linne, cernica Sow., ponderosa Gmelin, rufa Linne and one not translateable.

Tonnidae: 2 species: Tonna luteostoma Kuster* and Tonna perdix Linne*.

Cymatiidae: thirty species including Monoplex echo Kuroda & Habe*, Septa pilaere Linne*, Cymatium lotorium Linne, Tritoniscus lablosus Wood, Turritriton kuensis Sow., Turritriton tenuiliratum Lischke, Gutturnium murinum Roding, Cymatriton nicobaricum Roding*, Ranularia pyrum Linne, Distorsio anus Linne*, Distorsio reticulata Roding, Charonia sauliae Reeve*, Charonia tritonis Linne*, Colubraria maculosa Gmelin, Septa hepatica Roding and others not translatable.

Bursidae: eight species, including Bursa bufo Roding*, Bursa dunkeri Kira*, Bursa rubeta Linne, Bursa mammata Roding, Colubrellina granularis Roding, Lampasopsis rhodostona Sowerby and others not translatable.

Muricidae: sixty-nine species, including Murex palmarosae, M. saulli, M. torrefactus*, M. ramosus, M. brunneus*, M. microphyllus*, M. penchinati Crosse*, M. anatomicus Perry, for a few.

There were nine species of Drupa listed.

Coralliophilidae: eighteen species.
Columbellidae: forty-three species.
Nassarlidae: seventeen species.
Fasciolariidae: sixteen species.
Buccinidae: twenty-seven species.
Olividae: seven species.
Vasidae: single species.

Continued on page 91

SHELLING ON HACHIJO ISLAND, JAPAN

Continued from page 90

Volutidae: Lyria cassidula.

Harpa: two species - H. amouretta Roding and H. major Roding.

Mitridae: fifty-four species, including Pusia cancellaroides Anton, Pusia pardaris consanguinea Reeve, Pusia discoloris Reeve, Pusia patriarchalis Gmelin, Pusia porphyretica Rve., Pusia adamsi Dohrn, Thala jaculanda Gould, Mitropifex bronni Dunker, Mitra stricta Link, Mitropifex collinsoni A. Adams, Pusia hizenensis Pilsbry, Chrysame chrysalis Reeve, Dibaphus edentulus Swainson, Chrysame pellisserpentis Reeve, Chrysame ambigua Swainson, Chrysame coffea Sch. & Wag., Strigatella scutulata Gmelin, Strigatella litterata Lamarck, Strigatella virgata Reeve, Strigatella auriculoides Reeve, Strigatella decurtata Rve., Pterygia undulosa Reeve, Pterygia nucea Gmel., Pterygia elongata Hirase, Tiara isabella Swainson, Imbricaria vanikorensis Quoy & Gaimard, Vexillum balteolatus Reeve, Chrysame eremitum Roding, Scabricola clathrus Gmelin, Vexillum formosense Sow., Nebularia monachialis Roding, Nebularia puncticulata Lamarck, Vexillum plicarium Linne, Vexillum ornatum coccineum Reeve, and others not translateable. We could have found more Mitra, but we did not have time and we did not search them out. The area seems perfect for the family.

Cancellariidae: one species.
Turridae: thirty-five species.

Conidae: forty-eight species, including ebraeus Linne*, chaldeus Roding, coronatus Gmelin*, fulgetrum Sow.*, sponsalis Hwass*, sponsalis nanas Sow.*, sponsalis ceylonensis Hwass*, pullcarius Hwass, fulmen Reeve*, catus Hwass*, generalis Linne, boeticus Rve., vexillum Gmelin, miles Linne*, capitaneus Linne, mustelinus Hwass*, rattus Hwass*, emaciatus Reeve, lividus Hwass*, geographus Linne, obscurus Reeve*, tulipa Linne, magnificus Reeve (?), retifer Menke, textile Linne*, auriconus Hwass, striatus Linne*, bullatus Linne, clavus Linne, nussatella Linne*, fulmen kira Kuroda*, marmoreus Linne*, tuberculosus Tomlin* (dredge), pauperculus Sow.*, magus Linne*, imperialis Linne, ermineus Born, achatinus Hwass*, spectrum Linne and others I could not translate, but I'm still working on it with the help of my collector friend here.

Terebridae: fifteen species, including nebulosa Sow., affinis Gray, pygmaea Hinds, fellna Dillwyn, crenulata Linne, lanceata Linne, verreauxi Deshayes, areolata Link, confusa Smith, chlorata Lamarck, raphanula Lamarck, serotina Adams & Reeve, subtectile Smith, diversa Smith, alveolata Hinds.

Pyramidellidae: nine species.
Hydatinidae: four species.
Bullidae: three species.
Scaphanderidae: three species.
Aplysidae: two species.
Umbraculidae: a single species.
Cavolinidae: ten species.
Dentalildae: three species.

This is all I have been able to translate to this date. The list also contains squids and octopuses.

Coral reef off Hachijo Island, Japan

OFF THE PRESS

Costa	as in a lot
Convex	bad guys behind bars
Frugivorous	this day
Whorl	as this old
Scutum	out of here
Septum	sure will
Secund	just a
Porcate	good ol-gal
Pachy	Indian tribe
Niche	I have a
Flexure	muscles
Fissile	out
Crest	toothpaste
Oblate	haven't seen him
Hiatus	don't act so
Lappet	up kitty

NEIL M. HEPLER

SNAIL TALES

Continued from page 86

Normally, Otala lactea snails aestivate up off the ground, on trees, large bushes, poles or other stationary objects, and because they form a double epiphragm over their apertures, they are better equipped than some snails to withstand extremes of heat or cold.

Like most snails, they are hermaphrodites and engage in similar courtships and mating rituals. After fertilization, the small pea-sized white eggs are laid in shallow depressions under leaves or small pebbles, in clutches of about 50 to 60 eggs for each snail. In favorable weather, the snails may lay more than one batch per year, but they are not fast breeders.

Many small animals, toads, snakes, beetles, ants and birds prey on Otala lactea, and man considers the snails to be a table delicacy.

A species found in the Mediterranean countries is quite often established in with colonies of Otala lactea and for this reason, its true status is not clearly defined. The Mediterranean species does not have a common name, but has been named Otala vermiculata (Muller). The shells of these snails are very much like O. lactea, except that most of them do not have any spiral color bands and the aperture and lip are always pure white.

Garden snails can be a nuisance, and even a serious problem in gardens, groves and vineyards as they are strict vegetarians and consume large amounts of foliage. They are, however, not too difficult to control, and are not known to be disease carriers, so the introduction of these particular species may not have been such a calamity as was suspected when first found on the United States. This statement does not apply to other introduced species of snails and their story is quite different, not to be compared with Helicidae, the gentle garden snails.

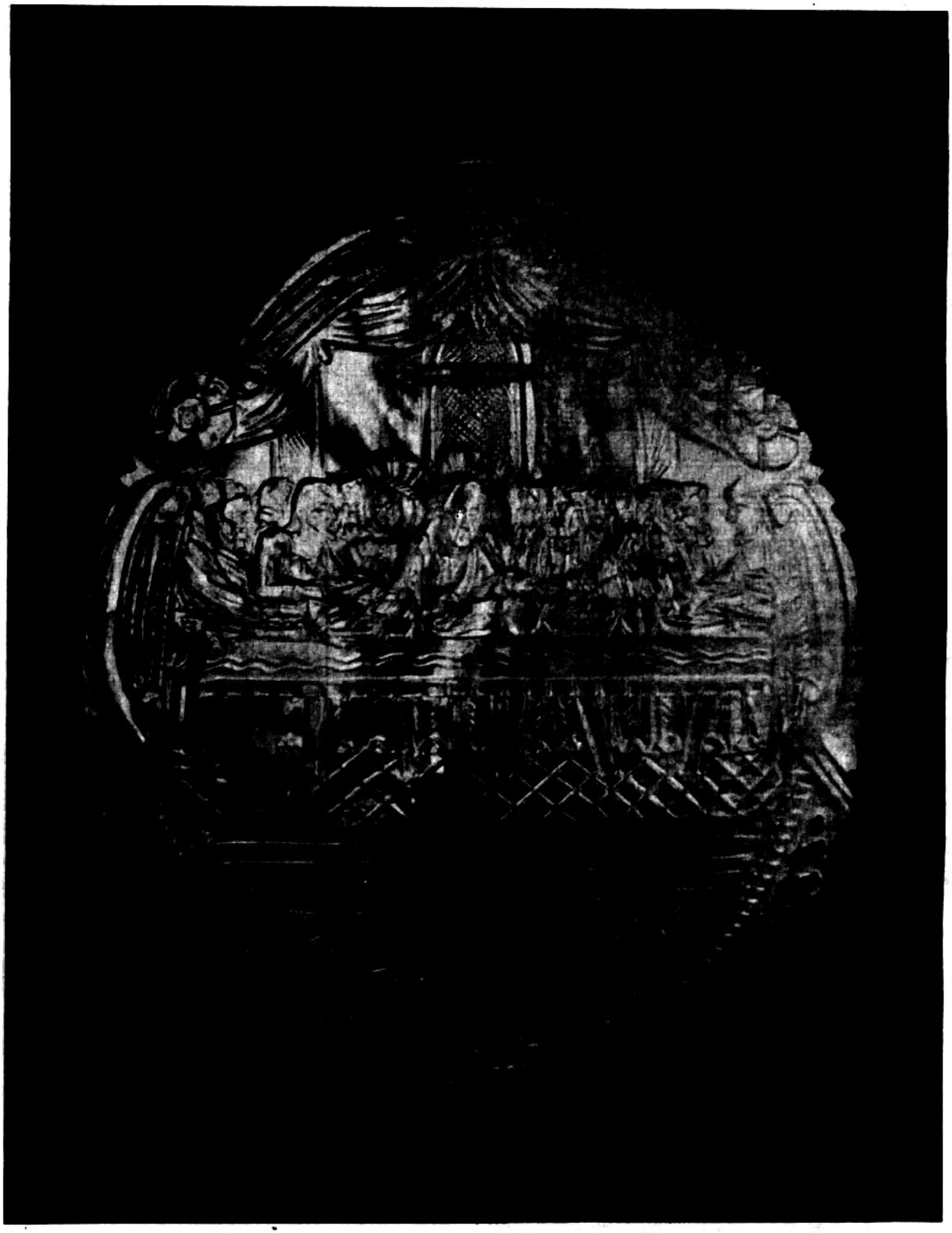
The following is from Youth's Companion for May 11, 1915.

A STRANGE ROCK DWELLER

One of the strangest creatures known to science is the Pholas, or boring clam. When still very minute the animal bores into the sandstone ledges at extreme low water, by means of its sharp shell, which is replaced by secretions as it is worn away. It penetrates the rock to a depth of six or eight inches, and hollows out its burrow as it increases in size.

Shaped roughly like a top, it could not leave its rock dwelling even if it wished to do so. For food, it depends on the animalcules that float in sea water, which it seizes by its long siphon or tongue.

Continued on page 97, column one



"The Last Supper" carved on shell. Photo by Jaromir Nemec, Brandys nad Labem, Czechoslovakia

The Great Ones

A FRAGMENTED HISTORY OF THE GIANT AND THE COLOSSAL OCTOPUS

By GARY S. MANGIACOPRA

"The Kraken was a mythical cuttlefish of fabulous size." Lucie L. Hartt, July 1869, American Naturalist (1).

"This is, at any rate, the first gigantic octopod that has been described or figured from an actual specimen." A.E. Verrill, February 1897, American Journal of Science (2).

The history of the giant and the colossal octopods is one that is totally unknown in comparison to the history and the knowledge of the giant squids.

For over a century many specimens of the giant squids have been found, examined, and been written upon. And yet, during this same period of time only a few meager and brief references - and importantly the examination and identification of which it is believed to be the only known beached remains of a colossal octopus - giving a fragmented but valuable history of these neglected giants of the seas.

THE COLOSSALS OF THE ATLANTIC

Towards the close of the 19th century, with the legendary Kraken proven to be what is now commonly known as the giant squid, the only known stranding of a carcass of the largest known octopus had occurred off Anastasia Beach near St. Augustine, Florida, on November 30, 1896. Subsequent examination by Dr. DeWitt Webb, a medical doctor and President of the Historical Society of St. Augustine, proclaimed it to be the mutilated remains of a gigantic octopus.

Photographs taken several days after the carcass was first cast ashore - which gives the impression to the viewer of an immense invertebrate - and letters written by Dr. Webb of his minutely detailed examination of the remains were ultimately received by Prof. W. H. Dall and importantly to Prof. A. E. Verrill of Yale University. It was through the proficiency as a writer of the latter on this incident that the majority of the published facts of the history, examination and subsequent controversy had been preserved.

Originally, both Prof. Dall and Prof. Verrill had proclaimed the beached remains to be those of an immense invertebrate, with Prof. Verrill officially naming it Octopus giganteus.

But subsequent later examinations of the preserved tissue specimens sent by Dr. Webb caused Prof. Verrill to retract his original opinion that it was a giant octopus and later stated that the beached carcass had originated from the head of a sperm whale. But throughout several of Prof. Verrill retractions there were doubts to the correct identification as to where the remains had originated from which precise animal. (3)

In 1951, A. Hyatt Verrill, the son of Prof. Verrill, wrote, "Several large pieces were preserved, enough for a zoologist to identify it. But when my father studied the specimens he was completely at a loss. The flesh was totally unlike that of any known creature, for it contained neither the fiber of muscles, nerves, blood vessels, sinews nor bones. Probably 9 out of 10 scientists would have propounded some explanation, but my father frankly and freely admitted that he was at a complete loss, that he couldn't even guess what it was, but that it unquestionably was the remains of a part of some totally unknown marine creature." (4)

It would take an additional five years before Dr. Forrest G. Wood would rediscover this forgotten stranding and six more years would pass before, in 1963, the remaining tissue samples would be examined by Dr. Joseph F. Gennaro, Jr., who would state that the samples were similar to those of the octopus. These findings would be published in 1972, showing that there was now another contender for the giant cephalopods and two short years would pass before Dr. Gennaro would write briefly of his additional studies of the tissue, stating that its collagen were those of an octopus. (As of July 27, 1974 the tissue was still being analyzed (5)). And in 1975 the journal Of Sea and Shore published the first paper of an unknown biologist with additional detailed history of this colossal octopod.

Even with the passage of 80 years, this single stranding - though conservatively it can not be conclusively stated that the remains were those of an octopus - this incident has held up under severe examinations and the indications are that it was probably a giant octopus and the original opinions of Verrill and Webb were correct.

It is this single stranding which has opened up the rather neglected possibility - but rather startling probability - that there were and may still be in existence gigantic octopods of size equalling and even surpassing the giant squids.

Dr. Wood related two anecdotal accounts of sightings of colossal octopods off the Islands of the Bahamas, which had occurred within this century.

In 1956, Dr. Wood was sent to the West End, Grand Bahama Island, to collect specimens of marine life for Marine Studios and had employed the services of local fishing guide by the name of Duke. From Duke, Dr. Wood learned of several reported sightings of which the most recent had occurred about ten years previously, near the West End.

Several days later Dr. Wood learned of another sighting from the island's Commissioner, a native of Andros Island, who as a lad of 12 (Dr. Wood thought he was over forty when he talked with him) had been fishing with his father and another man off Andros Island. In 600 feet of water the Commissioner's father's line had caught onto something and, as it was drawn up, a very large octopus was discernable. It attached itself to the bottom of the boat, finally letting go and returning to the depths from which it had come. (6)

Unfortunately, I have learned from Dr. Wood, at the time he did not make notes of these verbal reports and that these were the general recollections he had. (7)

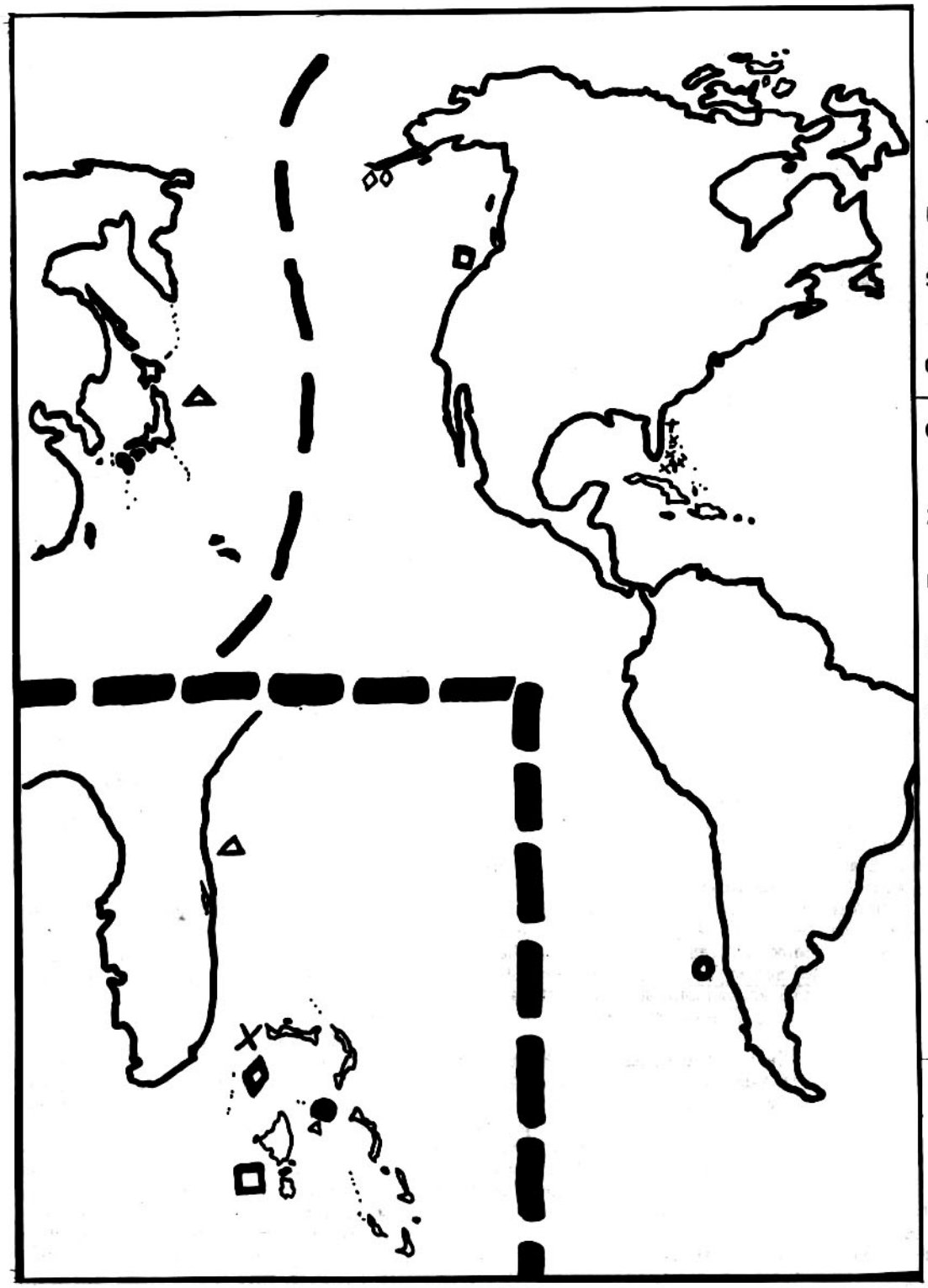
Dr. Wood also related that the giant scuttles - a Bahamian word for these creatures - were a part of the Bahamian lore. To the readers who originally disclaimed these incidents when his findings were originally published in 1971, it can be stated that the Bahamian lore of their giant octopods can be traced to the last century as far back as 1872.

A brief reference was published as follows: "A letter just received from Mr. J.S. George of Nassau, N.P. Bahamas, mentions a huge octopus ten feet long, each arm measuring five feet; the weight was estimated at between two hundred and three hundred pounds. The monster was found dead upon the beach and bore marks of injury. Mr. George adds, 'This is the first specimen I have seen during twenty-seven years residence in the Bahamas, but they are known here, traditionally of immense size.'" (8)

Though the dimensions that Mr. George states indicate a rather large octopus, what is most interesting is his matter-of-fact relating that they were traditionally known of immense size. As to the precise meaning of immense size is open to interpretation by the reader, it does, however, suggest of octopods of lengths greater than the one Mr. George had previously mentioned.

As to the location where they were traditionally known, it could refer to either Nassau or to the general area of the Bahamas, since Mr. George refers that he lived there for 27 years.

Mr. A. S. Packard, Jr. in an 1873 article on the newly discovered giant squids, wrote briefly on the possibility of the giant octopuses.



LEGEND

Triangle: alleged capture of a giant octopus off coast of Japan.

Diamonds: capture of two giant Alaskan octopuses.

Square: rumor of 400 pound animals off coast of Washington State.

Circle: Sighting of 30 foot cephalopod - squid/octopus (In Insert Section)

Cross: Only known stranding of carcass of giant octopus off St. Augustine, Florida.

X : sighting of a giant scuttle off West End, Bahamas

Diamond: 1964 expedition by Miami Seaquarium

Square: sighting of giant octopus off Andros Island

Black Dot: Stranding of a 10 foot octopus off Nassau by Mr. George in 1872

"Accounts of colossal species of Octopus are not uncommon. They occur in the mid-Indian, Atlantic and Pacific Oceans, and seem to be as large and much more common than the ten-armed squids." (9)

But what of sightings that had occurred more recently that may be attributed to these colossals of the deep?

Cousteau, in his book Octopus and Squids, relates the account of an expedition that was sent to investigate an enormous animal which, when sighted, resembled a squid and was reported by fishermen in the Gulf Stream region between the Bahamas and Florida. An underwater flash camera was to be activated by traction - the animal hooking onto the line photographs itself - but the photograph showed only an undefined stretch of brown flesh. (10)

I had referred to this sighting in my previous article for Of Sea and Shore as a possible incident involving a colossal octopus. (3)

But only recently was I able to locate a printed reference to this expedition, based upon the published newspaper accounts during that period of time, that a gigantic "something" was lurking near Bimini, Bahamas. It was suggested to have been either a giant squid or a prehistoric form of shark and one fishermen described it as having brown and black and brownish-yellow spots. The Miami Seaquarium was involved in the search for the animal in question and a Mr. Burton Clark - then the seaquarium general manager - was quoted that

something big was definitely out there. (11)

I was fortunate to contact Mr. Clark, who was able to give the few facts he could recall after some thirteen years. "In the Spring of 1964 I was approached by Mr. Marshall Smith, who was then Sports Editor for Time/Life Magazines, to assist in the search for a large unidentified marine animal which had been repeatedly reported off the island of the Bimini chain in the east side of the Gulf Stream.

"Dr. Herald Edgerton of the Massachusetts Institute of Technology provided a sophisticated submergible camera with strobe lights which would be activated by any creature taking the bait on a line which would trigger the camera. We set the expedition using the Seaquarium collecting ship and spent 12 days in the area where the sightings were reported. Using a sophisticated straightline fathometer, we did determine that at a depth of approximately 1,000 feet there was indeed some large creature that showed up clearly on the fathometer trace paper. We were unable to determine more than this and had to cancel the expedition because of cost and because time ran out.

"There is no available written record of the 1964 joint expedition carried out by the Miami Seaquarium and Mr. Marshall Smith of Time/Life Publications. Both the ship's log for that year and the fathometer trace which indicated that indeed there was some large creature on the ocean floor at about 100 fathoms, have been either lost or destroyed.

"There is no one, other than myself, who can give you any information and I can only give it as a personal communication. The Captain of our collecting ship has long retired and I have no idea as to the whereabouts of Mr. Marshall Smith.

"It is really too bad that more accurate information cannot be retrieved. But, I think you must agree, that an unsuccessful expedition of more than a dozen years ago, would not have a high priority for further follow-up or keeping extensive records.

"There are many rumors that I imagine are still going around in the Bahamas regarding such a creature. Speculation is that it is probably a giant squid or perhaos even a giant shark. There are those who claim to have hooked such a creature, usually at night when it was not possible to determine exactly what they had been able to hook. None of the persons reporting anything of this kind was able to back up their claims with unbiased witnesses."(12), (13)

It should be noted that the above verbatum quotes were based upon information culled from two letters and were arranged in a chronological order concerning the facts of the expedition.

As to what the animal, recorded by the fathometer trace paper, was will always be unanswered. It may have been a giant squid, perhaps a shark, or it could have been an encounter with an Octopus giganteus, which has been speculated to live within these regions. But what was determined is that some kind of large animal was living at a depth of 1000 feet; its identity is still unknown.

THE GIANTS OF THE PACIFIC

From the colossals of the Atlantic, we now examine the seas of Japan for an ancient incident of a giant octopus that was captured in this region.

The French journal La Nature has published, in 1874, two facsimile reproductions of Japanese etchings showing a giant octopus being captured and its ultimate fate in a fish shop as its tentacles were hung and sold for food. These etchings were from a book entitled Produce of the soil and of the sea by Ki Kone, which is principally devoted to the descriptions of the fishing grounds of the country. (14) The first etching shows a Japanese fisherman cutting off an arm of the octopus and, based on the height of the fisherman, it is of extraordinary length for such a creature. The second etching shows two of the tentacles hanging in a fish shop, being sold for food, as many passerbys look upon them with astonishment.

It could be said that these etchings are not conclusive proof of a capture of a giant octopus and, the size may be due to artistic freedom. Though it is rather factually stated to be a redoubtable enemy of the fishermen, one wonders if it might not be a misinterpretation of a giant squid.

Returning to the western coast of North America. In 1871, William H. Dall (who in later years would become involved with the Florida octopus of 1896) related of the species Octopus punctatus Gabb which occurs abundantly at Sitka, Alaska, reaching a length of 16 feet and a radial spread of nearly 28 feet, though the body does not exceed 6 inches in diameter and a foot in length. (15)

Three years later, in 1874, Dr. Dall speared an octopus in the harbor of Iliuliuk, Unalaska, Alaska which, upon its death and the relaxation of its muscles, measured 16 feet with a radial spread of not less than 32 feet. The largest of its suckers were 2½ inches in diameter. (16)

On the shores of Washington State, Arthur W. Martin of the University of Washington relates rumors of octopuses weighing up to 400 pounds. "Stories abound around the waterfront of animals weighing more than 400 pounds, but I discount these stories since the animals were not captured and weighed. I suspect some animals have reached sizes of 150 to 200 pounds, but the largest I can authenticate ran around 125 pounds and were taken by Ben Brick of Dungeness, Washington.

"I noticed a few years ago a magazine report giving 17 feet as the length of the arms of an Alaskan octopus. The picture showed the very long arm, with quite an ordinary body size - I would judge the total weight might be in excess of sixty pounds. Since arms can be stretched by pulling the animal after death, I do not care to judge size so much by length as by the weight. I do not know the species giving this appearance, presumably it was not Octopus dofleini apollyon, since this species does not have such long arms." (17)

Dr. F. G. Hochberg of Santa Barbara, California, also related that he heard from drag fishermen of animals that weigh up to 450 pounds, though he could not give precise dates or locations. (18, 19)

And traveling further south, to the coast of Chile, in South America, there occurred a fight between a 50-foot sperm whale against a 30 foot cephalopod, as I have written in a previous issue of Of Sea and Shore (Winter 1975-76). This cephalopod could have been either a giant octopus or, more probably, a giant squid. (20)

CLASSIFICATION

Of these fragments of information, rumors, statements and personal reports, it can be established that these octopods can be divided into two distinct categories based upon where the reports originated. From the Pacific there are indications that there may be a species of octopods which may attain a length somewhat greater than the established record of 16 feet in length and with an arm span of 32 feet. Such an animal would make themselves giants in comparison to the largest known species. But the real colossals of the deep are reported from around the region of the Bahamas. For there sightings of truly gigantic octopods, reaching a probable length of perhaps 100 feet and an arm spread of 200 feet.

It is perhaps best to quote from Dr. Bernard Heuvelmans, the foremost living cryptozoologist in the field of unknown animals, who has considered the possibility of the giant octopods. "I was not inclined to interpret all accounts of huge cephalopods as referring to giant squids. On the contrary, I kept an open mind, and wondered whether all the huge arms vomited by dying sperm whales under the eyes of astonished whalemen should be referring to Architeuthis rather than to unknown species of cephalopods, possibly octopi." (21)

And yet, on the part of this writer, after a year of further research into the unexplored field of the giant octopods, I have uncovered a few meager, forgotten facts upon which I have based this article. I am, therefore, placing an appeal for information to the readers of this magazine who may know of any additional facts concerning the history and lore of these animals. Any information, may it be newspaper articles, scientific journals, personal encoun-

ters, etc., will be appreciated and if anonymity is desired, it will be respected. It is hoped that readers may be able to add more fragments to this puzzle. Address: 7 Arlmont Street; Milford, Connecticut 06460 U.S.A.

ACKNOWLEDGEMENTS

I wish to thank the following persons with whose help I was able to add to the knowledge of these forgotten giants. Foremost, Dr. Bernard Heuvelmans, Centre de Cryptozoologie, Verihiac / Saint Chamassy, France; Mr. Burton Clark of Miami, Florida; Dr. Arthur W. Martin, Department of Zoology, University of Washington, Seattle; Dr. F. G. Hochberg, Curator of Invertebrate Zoology, Santa Barbara Museum of Natural History, Santa Barbara, California; Dr. Forrest G. Wood, Naval Undersea Research and Development Laboratory, San Diego, California and Dr. Joseph F. Gennaro, Jr., Dept. of Zoology, New York University, New York City.

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(12) Burton Clark, private communication, October 27, 1975.

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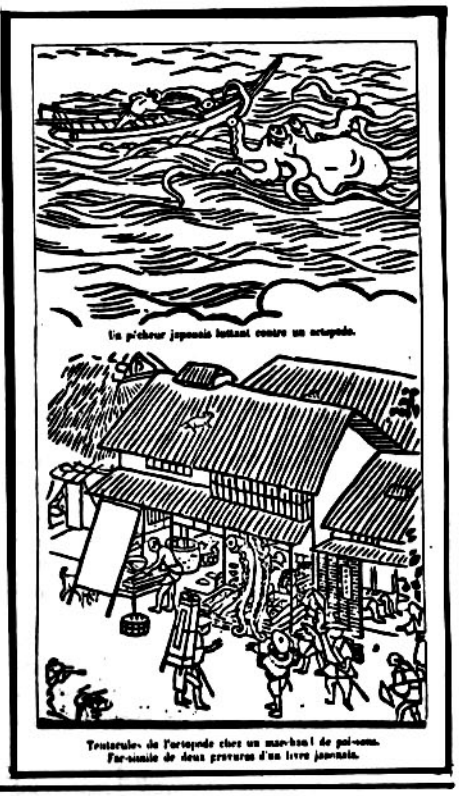
(17) Dr. Arthur W. Martin, private communication, February 18, 1976.

(18) Dr. F.G. Hochberg, private communication, August 25, 1975.

(19) ibid., private communication Mar. 26, 1976.

(20) Gary S. Mangiacopra, "Colossal Battle". Of Sea and Shore, Winter 1975-76, page 222, Port Gamble, Wa.

(21) Dr. Bernard Heuvelmans, private communication October 26, 1975.



Un pêcheur japonais luttant contre un octopode.

Tentacules de l'octopode chez un marchand de poissons. Fac-similés de deux gravures d'un livre japonais.

Notes on a Neptune

Recently, while visiting a "king crab" (Paralithodes sp.) processing plant in Seattle, Washington, I observed a six centimeter specimen of Neptunea lirata on top of a towel dispensor. Amazed to encounter a deepwater whelk in a crab plant, I asked the plant manager how and where it was found. This is the story I was told:

"While sawing king crab legs longitudinally for split legs, one of the plant's workers discovered an upper-leg section (merus) with no meat in it. The only thing remaining inside the section of leg was the whelk. The shell of the crab was completely intact. The crab was caught off Ketchikan, Alaska during the summer of 1975 at a depth of 100-200 meters.

"Apparently the hungry gastropod attacked the crab during a shell molt and penetrated the shell of the leg section before the shell hardened. The shell of the crab then hardened around the whelk, trapping it and causing it to starve after consuming all of the meat in the one crab leg."

I would be interested to know of any other possible explanation for the whelk being trapped within the intact shell of a live crab and also of other accounts of this or related species exhibiting similar feeding behavior.

CHARLES A. BARTLESON
Lacey, Washington

AFTER A HURRICANE

Continued from page 88

dock-sitter peruses our day's catch and concludes that we must be mad marine biologists, or possibly just mad. He notices that I have not been diving and indicts Eloise for bringing in colder water from the Gulf. I am thinking that Eloise has left behind cold water, ugly debris and no junonias, and caused considerable destruction of the beaches, but she has brought me shelling at Port St. Joe and for that I shall remain grateful.

SPECIES COLLECTED

Florida Horse Conch - Pleuroploca gigantea
Gulf Oyster Drill - Urosalpinx perrugata
Chestnut Turban - Turbo castaneus
Marsh Periwinkle - Littorina irrorata
Florida Crown Conch - Melongena corona
Lightning Whelk - Busycon contrarium
Common Atlantic Marginella - Prunum apicinum
Florida Cone - Conus floridanus
Common Auger - Terebra dislocata
Apple Murex - Murex pomum
Lettered Olive - Oliva sayana
Tiny Florida Olivella - Olivella pusilla
Ponderous Ark - Noetia ponderosa
True Tulip - Fasciolaria tulipa
Banded Tulip - Fasciolaria hunteri
Saw-toothes Pen Shell - Atrina serrata
Gulf Scallop - Aequipecten irradians amplicostatus
Broad-ribbed Cardita - Cardita floridana
Giant Atlantic Cockle - Dinocardium robustum
Cross-barred Venus - Chione cancellata
Florida Coquina - Donax variabilis
Ravenel's Egg Cockle - Laevicardium pictum

NEW CONES

By MICHAEL H. LEVITT Flushing, New York

At last! Five years of grueling exploration are over, and I can once again return to the comforts of civilization. I tromped through swamps, caroused among the coral and dodged the dangerous desires of deadly dogfish -- all for one goal - the introduction to the world of ten new species of Conus, published here for the first time:

1) Conus yumyum H. Johnson - the famous Ice Cream Cone. Comes in twenty-eight varieties, all quite delicious. An extremely nodulous subspecies is called Conus yum-yum withsprinklesi.

2) Conus bazoomi R. Welch -- the Sili-Cone. This strange mollusk feeds by injecting itself into species of the female Cymbiola glans. These injections cause the female C. glans to swell up, a factor which is supposed to be attractive to the male. Conus bazoomi in very common near Las Vegas, Nevada.

3) Conus borschbeltus Grossinger - -the so-called Myron Cone. This fascinating animal is easily distinguished by its post-prandial practice of arising to entertain other mollusks with one-liners. Very common in its limited habitat of Miami Beach and the Catskill Mountains of New York State. Lately, specimens have turned up in the Poconos.

4) Conus corteziana Pizarro -- the infamous Cone-quistador! This voracious predator has been known to have eradicated entire populations in its crazed search for Cypraea aurantium, upon which it feeds. Conus corteziana is said to have re-introduced the sea horse to American waters.

5) Conus astronautus J. Glenn, A. Shepard, et al -- the Nose Cone is the world's largest shell. It is extremely thick and hard, and capable of surviving plunges from great heights into the ocean. It is said that this animal is the mythical companion of NA-SA, the Tahitian god of cost overruns.

6) Conus bionicus Marcus-Welby -- the Six Million Dollar Cone can leap tall buildings, run faster than the sound barrier, and defeat Sumo wrestlers with the flick of a pinkie. Unfortunately, it is in danger of extinction, probably because it seems to be latently homosexual.

Other species which have been identified, but not fully studied are:

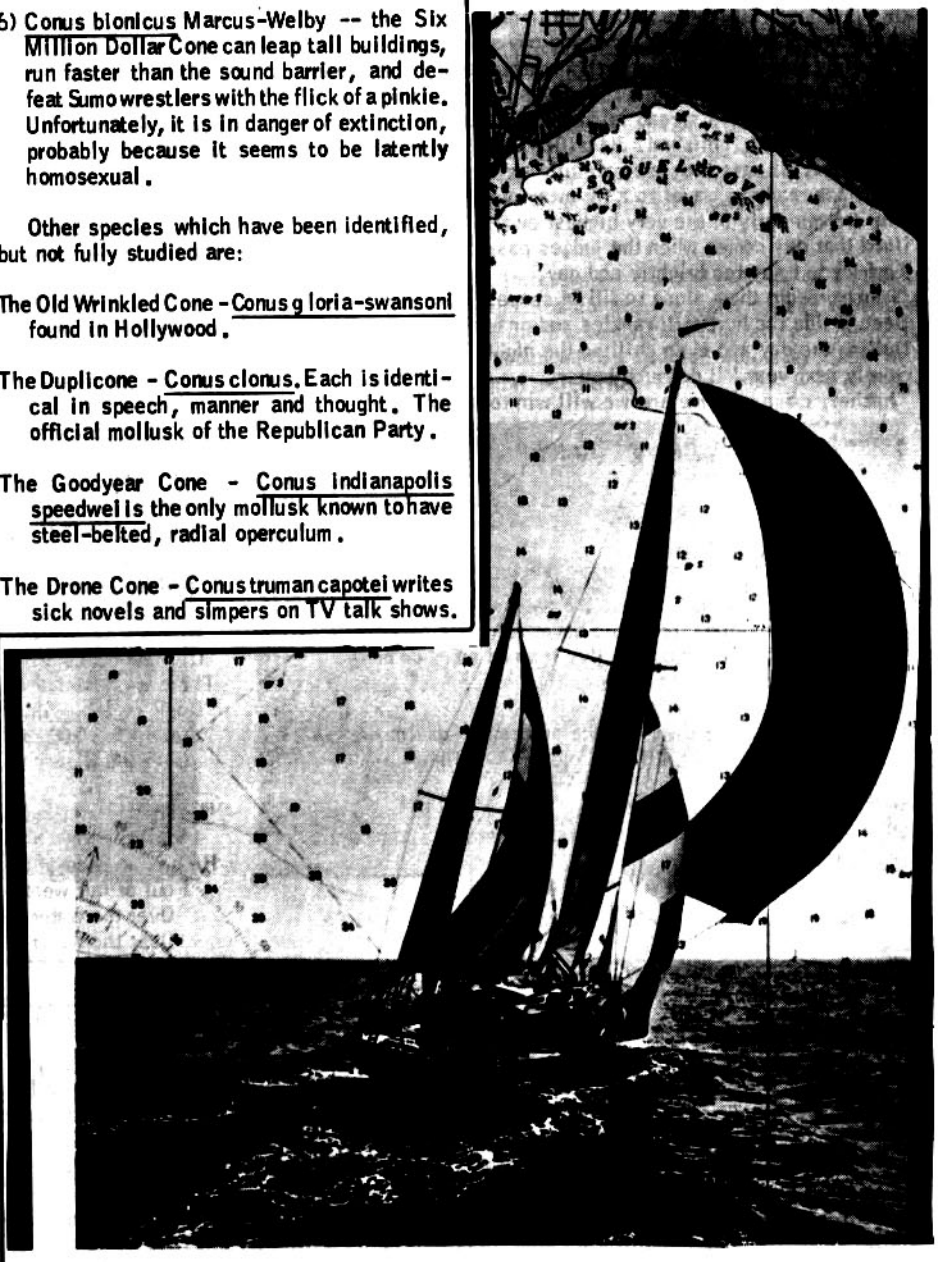
The Old Wrinkled Cone - Conus gloria-swansoni found in Hollywood.

The Duplicone - Conus clonus. Each is identical in speech, manner and thought. The official mollusk of the Republican Party.

The Goodyear Cone - Conus indianapolis speedwell is the only mollusk known to have steel-belted, radial operculum.

The Drone Cone - Conus truman capotei writes sick novels and simpers on TV talk shows.

Murex (Poirería) zelandica Q & G



By referring to a nautical chart like that in the background at left, crewmen on the yawl could easily pick out navigation aids and hazards as they sail along the California coast. This photograph appears in NAVIGATION the latest volume in THE TIME-LIFE LIBRARY OF BOATING published by TIME-LIFE BOOKS.

A STRANGE ROCK DWELLER

Continued from page 91

The pholas is in great demand at the seaside resorts along the Pacific coast, for its meat is very tender and makes excellent soup. The clams are dislodged in great numbers from the ledges by the use of dynamite, although it is possible to obtain them with a pick or crowbar.

The Poets' Page

COMPETITION IS THE NAME OF THE GAME

Dredged shells I like in quantities large
From many ocean depths to gather.
I find it fun to stir and seek them
Among coral bits, broken shells and sandy grunge.
To the kitchen faucet I hopefully hurry
Where I scrub and brush them free of greying sludge.
Oh, joy! Colorful jewels I now hold in my hands
In such rapturous pride and admiring covetousness.
Then into cabinets they are neatly stashed away
Until the next show time finally arrives.
Onto tables they are spread in complete disarray,
Sorted, cleaned, polished, classified, admired.
Into a special case they are carefully arranged
And made ready to travel to a far away place.
One dreams daily of the very highest award
Until that day comes when the judges pass them by.
To friends I say too brightly and gay,
"I just brought them along to fill in space!"
Deep inside the hurt still rankles and gnaws,
Dulling the day and even chilling the night.
Surely next year I'll do much better.
Thacher, come with me and we will win together!

NAWONA A. GARY

DOSINIA ELEGANS

Dosinia elegans - that is the shell
That my friends from Ohio have taught me so well -
And in hearing about it, I've learned so much more,
Then identification alone on the shore.

For its snowy-white surface and beauty of line
Are symbolic of all that is cleanly and fine -

O would that my work and my living could be
Like Dosinia elegans down by the sea!

VIVA FAY RICHARDSON

THE SEASHELL

Beauty from the waters,
rests here within my hand,
Placed to my ear, of sounds I hear
the ebb tide on the sand.

Mystifying seashell,
A work of art to me,
With colors rare, beyond compare,
A painting from the sea.

DOROTHY SCHMID

A SONG WRITTEN BY MARY HOWITT

"Who was the first sailor? tell me who can;
Old father Neptune! - no, you're wrong,
There was another ere Neptune began;
Who was he? tell me. Tightly and strong,
Over the waters he went - he went,
Over the waters he went.

"Who was the first sailor? tell me who can;
Old father Noah! - no, you're wrong,
There was another ere Noah began,
Who was he? tell me. Tightly and strong,
Over the waters he went, - he went,
Over the waters he went.

"Who was the first sailor? tell me who can;
Old father Jason! - no, you're wrong,
There was another ere Jason began,
Don't be a blockhead, boy! Tightly and strong,
Over the waters he went - he went,
Over the waters he went.

"Ha! tis nought but the poor little Nautilus -
Sailing away in his pearly shell;
He has no need of a compass like us,
Foul or fair weather he manages well!
Over the water he goes - he goes,
Over the water he goes.

Exchanges Wanted

I have been collecting shells for a number of years along the coast of Ghana and, being a diver have found most of my shells alive. Interesting shells we have in Ghana are: Cypraea sanguinolenta; C. stercoraria and stercoraria rattus; C. lurida. Some large members of the Voluta family and some members of the Conus and Murex families. PETER S. RYALL; P.O. Box 224; Takoradi, Ghana - interested in exchanging for Cypraea

Have number of common Cypraea, Conus, Murex, etc. all in good condition with locality data to exchange for others. Lists supplied and required. MARY DYKE; P.O. Box 378; Bendigo, 3550, Victoria, Australia.

Would like to exchange deepwater and rare shells of New Zealand for world wide shells write: RITA SAVILL; 34 MacMillan Ave.; Chrishchurch 2, New Zealand.

Shell collector and scuba diver would like to exchange common and rare shells from Portugal and West Africa areas for world wide shells. Please write to: JOSE H. CAMEIRA S. CARDITA; Avenida Madrid 23 - 1º - Dto; Lisboa - 1, Portugal.

If you are interested in exchanging shells? Send us your notice and we'll run it here, at no charge. No dealers please.

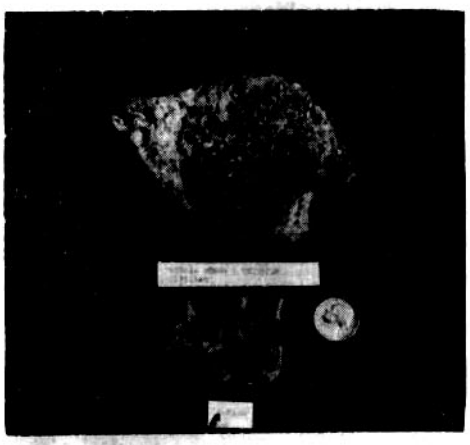
AL DEYNZER offers a complete line of Philippine shells for exchange: Cypraea, Conus, Murex, Mitra, etc. all gem quality, with complete data. PSC 1, Box 3647; APO San Francisco 96286

MOVING? SEND US YOUR NEW ADDRESS PRONTO!

Fossils From Ohio's Glacial Moraines

By HOWARD D. HILDEBRAND

Fort Myers Beach, Florida



#1 - crinoid stems (top); cockles (bottom)

In 1912 my father bought a farm on a shale hill, Pennyroyal Ridge, in eastern Ohio. It was good fruit growing country. The next farm to the north had a big mound of sand towering about 70 feet above the ridge. Both farms were known as orchard farms.

Because the pile of sand was cone-shaped, people, on first seeing it, thought it might be an old volcano. My father did not fall into that error. He knew it had been washed to the hill top by the Biblical flood. Others in the community agreed with him.

A little over three years later we began to use an excellent geography book in school. It explained in detail how coal had been formed. The chapter on the glaciers was most exciting to me. A great sea of ice from one to two miles thick had moved slowly down across our country from Canada. The limit of its movement could be traced all across the state from the Pennsylvania line to Indiana by the sand it had shoved along in front of itself, known as the moraines.

Soon after moving to the ridge I began to find stones with shell prints. Some even showed shells with some white. My father said they were a result of Noah's flood. Until we started using the new geography book I accepted his explanation.

It is probable that I found the stone with the Crinoid stems and crinoids about the time we began to use the new books. No one who lived near us knew what they were. Some guessed them to be Indian beads which had happened to fall into some clay-like mud that had hardened. I was well along in High School before I learned the word crinoid.

My father did not agree with the geography book. He thought God had put coal in the hills just the same as if a man had run it in there with a wheelbarrow. As for glaciers, the Bible never mentioned them. Some smart-aleck had gotten the notion he would seem smarter if he came up with the idea of glaciers.

He began to wonder if such a book should be allowed in the schools. After a talk with the Methodist minister who was a well-educated man, he stopped talking about having them withdrawn from the schools.

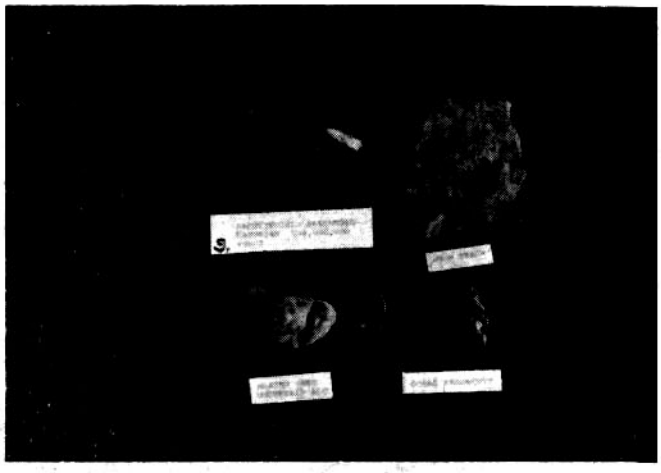
The minister believed the geographies were telling the truth. A great proof of the existence of glaciers was the fact that approximately five miles to the north of us was a boulder as big as a house. The nearest stones of a similar kind were in the mountains of Canada, over a thousand miles away. Smaller stones of the same kind of granite were all around us.

Scale trees appeared on the earth at about the same time as creatures with red blood. I did not find the two examples shown in photo #2 - the man who found the shorter one with the twig imbedded thought he had a piece of a fossilized snake.

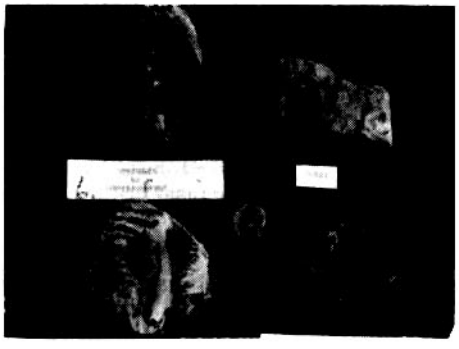
I did not learn that muriatic acid could be used to uncover a fossil where only a small section was in evidence until I was a grown man. At first is was a matter of trial and error. A number were ruined by using acid at full strength or by soaking them for too long in the acid. Photograph #3 shows some of the better results.

Photographs #4 and #5 are of the same object taken from opposite sides. The first men with scientific training who saw the fossil pronounced it a crinoid. Recently a man with equal scientific training thinks it is probably the hoof of an early horse. The glacier's movement and digging could easily have mixed fossils from different eras. So I have a question: is it a crinoid or an eohippus hoof? See #4 & #5 on next page.

#2 - scale trees



#3 Pachyteuthis (upper left); Worm track & Worm; Coral Fragments (lower right)



#6 - chiton in lower right.

FOSSILS FROM OHIO'S GLACIAL MORAINES

Continued from previous page

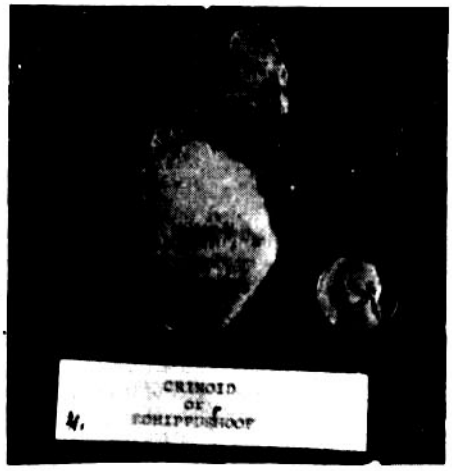


Photo #4

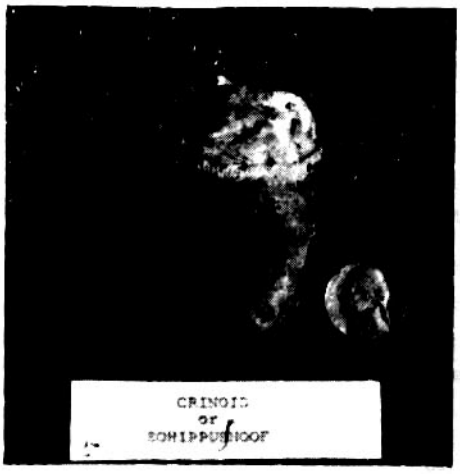


Photo #5

Photo #6 shows the questionable subject from still another angle. I included this plate primarily because it shows the only fossil chiton I have found. I almost washed it away with the acid before I learned what it was.

The photographs were taken by A.B. "Barney" Litchfield who used a five-cent piece to illustrate size of specimens.

Shell Clocks

The First Place winner at the St. Petersburg Shell Show in the "Shellart" section was an exhibit by Theodor G. Schaible. A German-born watchmaker, Mr. Schaible now lives in St. Petersburg and is in his eighties. In case you didn't notice, the clocks are made of shells.
(sent by W. R. Antonowitz, Charlotte NC)

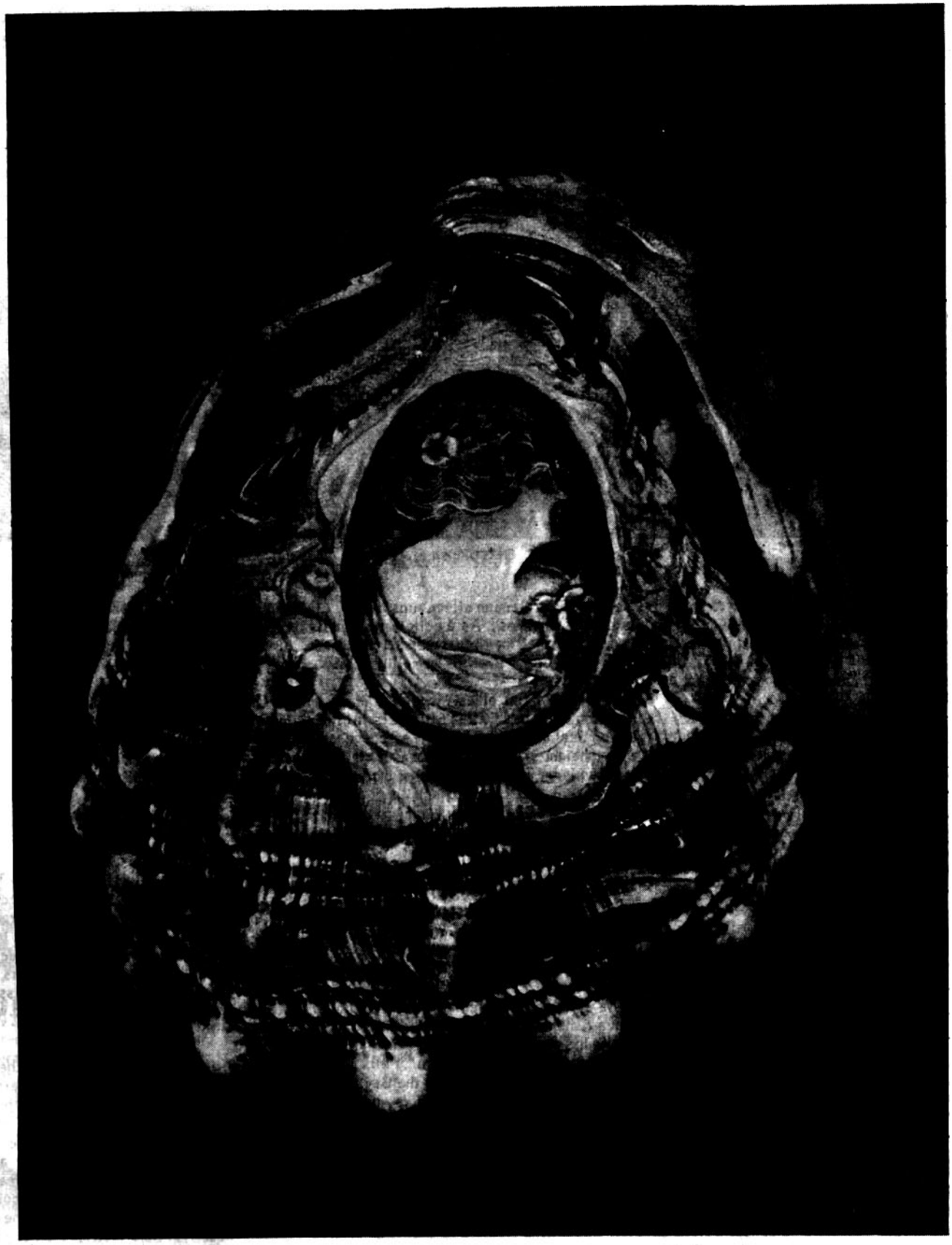
HELP!

A2

Length of front 675 feet

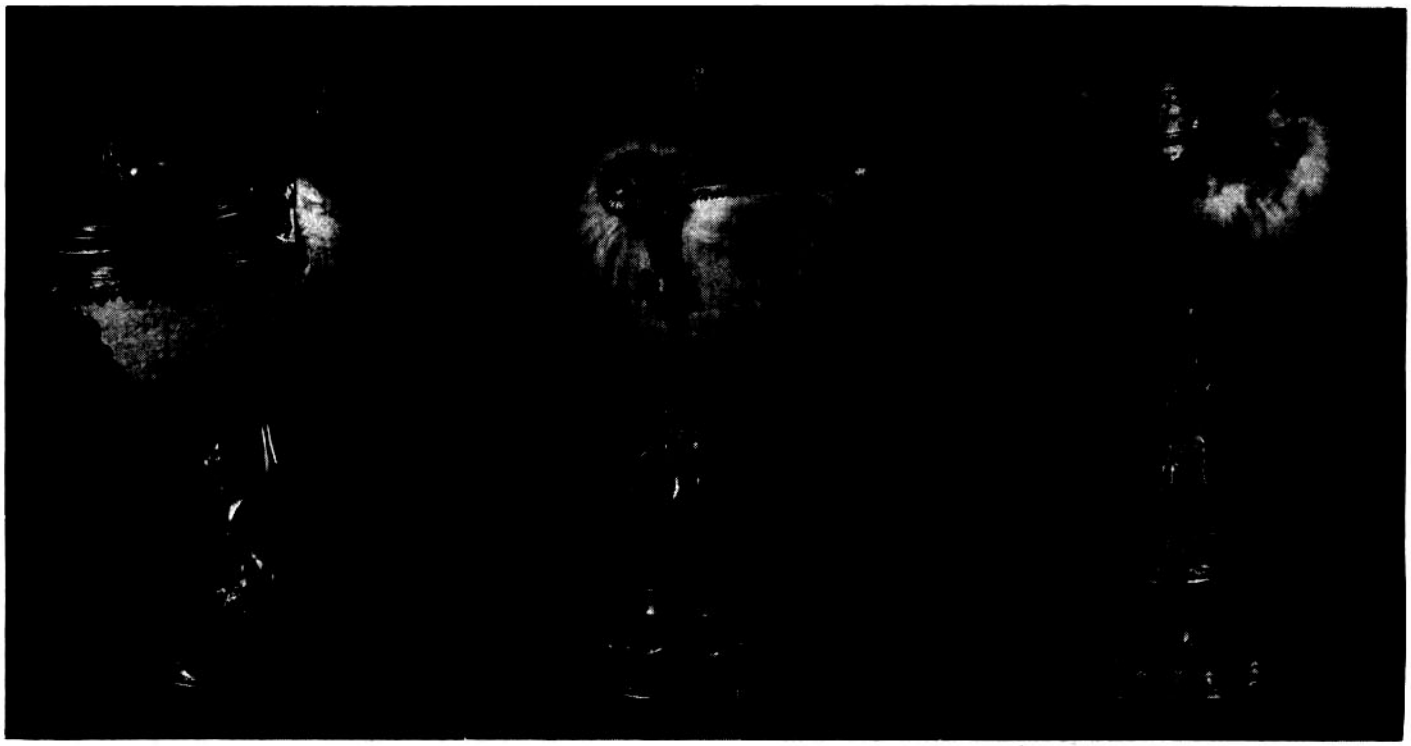
Probably the repository for more of the world's natural history treasures is the British Museum of Natural History. The building is 675 feet in length, height of the towers is 192 feet. The Museum was opened to the public on April 18, 1881. Be sure to visit the molluscan department if you visit London.

We are working on the next edition of our "A Sheller's Directory of Clubs, Books, Periodicals and Dealers" and want to add a section listing displays of shells which are available for public viewing. We are asking our readers to assist in gathering this information. Information needed includes site of display, size of display, hours when open to public, admission if charged, special emphasis or attraction of the collection and other information of interest to the collector. Send your information to "Sheller's Directory"; P.O. Box 33; Port Gamble, Washington U.S.A. 98364. And thank you in advance!



Cameo carved in Cypraecassis rufa Linne

Photo by J. Nemec, Brandys nad Labem, Czechoslovakia



There are immense artistic treasures located in Leningrad in the famous Eremitage. The building contains 1,050 halls and residential rooms of which 340 halls are open to the public. In these halls 2,300,000 works of art are deposited!

I visited Leningrad in 1974 and when I passed through the collections in the Eremitage I stopped for a while at a glass case containing a collection of German silver cups of the 16th and 17th centuries. As a collector of shells I was fascinated by three splendid cups made from shells of the Nautilus pompilius Linne.

The first, and oldest, cup was made by Heinrich Jonas in 1579-1605. It is in gilded silver, total height of 31 cm. The second cup, with a height of 38.2 cm. - was made by an unknown artisan at the beginning of the 17th century and is also gilded silver. The third cup was made in the middle of the 17th century, artisan unknown, again gilded silver, height 28 cm.

The cups are really beautiful and every collector would like to have some of them in his collection. But they are objects of enormous value and the only way most of us can have them in our collection is with photographs.

JAROMIR NEMEC Brandys nad Labem, Czechoslovakia

JOURNEY TO THE BAY OF ANGELS

Continued from page 80

carded after eating the animals. We stopped and searched through the shells hoping to find an albino or some other interesting shells. Unfortunately, they were all alike. We picked out a few of the better ones and started down the trail back to town.

We rode the motorcycles back to the small village of Bahia de los Angeles (dominated by the Casa Diaz resort). The restaurant here serves fresh sea turtle, fish and other seafood delicacies. An archway here is made of whale ribs, over ten feet long and very heavy. We purchased some bottles of cold Mexican beer and sat on the patio overlooking the Bay. After a long day of exploring the cold beer tasted good. The rays of a glorious sunset danced on Canal de las Ballenas (channel of the whales) which runs along Angel de la Guarda Island. A small plane came spiralling out of the sunset, gliding to a landing on the runway (main street). The passengers were coming down to spend a few days away from the "hectic life", this particular resort is a favorite of the "fly in" crowd.

We struck up a conversation with a colorful native fisherman. His name was Felix and a sign on his old car proudly proclaimed "Felix, the Greatest Fisherman on Earth". Felix makes a living taking people out into the Bay to fish for seabass, cabrillo, dolphin, toro, mackerel, corvina and many others. We made arrangements to go out with Felix, not to fish, but to visit a nearby island to search for shells - who wants to fish when visions of rare shells dance in your head!

It was getting dark, we're tired and hungry, so we headed back to camp. Bill had already started dinner. After dinner I realized just how really tired I was - it had been a long day fighting the desert sand and a stubborn motorcycle, not to mention aching muscles from crawling about for shells. I was sitting in the trailer when someone announced that the tide was going out. I had dreamed of those famous Baja tides for years and I was not going to miss one. So we got some strong lights and started walking down the beach.

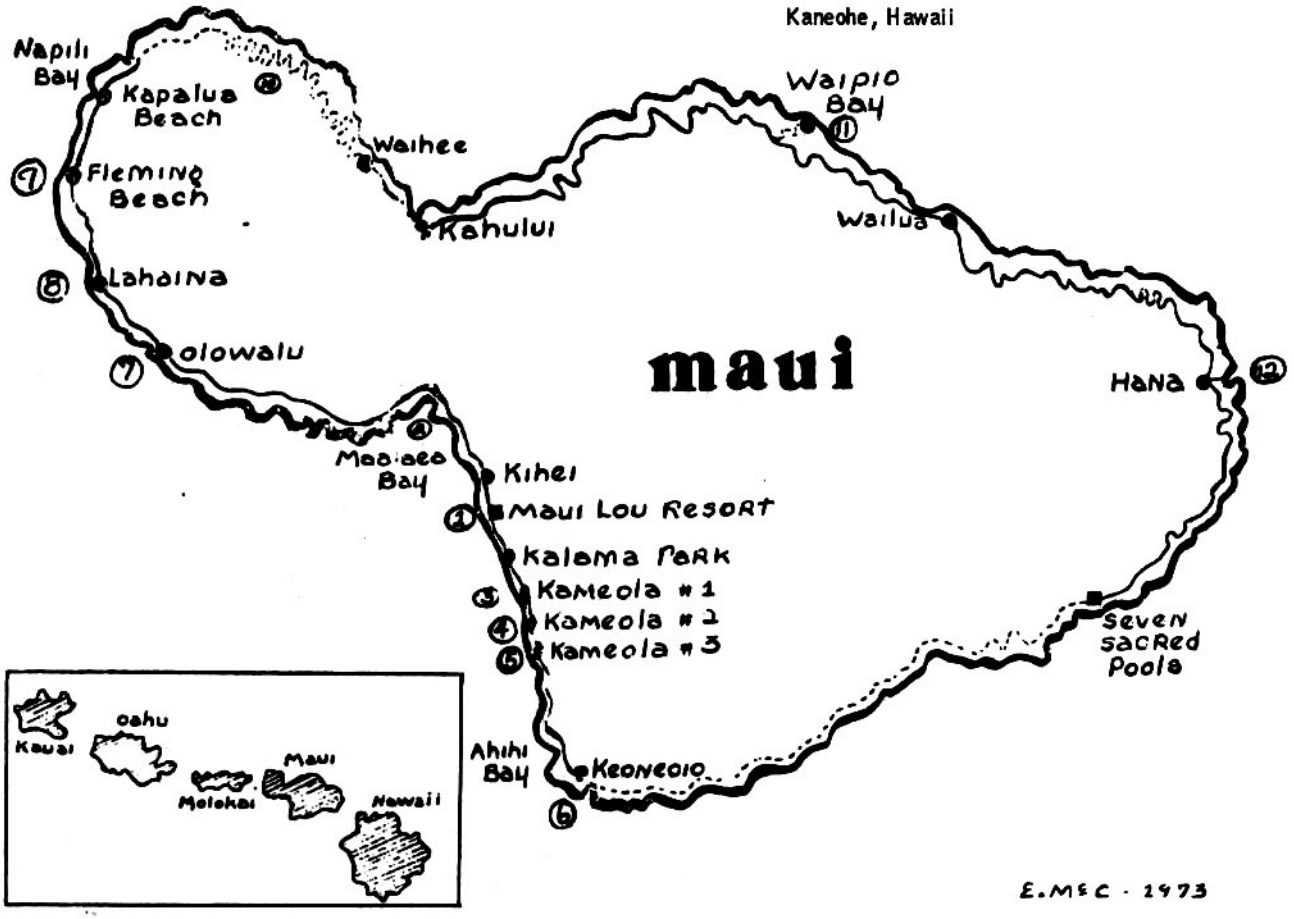
I was interested in exploring about the pier which had been formed by dumping boulders into the sea. The pier ran a good ways into the Bay and I had hopes of finding some good shells among the rocks. We walked out on the rocks just above the water line, searching as we went. The tide had dropped about four feet and our lights revealed a playground of colorful fish darting in and out of the rocks in the clear water. These fish were prettier than any I had seen in the Florida Keys and seemed more abun-

Continued on page 119

Maui No Ka Oe

By EVE McCLELLAN

Kaneohe, Hawaii



(The following originally appeared in the newsletter of the Pacific Northwest Shell Club and is presented here with the author's permission.)

Maui No Ka Oe (Maui is best) expresses my feelings exactly when it comes to water-watching ... and I'm one who enjoys watching more than collecting. The waters around Maui are an ideal setting for watching ... but I'm getting ahead of the story.

We arrived at Kahului Airport on September 3, 1973, at about 2 PM. Stepping down from an air-conditioned Boeing 747 into 88 degree temperature, bright sun and soft winds were the first of many delightful experiences awaiting us during the next three weeks. We filed our luggage in the trunk of the car and drove off in a high state of anticipation.

The drive from Kahului to Kihei takes about 25 minutes on a paved road that winds through cane fields for about 13 miles and then follows the coast into Kihei. Just a word about accommodations ... in my opinion the Maui Lu is the best on the island for marine explorers. There are private cottages (hales) spaced throughout 30 acres of gorgeous tropical landscapes. Each hale has a pullman kitchen, bath, livingroom/bedroom and lanai. Because the resort is on the beach, one can carry buckets of live specimens to the hale for study and then return them to their home unharmed, all with little effort. Since I have an aversion to trailing buckets of sea water and live snails through the carpeted lobby of a hotel (to say nothing of the looks one gets in the elevator) this arrangement just suits me fine. The cost is unbelievably low if you go off-season. In September one may expect an average 88 degree temperature, high winds and an occasional short-lived rain storm ... but the advantages of few tourists, little road traffic and low prices make it well worthwhile.

We planned this trip with a dual purpose ... a sort of explore-the-whole-island and study-the-marine-life experience ... and we barely could wait to get into our gear and into that remarkably clear water. Because we had so many interesting experiences examining Maui marine life I will only include the unusual, or those that may be of special interest. To keep this article short I have simply copied my field notes and added to them only when necessary. The area near each station is shown by the number on the map. All identifications are from Morris: A Field Guide to the Shells of the Pacific Coast and Hawaii or Boom: Hawaiian Sea Shells, with the exception of Cypraea helvola hawaiiensis, which is from Burgess: The Living Cowries.

Station No. 1, Kihei

Beach and rock jetty, near Maui Lu resort; 7 PM, Sept. 3, sandy bottom. Absolutely breathtaking night. No one on beach. Stars so bright it seems I can reach out and touch them. Wind is lazy, water calm, temperature about 80 degrees.

Lava rock jetty built in half-moon shape (to form protected swimming pool for children) and extends into about 8 feet of water at the outer perimeter. I turned rocks, peered into crevices and inspected bottom all the way around the inner side of jetty. In shallow water observed huge colony of Cypraea caputserpentis. Counted 22 which seemed to be "setting" with egg cases. Eight of these were depositing egg cases. Didn't know sea creatures kept night hours in the delivery room! All were nestled

in smooth pits on the underside of rocks. Those with egg cases had no mantle showing, but the others were all with extended mantle. Mantles are semi-transparent allowing dorsal color and pattern to show through. Light from my torch did not seem to disturb them. Took no specimens. Will watch them each night while here. (I did, but there was no apparent change until the 12th, when all but three "sitters" were gone, egg cases and all.)

On outer perimeter in shallow water observed two juvenile moray eels, both about two feet long. Appeared to be browsing for food ... nosing into rock crevices and moving slowly ... very graceful, undulating slowly, turning in slow motion. Not disturbed by torch, but retreated under rock when I moved toward them to get a better view. Caught one behind the head and examined it closely. Quite beautiful markings and coloring; dark olive with lighter markings of yellowish green. Teeth are fairly long for so small a creature, and are extremely pointed at the tips. Specimen splashed tail about vigorously at first, but became docile and lay quite still until I turned him loose. Stroking back of head seemed to relax him ... in fact, I think he liked it.

Rocks in shallow water were teeming with Nerita picea, Siphonaria normalis, Littorina picta; pools were crawling with hermits sporting a variety of exotic houses. Took a half bucket of small specimens to hale for identification, the most of which were returned to carry on their night carousing. The lot included:

Morula fiscella, dead
Morula elata, crab
Bursa affinis, crab
Littorina picta, live
Littorina scabra, live
Drupa morum, live
Drupa ricina, juvenile, live
Morula uva, live
Isognomon costellatum, live, juvenile
Trochus intextus, crab
Balcis cumingi, dead
Strombus maculatus, crab
Cymatium nicobaricum, crab
Nassarius hirtus, crab
Peristernia chlorostoma, live and crab
Mitra consanguinea, dead
Natica marochiensis, fresh dead
Vexilla taeniata, live
25 unidentified specimens

Station #2 - Maalaea Bay

No beach, Keawe trees growing to water's edge; 10 AM, Sept. 5, 1973, 89 degrees, bottom rocky with patches of weedy sand; sharp drop off to about 9 feet depth just 5 feet off shore.

Found eight dead Conus lividus so took to the water to observe bottom. In about four feet of water, on the edge of rocky ledge, spotted a Conus partially buried in rubble, proboscis waving about like a worm. Made a wide swath with my net scoop and came up with three specimens which turned out to be Conus lividus, all about 5 cm. Periostracum is dark greenish-brown. Observed a group of Conus sponsalis on a flat rock (3 feet depth). Counted 17, all about 1 cm. Suspect the rock served as a nursery as there were an equal number (couldn't actually count them) under the rock among rubble and rock. Surprised to find them atop the rock in full sun. Perhaps rock had been turned over in some manner leaving them exposed?

Saw three eels that looked to be about the size of Moby Dick ... but, were actually about four feet long; all slithered under rocks as I approached. It seems odd to me that they would be in such shallow water in full sunlight. Didn't have the foggiest notion what to expect from them, so watched them closely for a while, but they seemed not to mind my being there. They made no move toward me, so I relaxed and went on prowling. Turned several small rocks and found many blackish brittle stars. Black spiny urchins were tucked in rock crevices everywhere, and the rocky bottom was covered with them. Took four more Conus from the base of a rock. They proved to be C. lividus, so I returned them to their home after waiting a half hour for them to show some signs of life in shallow water. They didn't.

My underwater prowling was cut short as I was summoned by Shelly, my fellow prowler. As I surfaced she shouted something that sounded like "There's a bunch of snails under this tree". As I reached shore she handed me a huge periwinkle (3 cm.), the largest I have seen anywhere in the islands. It was Littorina pintado. We took 22 specimens (some Littorina scabra) from the limb of one tree. The trees along the shore were gnarled and twisted and some of the branches were low above the water. As we inspected we found that every low branch was literally covered with Littorina, and well over half of them were large. The trees grew along the shore for about 100 feet and all housed Littorina. What fun picking sea shells off trees!

Station #3 - Kamaole

8:30 AM, temperature 81 degrees, strong surf, bright sun; sandy flat bottom, surrounding lava reef. September 6, 1973.

Gorgeous morning, no one in sight. Water seems same temperature as air. Snorkeling in about four feet of water over gently sloping sandy bottom. Huge colony of Hastula peniciliata (2.5 to 3 cm). In the shallows, some were rolling along bottom with the current. Most were in sand with apex end about 1 cm of shell exposed. Took ten specimens. Colony covered an area of about 20 feet long and nearly 10 feet wide and ranged from 1 foot to 5 feet of water depth. Bottom looked as though someone had systematically poked small brown twigs in the sand. (Note: went back to this spot six times while in Kihei and never again found one of the creatures. I searched from shallow to deeper water, hand dredged to about 6 inches and not one little shiny Hastula turned up. 'Tiz a puzzlement!)

Supralittoral exploration proved very rewarding. Littorina scabra, Littorina picta and Siphonaria normalis were plentiful. Algae-covered rocks in high wash zone were alive with many specimens of Cypraea caputserpentis, Morula uva, Drupa racina, Drupa morula and Vexilla taeniata. In sand in about 3 ft. of water took two Terebra felina. On rocks at about this depth were Cypraea maculifera, large C. caputserpentis and one C. helvola hawaiiensis. Black spiny urchins and small pencil urchins were abundant.

At about 8 feet depth a large lava rock (about 12 ft square) was serving as a posh condominium, complete with penthouse, for a colony of Cypraea mauritiana. Sides of rock were overgrown with leafy algae and coral, and in nearly every crevice a large cowry lay. The exposed top of the rock was bare of algae, but eight cowries were there ... as though sunning themselves. The books say they don't like sunlight, but there they were. As the waves washed over the rock the beautiful dorsal patterns sparkled like jewels on black velvet. They were all about 7.5 to 10 cm in length. I counted 44 specimens on that rock, took six of the largest, and vowed not to betray their hideaway to anyone. (I went back several times. They were still there, although none were atop the rock.)

The same area produced many Drupa racina (2.9 cm); Morula uva, Morula fiscella and Drupa morum, all adult and large. At the base of the Cowry Condominium were two Conus textile. I know they aren't supposed to be that shallow, but these two hadn't read the books, because there they were. They were both half-buried in sand and rubble, and both had extended proboscis. Directly above them a black urchin with six-inch spines rested on the rocky ledge. Whether intentional or not, he was providing protection for the cones in the sand beneath him. Those spines are nothing to tangle with, and I have the scars to prove it. Anyway, I managed to move the urchin and scoop up the cones. I couldn't believe they were C. textile, but sure enough ... they are. Spent the rest of the morning floating around watching the underwater floor show. Absolutely fascinating!

Note: Every station marked on the map was an exciting adventure in water-watching, but it would take a book to record my feelings and experiences in Maui waters. I repeat ... Maui no ka oe!

From a booklist of rare editions:

Thornton, R.J. New Illustrations of the Sexual System of Carolus von Linnaeus

1799 - 1807

Price: 4,750 Pounds Sterling

(a monumental work, probably the most celebrated botanical work.)

Observations of a Family Shelling off South Bimini

AS RELATED BY BARRY CUDA

The place I call home is anywhere between Henry's Bank and Nixon's Harbour, off the SW tip of South Bimini. That is where I cruise the sandflats at low-tide and the adjacent coral reefs at high tide. Occasionally there are visitors that also swim in my domain, assuming a strange appearance: bright, shining glass covers their faces, to which is attached a kind of air tube and they have fish-like feet. I have learned that they are Man-creatures. I don't resent their presence since I have a curious nature and enjoy following these creatures to observe what they are up to. I am young and not at all large, but already I have discovered that if I get too close to the Man-creatures they become nervous and leave the water and then I am left with nothing to do between meals. So, I try to stay just outside of what I have determined is their very limited range of vision. Then I can go ahead and enjoy watching them in their antics and search for whatever it is that entices them into my world.

Recently I spent about five days, from dawn to dark, watching a family that consisted of a Man-creature, a Woman-creature and two girl-fry. They seemed to be quite intent upon finding many of my mollusk friends that live about. The first morning I noticed them, the sun was just breaking - casting increasingly brighter shafts of light into the crystal waters. The tide had just past its mean-low for the month and another beautiful day was promised. The family walked far out into the eel grass that abounds in huge patches over the sandflats. They seemed to be quite pleased each time one of them found some mollusks during the morning hours that slowly wore on, bringing the turn of the tide. I observed that, as a group, they picked up and kept large, perfect Cassis tuberosa, many Murex pomum, Fasciolaria tulipa, Astraea phoebia, Strombus costatus and Turbinella angulata - plus a couple of lovely Cassis flammea - all common enough around here, but they seemed to want them. Happily, I noted that they would put back in the water a few of the shells they found; I guess that they did not consider them acceptable for their own reasons. It was odd to watch them all shuffling along - so awkward a manner of moving about - but I suppose they did not wish to step upon some of my friends like Bat Ray and Turk E. Fish.

On a different day I saw that the Woman-creature of this family was very good about finding nice Strombus gigas, one in particular that she was quite pleased with, had a large fragile, but perfect yellow wing and lip; she found other colorful "rollers" - not all of which she kept; she also found a very lovely brightly colored Strombus raninus that she seemed to like. I laughed as she really got excited about her Turbinella angulata. (On another day, my fish friends would tell me, she found a huge and heavy, old Turbinella angulata on the sandflats of the harbour off North Bimini.) They all seemed to enjoy this activity tremendously

drawings by a fried of Mr. Cuda

and they were lucky to have two low-tide periods during daylight hours.

One day my friend Sgt. Major told me that he had noticed a family that would cross a narrow channel at various times during the day and he supposed that they were going by land over to the reef area where I've observed such man-creatures before. C. Urchin and I would compare notes as to their activities on the reefs. He told me that the family I'd watched on the sand-flats would just swim around his reef, peering under rocks and into crevices. They would also look over, quite deliberately, the colorful purple and yellow seafans that decorate the rocks with orange and yellow sponges and stinging corals. He said that they would, from time to time, remove little orange-spotted Cyphoma gibbosum - they only took a few and there were many left - from the sand where the mollusks like to live. When I followed them around to the reef, I noticed that they mostly seemed to like to just admire the brilliantly-colored little fish that make their home in the reef. Many of my friends: Parrot Fish, Tangs and Surgeon Fish, little iridescent-blue anemone fish, damsel fish, Blue-Headed Gobbie and Purple Gemma, French-ie, the Angelfish, and Butterfly Fish were all there in full regalis for them to see. They would point and gesticulate enthusiastically at Grouper, odd-looking Trunk Fish, graceful Bat Ray and hovering Needle Fish. C. Urchin said that they would return frequently and I noted that they did, just searching our reef or looking around.

One morning, towards noon, only the Man-creature was wandering about my sandflats when I saw two friends, Sandy Shark and her mate, begin to approach him. I watched anxiously to see if they would start to tease him or pass on by. Sandy decided to play her waiting game, but her mate chose to find something better to do. Sandy swam towards the Man-creature very slowly and followed him a way; he didn't seem to mind her. However, when Sandy came too near the Man-creature started to walk directly towards her; she decided he didn't like company and she went off to join her mate. (Luckily he hasn't noticed me yet; I guess I really have the hang of Man-creature watching!)

I had really begun to enjoy watching this family after nearly five whole days when my grandfather managed to spoil my fun. In an area of the sandflats known as the Fishermen's Conch Graveyard, the Man-creature was walking around in about three feet of water with one of his girl-fry swimming along beside him. My grandfather decided to investigate them - he'd been absent from the flats since I had begun watching. Gran'Pa Cuda is much bigger than I; he is about four feet long and, from time to time, doesn't like other creatures in his territory. He appears fierce, but I do not think he would have harmed the Man-creatures. He also doesn't think that watching families can be a fun pastime. He is curious just as I am, but he doesn't use his head - like on this occasion. He went very close to the Man-creature, who then lifted his girl-fry completely out of the water, so Gran'Pa couldn't see her anymore. Gran'Pa followed them for a few minutes to see what they were doing, but then the Man-creature started to play the game he did with Sandy Shark: he started to walk towards Gran'Pa. Gran'Pa Cuda doesn't like to be crowded, so he just left them and went out to deeper water where he knew the Man-creature couldn't follow.

I was sorry that the family didn't come back after that and I told Gran'Pa to please not let the Man-creatures see him - for if he continues to scare them off, I shall be quite bored around here!

Preparation of Chitons for the Collector's Cabinet

By COLONEL GEORGE A. HANSELMAN

(Note: this article appeared in Vol. 1, No. 1 Of Sea and Shore.)

Along with the constantly increasing interest in seashell collecting, there seems to be a concomitant interest in various other forms of marine life, among these being chitons - POLYPLACOPHORA, or "bearing many plates". The chitons, however, do not lend themselves to the same method of handling as seashells, and some degree of puzzlement as to "what to" and "how to" can crop up.

Unlike the simple shell/animal/operculum/periostracum set of characters of a seashell, the chiton consists of eight plates, a surrounding girdle covered with often complex ornamentation, a visible set of branchiae, a foot, and internal organs. With a seashell, the serious amateur collector endeavors to preserve the shell, the operculum, and sometimes the periostracum, essentially a simple matter because of their comparative indestructibility. With the chiton all parts must be preserved — the internal organs sometimes excepted -- in order to provide a worthwhile collection specimen; and most of these parts can be extremely delicate.

In general, two types of chiton collections can be established, the WET COLLECTION and the DRY COLLECTION. In the WET type the specimen is permanently maintained immersed in a jar of alcohol, usually tied therein to a glass slide on which the collecting data is also noted. A collection of this type is usually maintained only by museums, and by researchers studying the internal anatomy of the chiton. The advantages of a WET collection are that the chiton is maintained almost permanently in its original fullness of shape and color, and the internal organs are retained in a condition permitting dissection and study. The disadvantages of the WET collection are the bulk and the weight of the specimen jars, the handicaps and sometimes hazards in viewing the individual specimens, and to some extent the cost and difficulty of obtaining preservatives. Ethyl Alcohol, for instance, is obtainable in quantity at reasonable prices only by special permit, and Methyl Alcohol is extremely dangerous to use except in specially ventilated areas.

The DRY collection, on the other hand, requires little storage space, poses no weight problem, permits ready annotation of data, and affords easy study of the specimens. All required materials are usually easy to obtain, although one is not inexpensive. There is some girdle shrinkage and loss of color, and only partial reconstitution of the internal anatomy is possible. But for the serious amateur collector the DRY collection seems by far the more feasible and the method of preparation outlined here is reasonably easy of accomplishment.

Before going further, please note that I use the terms "serious amateur collector" and "reasonably easy". Certain phases of this procedure cannot be even slightly neglected if decent specimens are desired. Care in handling and immediate processing are mandatory. Time required per chiton, exclusive of time spent in cleaning, will run about thirty minutes. The processing period will extend over some six weeks. Materials needed are not inexpensive. For these reasons, I suggest the desirability of starting on a somewhat limited scale, to determine how deeply you indeed are interested. But at the same time, keep in mind that the procedure is quite simple, requires no special skills -- and must be almost fool-proof, or I couldn't use it!

The procedure can be divided into several steps:

1. Collecting is the art of taking, and bringing home in good condition, the live specimens.

2. Data Entry is notation of all pertinent collecting data, preferably in a permanent record and placement of similar data with the specimens so that it will accompany them throughout processing and into the collection.

3. Tying is persuading the live specimens to relax and flatten and binding them on boards in this flat condition.

4. Killing is immersing the tied live specimens in an Isopropyl Alcohol solution for killing and initial dehydration.

5. Preserving is immersing the killed specimens in a preservative solution for the required length of time.

6. Drying is re-tying the preserved specimens on boards to prevent warping while the preservative solution evaporates from the tissues.

7. Filing consists of verifying identifications, performing whatever cleaning is desired, preparing labels for the specimens and placing them in the collection.

For this, certain materials and equipment will be required. These are listed according to the Step in which they are used. The amounts and numbers of each will depend on the sizes and numbers of chitons to be preserved.

STEP # ITEM

1. A bucket or container especially for the chitons. Do not mix them with shells or other items, or you will have to re-collect them off the shell when you get them home.

1. A knife with a thin sharp-pointed blade. Stainless, of course.

2. A notebook.

2. Adhesive tape. One-inch width works well.

3. Relaxing dishes (or pans, or bowls), in which the chitons can make themselves at home, relax, flatten, and crawl around. Be sure these are round bottomed -- no sharp corners -- and do not have an inside lip; you will need to slide the chitons smoothly out of the dish. The chitons appear to relax most readily in dishes of pyrex glass, with stainless steel a close second and plastic a poor third. Size of the dishes will of course depend on the sizes and numbers of chitons.

3. Boards, which I usually cut from scrap plexiglass I get free or for a very small charge from firms which make signs, etc. from plastic sheet. Any material which is firmly rigid and which does not discolor the preserving liquids will do. I do not recommend glass. Note that the length and width of the boards cannot exceed the depth and mouth of the killing jar to be used.

3. Ties, for which I use one inch width white Bias Tape. This makes a firm tie, with just enough elasticity to it. The ties can be re-used for a long time.

4. A killing jar of sufficient size to hold the boards of tied chitons standing on end. This jar should be wide-mouthed and have a tightly sealable top. I usually use a one-gallon wide-mouthed pickle jar, in which I place 84 ounces of the killing solution (listed next). This jar accomodates the larger species. If the day's take is small, the boards lean at a slant and are submerged; and if the take is large the bulk of the boards and specimens raises the level of the fluid enough to cover them.

4. Killing solution, which is 50% Isopropyl Alcohol. This can be prepared in larger amounts by adding one gallon of distilled water to one gallon of 99% Isopropyl Alcohol. For small amounts, to a 12-ounce bottle of Rubbing Alcohol -- the cheapest you can get at the drug store -- add 4.8 oz. of water and you will have 16.8 oz. of 50% Isopropyl Alcohol. (Rubbing Alcohol is basically 70% Iso, so 12 ounces equals 8.4 ounces of pure Iso, plus 3.6 ounces of water, plus a tiny amount of perfumery.)

5. Preserving jars sufficient to hold the size and bulk of chitons being processed. The jars should be wide mouthed, and have tightly sealable tops. I place very small (up to 5/8-inch) chitons in 4-ounce or 8 ounce jars, large specimens in pint jars,

and very large specimens in a container of appropriate size.

5. Goop, which is what we will call the preserving solution. This consists of 1 part chemically pure 100% strength Glycerine and 1 part 60% strength Isopropyl Alcohol. More simply stated, it is half Glycerine and half 60% Iso. Use chemically pure glycerine, the commercial grade is a bit cheaper, but has an odor. For 60% Iso, to one gallon of 99+% Iso add 85 ounces of distilled water to get 213 ounces of 60% strength Isopropyl. Or to 12 ounces of Rubbing Alcohol add 2 ounces of water to get 14 ounces of 60% Isopropyl.

6. The boards and ties in this step are the same ones used in Steps 3 and 4.

7. Labels, boxes, magnifying glass, microscope, cleaning picks, etc. according to taste.

All of the above through Step 4 should be available before you start for the beach; you will need them as soon as you get home. So now you have them, the tide is right and here we go!

STEP 1 : COLLECTING

Chitons live on rocks, shells and pilings, clinging to the flat surfaces of these objects with a broad soft flat foot. The girdle of the chiton is normally slightly raised at the rear to permit exit of waste, so this is the best point of approach. DO NOT touch the chiton beforehand or it will clamp down like a limpet, making it difficult to remove without damaging the girdle. Using a thin-bladed sharp-pointed knife, approach the chiton from the tail and after carefully positioning the knife remove the chiton with a swift sliding movement. Keep the point of the knife slightly slanted down to prevent stabbing the chiton. Like people, when stabbed in the belly they tend to double up -- which makes Step 3 difficult.

Place the chiton in a container for chitons only. Keep ample water in this container while collecting and change it to fresh cold seawater before leaving the beach. Chitons are mortally sensitive to heat, and also can use up the oxygen in a too-small amount of water at an astounding rate. As your further success in this procedure depends on having strong healthy happy and cooperative chitons, their initial welfare is of critical concern.

STEP 2 : DATA ENTRY

In reality this will be accomplished somewhere around Step 3½ or Step 4½. But I insert it here to emphasize that it is indeed an essential part of preparing a collection. The first thing to do when you get home is to get the chitons into the relaxing dishes; then while they are making up their little minds that it is safe to unroll you can get started on this homework.

If you keep a Collecting Notebook --- and you do, don't you? --- now is the time to enter the date, tide, time, tide level, collecting spot (maybe with a sketch of the area if it is your first time there), a tentative listing of species collected and a comment on the circumstances in which each species dwelled.

Then make a label on a piece of adhesive tape, noting the place, date, time, tide and stick it on the top of the killing jar. From now on during the processing, as the chitons move from killing jar to Goop jar to drying board, you will move this data label along with them. And in Step 7 you will transfer the information to a label for each specimen collected, to accompany them into the collection. Trouble? Sure it's trouble. It's also the difference between a drawerful of "pretties" or a collection that the Smithsonian would find useful. You're going to an awful lot of trouble anyway; why not a few minutes more and make the whole thing really worthwhile?

STEP 3 : TYING

Using seawater from the collecting bucket, fill sufficient relaxing dishes to accomodate all the chitons without crowding and transfer the chitons from the bucket to the dishes. Too many chitons in a dish forces them to crawl over each other as they move, delaying flattening. Keep them from congregating in bunches. As they flatten, tie the flattened ones and make more room for the stubborn cases. Put the "teenies" in separate dishes from the big boys; if a big one crawls over a tiny one, sometimes the big one inhales and there is no tiny one!

Once enough chitons have flattened out, choose a tying board of appropriate width, slide a chiton out over the edge of the dish, place it flat crosswise of the board, hold it gently in place with the thumb of one hand and wrap the tape firmly around it in overlapping spirals until the chiton is covered. Now take the next chiton, place it beside the first on the board and continue wrapping until the board is full. Work fast once the chiton is on the board. Some species will hold still quite a while and others will double themselves up again in just a few seconds if they are not tied down promptly. If they manage to curl, put them back in the dish and wait again. To start the tape, just wrap it once around itself. When you come to the end of the board, tuck the tape under its own last spiral. Wrap the tape firmly over the chiton but remember that too severe pressure can crack the plates and that your leverage is substantial.

If a chiton is too long for the width of the board, place it lengthwise on the board and be especially careful that every spiral wrapping around the chiton is the same pressure. Otherwise the result will be a humpbacked or swaybacked specimen. Take much care in assuring that the girdle of each chiton is flat and is extended fully all the way around the chiton before you take it out of the dish. Once the chiton is killed, it's too late; a bent girdle is irretrievably so.

If a chiton is reluctant to uncurl in the dish, try placing it on its back, on its tail end, on its head end, and if none of these work (it's amazing how particular certain species can be in this respect) try rolling it roughly around to give it the idea it has been caught off-base by the incoming tide. And if that doesn't work either, sometimes a vigorous aeration with a small syringe bulb will pump in enough oxygen to energize the weaklings. And remember, the stronger and healthier they are when you get them home, the surer they are to relax for you.

STEP 4 : KILLING

Make sure the killing jar is large enough to accomodate the number --- and length --- of the tying boards you will be using. Fill the jar about two-thirds full of 50% strength Isopropyl Alcohol and screw the lid on tightly. The Iso evaporates rapidly, so a tight seal is an absolute necessity.

As each board of chitons is tied, place it on end in the jar, making sure that ALL chitons are submerged. Leave them in the killing jar for 24 hours, then continued to Step 5.

The killing solution may be re-used until it is quite dirty. But note that as you place the wet newly-tied boards of chitons in the jar, their seawater tends to dilute the solution. And as you remove the treated boards, their wrappings carry away some of the solution. It is therefore necessary to add, from time to time, a little over-strength (70 or 99%) Iso to bring the solution back to strength and quantity.

STEP 5 : PRESERVING

First determine what sizes and numbers of jars you need to use and fill each jar a little more than half full of Goop. After the chitons have been in the killing jar 24 hours and Step 4 is complete, remove the boards of chitons from the killing jar, unwrap them and place the now-flat firm dead chitons loose in the jars of Goop. Do not put more chitons, by bulk, in a jar than equals the bulk of the Goop. Be sure the chitons fit loosely in the jar and are well covered by the liquid. I usually place small chitons in a separate jar so that they can be processed earlier in subsequent Steps.

Time in the goop relates to the amount of meat on the chiton -- girdle, foot and innards. The more meat, the longer the time required. For a rule of thumb, the following will usually serve:

Teenies (to 3/4 inch)	10 days
3/4 to 1½ inches	15 days
1½ to 2½ inches	20 days
2½ to 3 inches	25 days

over 3 inches, proportionally more time

After you have unwrapped the boards upon removal from the killing jar, run each tie through your fingers to straighten it and then hand all the ties to dry, preferably in a good breezy place; they are then ready for re-use. Wash off

the used boards with plain water. DO NOT use soap or detergents on ties or boards, or to clean dishes, jars or buckets in which chitons are to be placed. They apparently hate the stuff!!

When the proper period of time has elapsed, on to Step 6.

STEP 6 : DRYING

Drain the goop from the preserving jar(s). If the goop is fairly clear, save it for re-use. If it is badly discolored, discard it. It's a bit expensive, but filthy good tends to deposit a coating of dirt on the next batch of chitons --- which is even more expensive and also introduces the moral question of "Why kill the chiton when you aren't going to handle it properly?"

Now place the chitons on paper towels to drain, pat them dry with Kleenex or something similar, and re-tie them carefully on the plastic boards. As you do this, affix to each board a slip bearing the collecting data.

Prop the boards, on a slant for maximum air circulation around them, in a shaded breezy place where they will not be in the way for a few weeks. Drying time will roughly correspond to the length of time spent in the goop ---teenies 10 days, etc. The flesh of the chiton must dry internally as well as externally, which means that slow drying is required. No direct sun and no forced drying in the oven or such; I've already tried that --- unfortunately!

If the local climate is dry, or if gas heat is used during the winter and the indoor s is therefore exceptionally dry, the drying time may be slightly shortened. If the climate is a bit humid or if a spell of high humidity intervenes in the drying period, the time may be lengthened.

STEP 7 : FILING

We have now decided that the chitons are properly dry. Remove them from the boards, smooth the ties and wash the boards.

Re-check the identifications, group them into species, and correct or add to the information in the Collecting Notebook as to species collected, the number of each, and whatever else may seem of future interest. Now, without delay, make labels for each species to accompany them into the collection. Show Genus, species, place, date, tide and an abbreviated statement as to where in the shore zone they were found; future students may not have access to your Collecting Notebook. Example:

Lepidozona mertensii Middendorff, 1846
Point Pinos, Monterey, California
11 Nov. 1966; tide -1.1' at 1400
On bottom of loose-set rock, in water at lowest low tide.

You have now assured that some future researcher can benefit from your efforts, that your trading friend won't embarass you with "But where's the data?", and that when you finally decide to give your collection to a museum or university it will be placed with the useful working material instead of regretfully filed away. And all this insurance can be bought with just a couple more minutes of your time!

Cleaning dirt and growth off the live chitons is of course impractical at a time when your main interest is getting them to relax. So now is the time to accomplish whatever cleaning you feel is desireable. Care should be taken not to damage or remove plate sculpture during the process, and girdle ornamentation should receive just a little more respect than rare old Meissen. An extremely fine pick, used under a magnifying glass or microscope, works well in cleaning off the plates. The girdle, no matter how dirty, is usually best left untouched. And if a brush is used, brush only the plates, never the girdle. The point is simple: you have taken great care and trouble to prepare a fine specimen; it would be a shame to ruin it now in the name of "neatness". A dirty specimen with all its various characters perfectly preserved is a jewel. A sparkingly clean specimen with denuded girdle and scarred sculpture is just an artificial freak.

And now the finished product is ready to go into the collection, complete with data and fit to be displayed with pride. BUT --- this will be true only of a certain percentage. No matter how hard you try and no matter how good you get, you're going to "bend" a few. And you'll also find that a few that looked pretty on the rock now look pretty rocky when viewed at leisure in good light. These are the ones to be used for disarticulation and study of the internal characters of the plates, and for extraction of the radula. So they're winners too, even while losing. Don't throw them away!

Good luck! If you'd like to exchange chitons, drop me a line at 5818 Tulane Street; San Diego, California 92122.

Hasta luego!

British Show

By ROBERT W. MORRELL

Whether by accident or design the Eight Convention and Exhibition organised by the British Shell Collectors' Club, on March 27, 1976, at the Napier Hall, London, was held almost four years to the day from when the Club was founded. No shell exhibition, open to the general public as well as members of the Shell Collectors' Club, and by invitation the Conchological Society of Great Britain and Ireland (which celebrates its centenary this year), has been held in England for many years, and so as the date drew near there must have been some trepidation in the minds of Michael Dixon, founder of the Club, Graham Saunders, Club Secretary and Tom Pain, who, with others, did the organisational donkey-work, as to whether members of the Club, who are scattered all over the United Kingdom, and members of the public, would come along and support the event. However, as it transpired, any fears that they might have entertained quickly disappeared as members and visitors poured in.

Members of the Club demonstrated their support for, and approval of the event by taking up every single inch of available table space, and Graham Saunders was heard to wish aloud, several times, that there were more tables available. Although members had been asked in advance to state exactly what space they would require for their displays, in the event many brought far more shells along than they originally had planned. And what superb displays these were. It is almost impossible to single out any specific display as outstanding, and as the Exhibition was non-competitive, there was no need for some poor, unfortunate judge, or judges, to sort out the best entry; and in view of the general fine quality of all exhibits one would have had to have a great deal of pity on anyone who found himself, or herself, landed with the job of saying which was the best display. On the other hand, however, we all have our favourite shells and so were drawn to specific displays, such as the mouth-watering volutes from the collection of Robert Scase and the many cones and cowries shown by other members. Particularly attractive were Tom Pain's murex, which may well have surprised some people who know Tom Pain as a specialist interrestrial mollusca, particularly those of Africa. This point indicates an area which shell collectors seem to neglect, that occupied by terrestrial and freshwater species, which can be very attractive indeed - as could be seen by looking at the only display of terrestrial species in the exhibition, that contributed by D. R. Worth, or my own freshwater bivalves (bias ??). Other very attractive displays were mounted by A. P. H. Oliver, particularly his Haliotis; E. A. Sadler and Fred Pinn, who showed fine examples of Lambis.

Of the individual shells on display there was no shortage of highly desirable rarities (not all rare shells have emigrated to America, South Africa or the Pacific region), as well as those which are anything but rare yet remain expensive because of demand, and a few of those which attracted the present writer were Harpulina arausiaca Lightfoot, Pterynotus elongatus Lightfoot, Entemnotrochus adansoniana Crosse and Fischer, Tibia martinii Marrat, Lambis violacea Swainson, Amoria elliotti Sowerby, Conus coelinae Gmelin, a truly huge Syrinx aruanus L., Cypraea aurantium Gmelin, and, well there were rather too many goodies to carry on!

With the outstanding success of the Convention and Exhibition it is to be hoped that it will become an annual event, and as the Shell Club now has about two hundred members, it certainly seems that shell collecting as a hobby

is on the increase in Britain. There are not many shell dealers in the United Kingdom, however, three were represented at the Exhibition and their stands seemed to be busy all the time, while their stock showed that they had many good, and in several cases very rare, items on offer at very reasonable prices, and I noticed as well as several C. aurantium Gmelin, some scarce Conus boschi Clover and Harpa costata L., to mention but three attractive species.

All in all, then, a truly splendid event, and one from which the British Shell Collectors' Club will have learned a number of valuable lessons which can be used to make the next show better than ever. However, to conclude on a note of mystery; shell art is very popular, and several Club members go in for it, yet I noticed not a single display devoted to it. Perhaps I did not look hard enough, or perhaps the practitioners of shell art simply did not turn up.

Hong Kong

The Department of Zoology, The University of Hong Kong is organizing a workshop on "the malacofauna of Hong Kong and southern China".

The workshop will be held at a field studies centre in the rural New Territories of Hong Kong from Friday the 25th March to Friday 8th April 1977. The workshop will comprise evening seminars, the whole day being normally left free for scientists to undertake their own research.

The field centre at Wu Kwa Sha is located on the sea's edge and is close to sublittoral coral, mangrove, rocky and sandy shores as well as the stream and paddi habitats. Plover Cove reservoir is close by. Special trips to important habitats will be organized. The approximate cost is provisionally estimated at 5 pounds per day inclusive of food and housing. Hong Kong has an international airport and charter and excursion fares are available from most major cities.

Interested malacologists should write to the organizing secretary, Dr. B. S. Morton, Department of Zoology, The University of Hong Kong for further details.

Texas

The Coastal Bend Shell Club is sponsoring a shell show in Corpus Christi, Texas, from October 1 to 3, 1976. The show will be held at the Holiday Inn, Emerald Beach, right on Corpus Christi Bay. It's only 30 feet from your room to the water's edge - appropriate for a shell show! The display area is just across the pool and patio area from the rooms. Corpus Christi is a beautiful and friendly city and those exhibiting or just visiting the show will certainly enjoy themselves. For rules and further details write: Mrs. Theresa Stelzig, President Coastal Bend Shell Club; 109 Duke Lane; Portland, Texas 78374.

Indiana

The Crown Point Shell Collectors' Study Group will present a shell display at the Southlake Mall from Monday September 20, 1976 to Sunday September 26th. The display will be non-competitive and only members of the Club will be showing. Anyone in the area, or visitors are urged to stop by and see the display.

Shells on Money

The Republic of Guinea has issued a series of new coins. The monetary unit is called the syll and is comprised of 100 decimal units called cauris. The unit derives its name from the cowrie shell, still used as currency in parts of West Africa. The 50 cauri value aluminum coin depicts a cowry in its design. Though dated 1971 the coins were not released until 1973 and examples were not in coin collections until late in 1974. Does anyone know of other shells being used on currency?

While guiding a shelling tour through Tahiti some years ago, your Editor discovered that the 500 Franc bill used in that French Possession had, in the design, a Lambis and Charonia tritonis.

Surely there are more than two examples of mollusks on currency or coinage? Drop us a note if you know of others.

C.O.A.

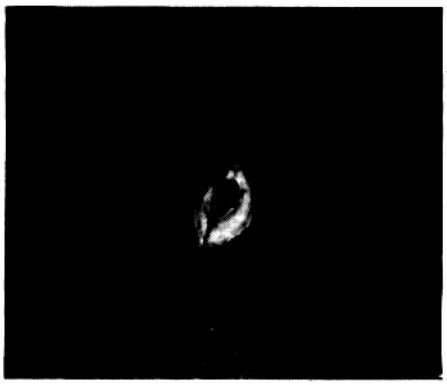
The Conchologists of America, the nation's only nationwide shell club, held its fifth annual meeting in Portland, Oregon from June 16th thru 20th. Collectors attended from nine states and two countries. The program featured talks on collecting trips to such places as Bonaire, East and West Africa, Australia, Mexico and discussions of malformed shells, how to collect shells using a dredge, a panel discussion on writing shell books.

More than eighty persons were registered for the meetings and most were able to attend the Annual Banquet which was followed by our organization's most successful auction ever (probably one of the most successful shell auctions held by any club) which when all the receipts were totalled garnered $1,148.25 for the organization's treasury.

A boat trip up the beautiful Columbia River gorge and a bus trip to the spectacular Oregon coast brought the meeting to a grand conclusion. Wayne and Marjorie Stevens (convention chairmen) and the Oregon Society of Conchologists (the host club) outdid themselves in making this a most memorable and enjoyable convention.

1977 officers elected included: Sally Bennet (Phoenix, Arizona) as President; Marjorie Stevens (Portland) Vice-President; John and Faye Rathbun (Portland) Secretary and Kathe Daniels (Apollo, Pennsylvania) Treasurer. The 1977 convention will be held in Fort Lauderdale, Florida right after the A.M.U. meeting in Naples next July. Kirk Anders, of Ft. Lauderdale will be convention chairman, and a great time is assured.

More From Tristan



Several years ago an old friend had written to a young woman on Tristan da Cunha after reading the National Geographic of January 1964 about the Islanders' return to their island following the volcanic activity there. After a very long spell of correspondence between the two my friend was very excited over receiving a small parcel of shells -- all the same specied. They were taken from the family's fish traps. The young woman told my friend that these were the only kind of shells she'd ever seen on Tristan. My friend, always generous, presented me with a gift - one of the shells, complete with operculum. For years I have attempted, with no success and have displayed the shell in my collection with a label saying only: "Buccinid (?) from fish trap, Tristan da Cunha". Can anyone help with a name for this shell?

PAT ARMES

The San Marcos Bicentennial Shell Show

By NAWONA A. GARY

Some of the 175 exhibits presented at the San Marcos Show.

October 11th and 12th (1975) saw a wonderful event take place in San Marcos, Texas. Exhibitors from coast to coast and border to border came together to make this year's San Marcos Shell Club Show the best to date. The exhibit attracted visitors from all over the U.S. and Canada, as well as some who flew in from the Windward Islands. A great time was had by all at this American Bicentennial function and America's first National Shell Show.

Two of the judges were the well-known and popular Tom Rice and Kirk Anders. These young men helped organize the Conchologists of America and are among its past-presidents. Tom is probably best known for his editorship of Of Sea and Shore, but also has many other excellent facets to his personality as most of you know. Kirk Anders has tried his hand at several enterprises and is doing them all well. He is best loved as the tour guide for his Kirk Anders Tours. These two were on hand at the show at all times and available for questions or visiting.

Chuck Lawerence of Seguin, a nationally-known geologist, was found to be a knowledgeable person with a most-pleasing personality. Mr. and Mrs. Robert H. Yeargin of Houston were judges in the Art and Photography Divisions. Mrs. Altharetta Yeargin has been one

Mary K. Myers receives the duPont Trophy from Kirk Anders, the two other judges are Chuck Lawerence (between Kirk and Mary) and Tom Rice (on the right).

Tanya Lynn Daniels, age 5 was youngest exhibitor.

Bernard Pipher (with wife Phyllis) won Sweepstakes Award.

of the nation's outstanding art teachers for the past fifteen years, while Bob Yeargin is a well-known commercial photographer.

Chairmen for the show were Dr. and Mrs R. Thatcher Gary of San Marcos (their third show chairmanships: San Antonio Shell Exposition 1970 and San Marcos Shell Show in 1973 prior to this one) and Richard Craven of Seguin, Texas (his previous chairmanship was of the Galveston Shell Show in 1971) backed up by the excellent work of every member of the San Marcos Shell Club.

There were more than 175 exhibits entered by 47 exhibitors. More than 500 linear feet (2.5 feet wide) were used for table displays. Some of the art objects were displayed on an additional 80 feet of wall space. The emphasis in our Club has been on youth - the youngest exhibitor was five years old.

Miss Mary K. Myers of Houston won the du Pont Trophy. Miss Myers is undoubtably one of the best exhibitors in the United States. In February 1975 she received the Smithsonian award at the St. Petersburg (Florida) show for her exhibit entitled "Choice Collector's Shells" and in July 1975 garnered the du Pont trophy at the Jacksonville, Florida show for "Seashells and Shell Stamps". At the San Marcos Show Miss Myers' winning exhibit was "Fascinating Favorites" which gave the history of a number of rare shell. One hundred twenty-one shells were displayed in the four cases. The exhibit also won the trophy for Division I.

Division II (Phylogenetic) Trophy was won by Mrs. Phyllis Pipher of Tekamah, Nebraska. The exhibit was entitled "Genus Volutoconus" and featured examples of each member of the group.

Division III (Shell of the Show) was won by Mrs. Molly Miller of Portland, Texas in competition with over forty other exhibitors. The Murex laqueatus collected by her son on Guam was the prize winner.

The Division IV (Educational) award went to Mrs. Rosemary Habermacher of Houston for a well done display. Division V (Arts and Crafts) was taken by Mrs. Albadelana Daniel of Austin, Texas for her sterling silver Venus Comb Murex pen set, festooned with tourquoise. Division VI was non-competitive so no trophy was awarded. One entry in this division covered 24 feet - "Genus Lambis" by Dr. and Mrs. Gary had been discussed and illustrated in the magazine La Conchiglia.

The Photographic Division (VII) was won by Mrs. Elizabeth W. Dibrell of Wimberley, Texas for her slide show story of a "Fresh Water Field Trip". Best Display of Texas Coast Shells was awarded to Mrs. Opal Riedel of Galveston for a display of four varieties of Janthina. "The Present: A Key to Understanding the Past" by high school student Jan Anderson of San Marcos won for Best Display of Texas Fossils. Growth series of locally found fossils were featured in the four foot by four foot by six foot tall exhibit.

The trophy for the "Best Fresh Water Shells" was taken by nine-year-old David Sissom who showed a growth series of the Corbula clams now invading many freshwater lakes in this country. David's first reaction on winning was "They said we youngsters would have the same chance to win as adults and this proves it!".

The "Best Display of Self-Collected Shells" award went to Mrs. Ann Craven of Seguin, Texas for a display of American shells housed in twelve feet of cases.

The Sweepstakes Trophy was won by Bernard Pipher of Tekamah, Nebraska for having the most points accumulated by ribbon awards (all blue ribbons in this case). The "Most Popular" exhibit, as determined by a vote of the visitors, went to Mrs. Merle Kleb for a "shell painting" in the arts and crafts section.

All exhibitors enjoyed the good times spent at informal receptions, visiting with friends and making new ones. Over seventy-five people attended the Awards Luncheon at the Holiday Inn (whose sign-board welcomed all shell collectors). And a post-show dinner of Mexican dishes at the Casa de la Rosa was enjoyed by more than fifty.

As with all shows there came the sad time Sunday evening of taking the exhibits down, saying goodby to old friends and new and all hoping to see one another again soon at another place another show.

IN REVIEW

CARD CATALOGUE OF WORLD-WIDE SHELLS
Sally Kaicher 1976
pulished by the author

This is number 9 in the continuing series of 3x5" card sets issued by the author. #9 deals with Mitridae, Part III. The Catalogue now illustrates nearly 300 species of Mitridae. As with the previous numbers in the series, quality of the black and white photographs is high and the concise information useful. To purchase this set, or previous ones write the author at 5633B 18th Way South; St. Petersburg, Florida 33712.

THE BEST OF THE NAUTILUS
Edited by R. Tucker Abbott 1976
American Malacologists $13.95

One hundred of the more fascinating articles from the forty years of The Nautilus are reprinted in this Bicentennial Anthology of American Conchology. Loaded with amusing and informative articles this treasure belongs on your malacological library shelf.

NEW ZEALAND SEASHELLS IN COLOUR
J.R. Penniket (text), G.J.H. Moon (photos)
Reed (U.S. - C.E. Tuttle) $8.50 1970

112 pages, 51 full color plates. This title has been around for a few years, but is now available through a U.S. distributor. The color plates and simple informative text make this a valuable addition to every sheller's library.

reviews this page by T. Rice

THE AMERICAN MUSEUM OF NATURAL HISTORY GUIDE TO SHELLS: Land, Freshwater and Marine, from Nova Scotia to Florida
William K. Emerson & Morris K. Jacobson
Alfred A. Knopf, Inc., New York 1976
$8.95 (paper); $17.95 (hardbound)

This is the first time a single volume has encompassed the marine, land and freshwater mollusks of the eastern United States and Canada. The 800 species described, and illustrated in more than 1,000 figures are divided into five major sections: marine snails, land snails, freshwater shells, marine bivalves and other marine mollusks. Numerous keys, concise descriptions and the fine illustrations will make this volume of great value to both beginner and serious collector. I know I'll have this volume with me when I collect anywhere along the eastern seaboard.

PREPARING SEA SHELLS FOR DISPLAY
R. D. Coale 1973
published by author $2.00

This small, 34-page, booklet was originally published in Australia and now is in its third printing. Shell cleaning techniques, organizing a shell collection and methods of displaying shells are covered. Especially interesting, and I feel useful is the set of tables giving recommended method to clean various families of gastropods. The author has called upon years of personal experience and the information he shares with the reader should prove very useful and even advanced collectors will find new methods and ideas to try. The author previously co-authored, with F.B. Brost, "A Guide to Shell Collecting In the Kwajalein Atoll."

WHAT SHELL IS THAT?
Neville Coleman 1975
Paul Hamlyn, Sydney, Australia about $20

Occasionally a book comes along that one can rave about - this is such a book. Everything about it is great, but especially the photographs. The author's photos have graced the covers of OS&S issues, so perhaps I'm prejudiced, but I feel these are the finest photos appearing in any shell book. Most of the 750 species covered in the book are shown as living animals in their natural habitat. The text is arranged by type of habitat and each species is numbered for easy reference. $7\frac{1}{2} \times 10\frac{1}{2}$", 308 pages, the last few shipments of the book to this country have suffered in handling, but even a broken-spined copy will prove your best book for your Australian shells - our tour group was able to identify most of what we were collecting by using it.

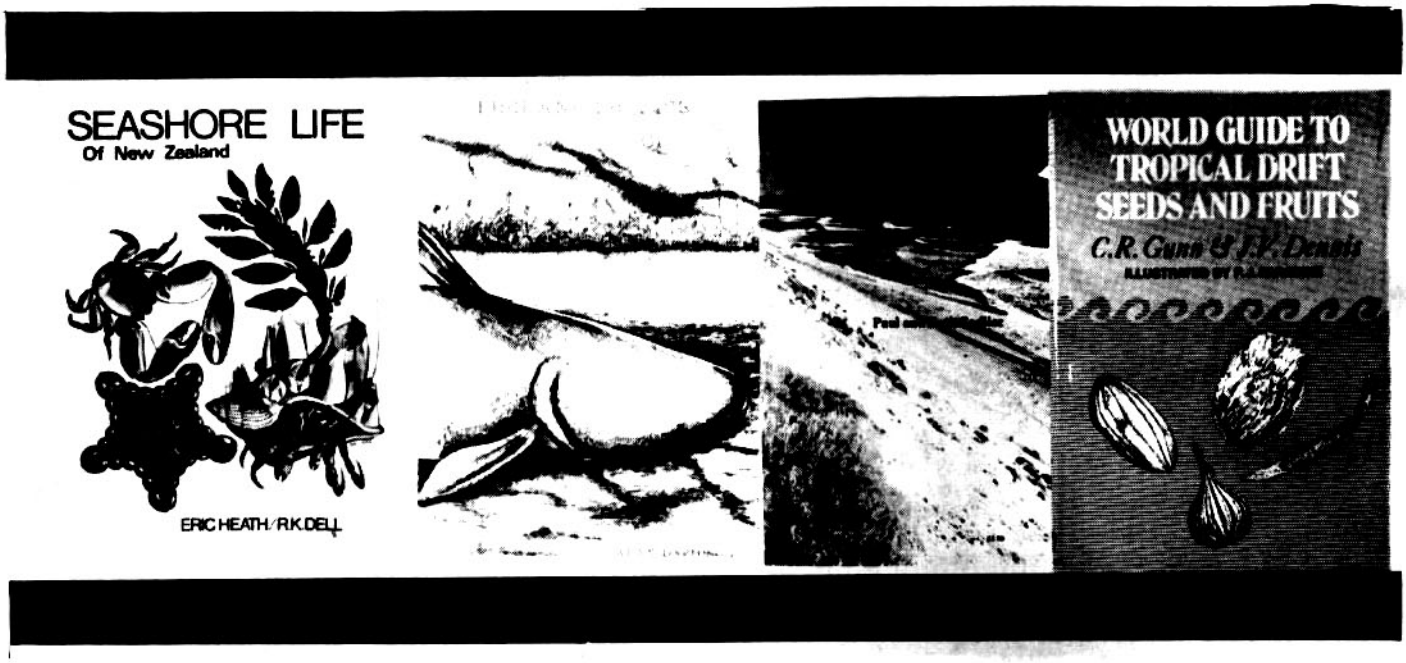
MAJOR RESEARCH WORK DUE

G.K. Hall & Co. has announced the publication in book form of the Research Catalog of the Library of the American Museum of Natural History: Authors, New York. The Catalog represents one of the world's great natural history collections. Approximately 200,000 cards cover materials on all branches of biological sciences. The Library is particularly rich in older historical materials, and 17,000 serial titles add to its strength and comprehensiveness.

The Library's extraordinary coverage of the natural history field is due to many special collections such as the John C. Jay conchological library. The Author Catalog covers all

(Continued next page, column three)

New on the shelf ...



ATLAS OF PHYSICAL & CHEMICAL PROPERTIES OF PUGET SOUND AND ITS APPROACHES
Eugene E. Collias, Noel McGary & Clifford A. Barnes
University of Washington Press $15 (paper)

This publication, while of prime interest to the oceanographer, has little or no value for the shell collector or beach roamer. The information contained in the book is statistical in nature, concerning the chemical properties of the sea water in the Sound as related to fisheries and oceanography. There was no intent by the authors for anyone other than the professional chemist or oceanographer to utilize this work. (Jerry Ward)

SEATTLE SHORELINE ENVIRONMENT
Randall McGreevy 1974
University of Washington Press $1.95 (ppr)

This booklet describes the resources of Seattle's natural shoreline. Its pages are interspersed with maps, photographs and descriptive analysis of the area around greater Seattle. The information presented is useful for the environmentalist and city planner within the local area only. It can also serve as a format for shoreline inventories in other areas which are planning studies of this kind. (J. Ward)

SEASHORE LIFE OF NEW ZEALAND
Eric Heath and R. K. Dell 1971
Reed (in U.S. by C.E. Tuttle) $6.50

This small, 7 x 9½" - 72 page, book deals with the more common intertidal life of the shores of New Zealand. 209 species of animals and plants are discussed and illustrated with well-done color drawings. 70 species of mollusks are included. This small volume would probably be "the" volume for the visitor to New Zealand to take along to identify the majority of what he'll see at the shore.

MARINE FISHES OF NEW ZEALAND
Eric Heath and John M. Moreland 1967
Reed (in U.S. by C.E. Tuttle) $6.50

Another in the very useful series on New Zealand natural history. In the 56 pages some 100 species of New Zealand fish are discussed and illustrated in color.

FISH AND FISH DINNERS OF LAOS
Alan Davidson 1975
Charles E. Tuttle, Rutland, Vermont $4.75

This 6½ x 9½", 206 page, paperback is an interesting combination of identification guide and cookbook. Sour Snakehead Soup, Samla Mchou Banle (acidulated fish soup), are a few of the recipes included from neighboring countries. There is a section on edible roots and leaves which are used in cooking Laotian fish dishes. Three species of freshwater clams and recipes for their use and appended to the text.

SHORT WALKS ON CAPE COD AND THE VINEYARD
Paul and Ruth Sadlier 1976
The Pequot Press $3.50

5½ x 9", 96 pages, lists and maps 25 short nature oriented walks in this fascinating area of Massachusetts. All but two of the walks are less than two miles in length. Numerous black and white photographs enhance this delightful little paperback.

WORLD GUIDE TO TROPICAL DRIFT SEEDS AND FRUITS
C.R. Gunn and J.V. Dennis 1976
Quadrangle, New York $17.50

6 x 9", 240 pages, illustrated with 93 figures showing more than a hundred varieties of the seeds and fruits one finds washed ashore on tropical and sub-tropical beaches around the world - especially in Florida where such flotsam garners much attention. A needed work for the library of the beach stroller who does not limit himself to shells. Those of us who have wished for a good book to identify the various sea beans we've gathered in our travels need wish no more - it is here!

(Above reviews by Tom Rice)

Continued from previous page.
of the Library's research collections catalogued through the mid 1960s when the Library converted to the Anglo-American cataloging rules. It serves as an index to the literature of the natural sciences for a period when published indexes are not generally available, and offers access by personal, corporate and joint authors, compilers, editors, and illustrators of note.

The 13-volume Author Catalog will be available for $875.00 in the United States and $962.50 outside the United States until January 31, 1977. After that date, the price will be $1095.00 in the U.S. and $1204.50 elsewhere. The Catalog will be available for shipment in April 1977. G.K. Hall; 70 Lincoln St.; Boston, Massachusetts 02111.

Art in Shell of the Ancient Americans

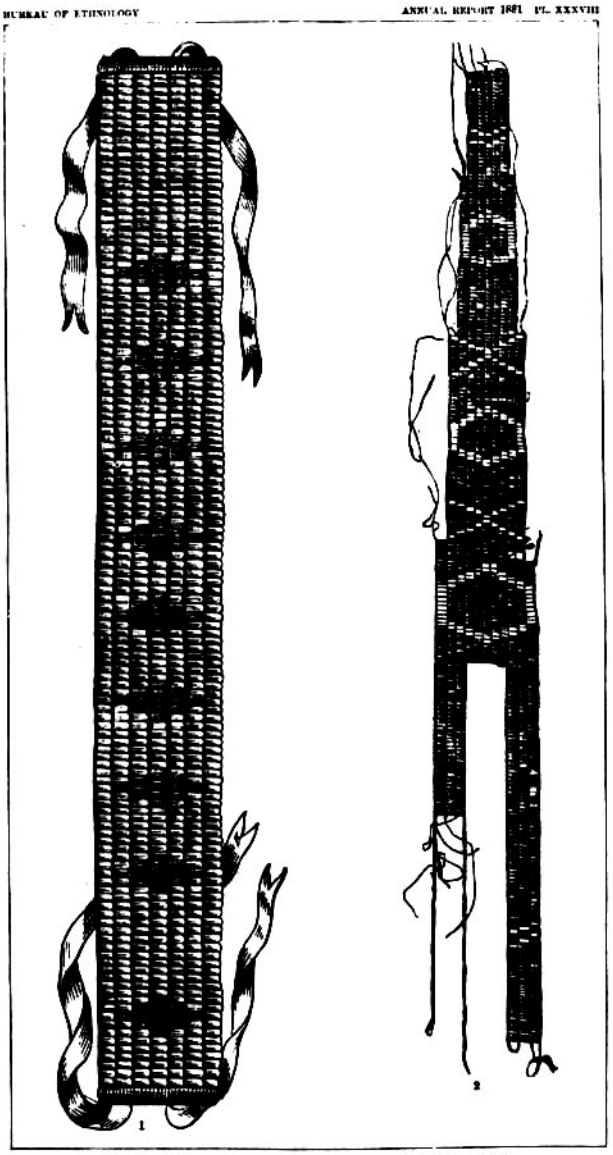
By WILLIAM HENRY HOLMES
(U.S. Bureau of Ethnology, Annual Report for 1881)

(Our thanks to Esther Hendrickson for furnishing photo-copies of this material.)

MNEMONIC USE OF BEADS

One of the most remarkable customs practiced by the American Indians is found in the mnemonic use of wampum. This custom had in it a germ of great promise, one which must in time have become a powerful agent in the evolution of art and learning. It was a nucleus about which all the elements of culture could arrange themselves. I shall not at present undertake to divest the custom of adventitious feature such as have been introduced by contact with European influence. Yet there is no reason to fear that any of the important or essential features have been derived from outside sources. It is not possible from any known records to demonstrate the great antiquity of this use of wampum. It does not seem probable, however, that a custom so unique and so widespread could have grown up within the historic period; nor is it probable that a practice foreign to the genius of tradition-loving races could have become so well established and so dear to their hearts in a few generations.

Mnemonic records are known to have come into use among many nations at a very early stage of culture. Picture writing as developed in the north is but another form of mnemonic record, a fact, a thought, a verse of a song being associated with an ideographic design, more or less suggestive of the subject. The Peruvians had their quipus, in which the record was made by associating things to be remembered with knots made in cords of different colors, each combination having a fixed association. The Mexicans had gone further and had achieved a system of picture writing that was very unique and curious, in which a phonetic element had already made its appearance, while the Mayas could boast the discovery of a true phonetic system with an alphabet of twenty-seven sounds.



1. Mohawk Belt 2. Mohawk Belt.

WAMPUM BELTS.

The mnemonic of wampum is one which, I imagine, might readily develop from the practice of gift giving and the exchange of tokens of friendship, such mementos being preserved for future reference as reminders of promises of assistance or protection. In time the use of such mementos would develop into a system capable of recording affairs of varied and complicated nature; particular facts or features of treaties would be assigned to particular objects, or portions of objects. With this much accomplished, but one step was necessary to the attainment of a hieroglyphic system - the permanent association of a single object or sign with a particular idea.

The wampum records of the Iroquois were generally in the form of belts, the beads being strung or woven into patterns formed by the use of different colors. By association simply they were made to record history, laws, treaties, and speeches - a fact, a law, a stipulation, or a declaration being "talked into" a particular part or pattern of the design with which it was ever afterwards associated, thus giving additional permanency to tradition and bringing it one step further forward in the direction of written records. Such records were, of course, quite useless without the agency of an interpreter. Among the Iroquois, according to Morgan, one of the Onondaga sachems was made hereditary "keeper of wampum", whose duty it was to be thoroughly versed in its interpretation. But knowledge of the contents of these records was not confined to the keeper, or even to the sachems. At a certain season each year the belts were taken from the treasure-house and exposed to the whole tribe, while the history and import of each was publicly recited. This custom is kept up to the present day. It is recorded by Ruttenber that among the Mohicans a certain sachem had charge of the bag of peace which contained the wampum belts and strings used in establishing peace and friendship with the different nations. (1)

Aside from records wampum was used in the form of strings and belts for a variety of purposes; some of them were probably mnemonic, others only partially so, being based either upon its association with the name of some chief or clan, or upon a semi-sacred character resulting from its important uses. It was employed in summoning councils, and the messenger who journeyed from tribe to tribe found in it a well recognized passport. When a council was called it was presented by the delegates from the various tribed as their credentials; it was presented by the delegates from the various

(1) Ruttenber: Indian Tribes of the Hudson River, page 43

tribes as their credentials; it was used in the ceremony of opening and closing councils, as was also the calumet; it assisted in solemnizing oaths and in absolving from them; white, it was a messenger of peace; black, it threatened war, and covered with clay, it expressed grief. "White wampum was the Iroquois emblem of purity and faith, it was hung around the neck of the white dog before it was burned; it was used before the periodical religious festivals for the confession of sins, no confession being regarded as sincere unless recorded with white wampum; further than this, it was the customary offering in condemation of murder, although the purple was sometimes employed. Six strings was the value of a life, or the quantity sent in condonation for the wampum was rather sent as a regretful confession of the crime. with a petition for forgiveness, than as the actual price of blood." (2) We readily recognize the influence of the Christian missionary in a number of these symbolic uses of wampum.

The literature of wampum would fill a volume, but I forbear presenting more than will give an outline of the subject, confining myself to such quotations as will serve to show clearly the extent and importance of this ancient custom and its attendant practices.

The method of handling the belts of wampum in the presence of ceremonial assemblies is extremely interesting, and cannot be better presented than in the words of eye-witnesses.

The following is quoted from Brice, who is describing a council held in the Muskingum Valley in 1764:

"An Indian council, on solemn occasions, was always opened with preliminary forms, sufficiently wearisome and tedious, but made indispensable by immemorial custom, for this people are as much bound by their conventional usages as the most artificial children of civilization. The forms were varied, to some extent, according to the imagination of the speaker, but in all essential respects they were closely similar throughout the tribes of the Algonkin and Iroquois lineage.

"They run somewhat as follows, each sentence being pronounced with great solemnity, and confirmed by the delivery of a wampum belt: 'Brothers, with this belt I open your ears that you may hear; I remove grief and sorrow from your hearts; I draw from your feet the thorns that pierced them as you journeyed thither; I clean the seats of the council-house, that you may sit at ease; I wash your head and body, that your spirits may be refreshed; I console with you on the loss of the friends who have died since we last met; I wipe out any blood which may have been spilt between us.' This ceremony, which, by the delivery of so many belts of wampum, entailed no small expense, was never used except on the most important occasions; and at the councils with Colonel Bouquet the angry warriors seem wholly to have dispensed with it. * * * And his memory was refreshed by belts of wampum, which he delivered after every clause in his harangue, as a pledge of the sincerity and truth of his words.

"These belts were carefully preserved by the bearers as a substitute for written records, a use for which they were the better adapted, as they were often worked in hieroglyphics expressing the meaning they were designed to preserve. Thus at a treaty of peace the principal belt often bore the figure of an Indian and a white man holding a chain between them." (3)

From an account of a council held by the Five Nations at Onondaga nearly two hundred years ago, to which the governor of Canada sent four representatives, I make the following extract:

"During the course of the proceedings Cannehoot, a Seneca sachem presented a proposed treaty between the Wagunhas and the Senecas, speaking as follows: 'We come to join the two bodies into one. * * * We come to learn wisdom of the Senecas (giving a belt). We by this belt wipe away the tears from the eyes of your friends whose relations have been killed in the war. We likewise wipe the paint from your soldiers' faces (giving a second belt). We throw aside the ax which Yonondio put into our hands by this third belt.' A red marble sun is presented - a pipe made of red marble. 'Yonondio is drunk; we wash our hands clean from his actions (giving a fourth belt). * * * We have twelve of your nation prisoners; they shall be brought home in the spring (giving a belt to confirm the promise). We will bring your prisoners home when the strawberries shall be in blossom, at which time we intend to visit Corlear (the governor of New York), and see the place where wampum is made.'

"The belts were accepted by the Five Nations, and their acceptance was a ratification of the treaty. A large belt was also given to the messengers from Albany as their share. A wampum belt sent from Albany was, in the same manner, hung up and afterwards divided." (4)

This indicates a most extravagant use of belts; but since it is probable that as many were received in return this was a matter of little importance. The great profusion of wampum used in some of the later treaties is a matter of surprise. In a council held between four Indian ambassadors from New England and the French thirty-six fine large belts were given by the ambassadors to thank them that their people had not been treated with hostility. (5)

"The appendix to the second volume of Proud's History of Pennsylvania contains the journals of Frederick Christian Post, who was sent by Governor Denny, in 1758, to make a treaty with the Alleghany Indians; and in delivering the governor's answer to the chiefs, on his second visit in the same year, after proposing to them to unite in a treaty of peace which had lately been concluded with the Indians at Easton, and producing sundry belts, one of which was marked with figures representing the English and the Indians delivering the peace-belt to one of the commissioners, he proceeds to say: 'Brethren on the Ohio, if you take the belts we just now gave you, as we do not doubt you will, then by this belt' - producing another and using their figurative style of speech - 'I make a road for you, and invite you to come to Philadelphia, to your first old council fire, which we rekindle up again, and remove disputes, and renew the first old treaties of friendship. This is a clear and open road for you; therefore, fear nothing, and come to us with as many as can be of the Delawares, Shawanese, or the Six Nations; we will be glad to see you; we desire all tribes and nations of Indians who are in alliance with you may come.' Whereupon a large white belt, with the figure of a man at each end and streaks of black representing the road from the Ohio to Philadelphia, was then given to them." (6)

Lafitau, whose statements are considered unusually trustworthy, as they were based on personal observation of the Indian tribes of Canada, gives the following very instructive account of the mnemonic use of wampum:

"All affairs are conducted by means of branches (strings) and necklaces (belts) of porcelain (wampum) which with them take the place of compacts, written agreements, and contracts * * *

* * * The shell, which is used for affairs of state, is worked into little cylinders of a quarter of an inch in length and large in proportion. They are distributed in two ways, in strings and in belts. The strings are composed of cylinders threaded without order one after another, like the beads of a rosary; the beads are usually quite white, and are used for affairs of little consequence, or as a preparation for other more considerable presents." (7)

"The belts are large bands, in which little white and purple cylinders are disposed in rows, and tied down with small thongs of leather, which makes a very neat fabric. The length and size and color are proportioned to the importance of the affair. The usual belts are of eleven rows of a hundred and eighty beads each.

Continued in our next issue.

(2) Morgan, in Fifth Annual Report on the condition of the New York State Cabinet of Natural History, page 73

(3) Brice: History of Fort Wayne, 1868, page 28.

(4) Events in Indian History, Lancaster, PA., 1841, page 143.

(5) History and description of New France, Vol. II, page 256.

(6) Penn, in Memoirs Hist. Soc. Penn'a, Vol. VI, page 222.

(7) In order to make the author's meaning quite clear, a free translation has been given of such words as porcelaine, branches, colliers, etc., as his use of them is somewhat confusing.

TRANSLATIONS of SOME SHELL NAMES FROM LATIN

By L. E. ADAMS*, Adapted by A. GORDON MELVIN**

*Adapted from Adams, Lionel Ernest, The Collector's Manual of British Land and Water Shells, Leeds: Taylor Bros. 1896. pg. 163

acéphalous	headless
achátina	agate
acícula	a hairpin
ácme	a point
aculeáta	prickly
acumináta	pointed
acútus	pointed
acúta	pointed
agréstis	inhabiting fields
agriolímax	field slug
álbicans	whitish
álbida	whitish
albína	white
albá	white
albocíncta	with a white band
anbolaterális	white sided
alliária	smelling of garlic
alpéstris	inhabiting heights
amnícum	inhabiting rivers
amphíbious	inhabiting both land & water
amphipéplea	enfolded around with a mantle
ampulláceous	shaped like a flask or bottle
ánatína	belonging to ducks
áncylus	a hook
ángiica	English
angústa	narrow
angústior	narrower
anodónta	toothless
antérior	the front; applied to bivalves to the end where the mouth of the mollusk is situated; the large, or blunt end. (The Pisidia have a pointed anterior end.)
antíqua	ancient
ántivertígo	not reversed
ápex	the extreme point of the spire of a univalve
aquátic	inhabiting water
arenícola	inhabitant of sandy places
árborum	inhabiting trees
arbustórum	inhabiting copses
árion	a fabled musician
articuláta	jointed
aspérsa	spotted, sprinkled
áter	black
átro-purpúrea	dark purple
aurantíaca	golden hued
auriculária	ear-shaped
áxis	applied to univalve shells, the centre column formed by the junction of the whorls
bálea	bay colored
beak	see umbo
bícolor	with two colors
bidentáta	with two teeth
bigranáta	with two small teeth
bimargináta	with two lines of different colors around the margin
biplicáta	having two folds
bívalve	shell composed of 2 plates
bizóna	with two bands
bizonális	same
bránchial	pertaining to gills
brévis	short
býssus	a collection of strands by which D. polymorpha, etc., attach themselves to stones
býthinia	an ancient province of Asia Minor (Bithynia)
caecilioídes	blind
calcáreous	chalky
cándida	white
cantíana	Kentish
caperáta	wrinkled
capulóides	resembling a knob or handle
cárdinal	pertaining to the hinge of a bivalve
carinátus	keeled
carnívorous	flesh-eating
cartusiana	after Carthusian monastery
castánea	chestnut-colored
celláría	inhabiting cellars
céphala	class of mollusks with heads
cerína	wax-colored (i.e. yellow)
cíncta	girdled
cinérea	ash-colored
cinéro-níger	dark ash-color
circumscríptus	trimmed around
clausília	the name of the genus with an appendage called a clausilium or door
cochlicópa	a shell with a notch
colubrína	resembling an adder
columélla	a small column; the technical term for the axis of a univalve
compácta	compact
complanátus	flattened
compréssa	compressed
cóncave	hollow
concéntric	having the same center
conchólogy	conchology treats of the mollusca, or that great division of invertebrate animals which have soft bodies and an organization superior to that of insects and only inferior to that of fishes
concínna	neat
cónica	conical
conóidea	cone-like
contécta	covered
contórtus	twisted together
contráctile	able to become shorter
cónvex	bulging out
córneus	horny
córnea	horny
córvus	a crow; applied to a very dark variety of L. palustris
costáta	ribbed
crísta	crested
cristáta	crested
crystállina	crystalline
cúrta	short
curviróstris	with curved beaks
cyclóstoma	round mouth
cýgnea	pertaining to swans
cylindrácea	cylindrical
decíduous	liable to fall of
decollátum	truncated
decússated	intersected by cross lines
dénticle	a small tooth
dentítion	arrangement of teeth
depiláta	denuded of hairs
deprássa	flattened
depressiúscula	somewhat flattened
déxtral	a univalve is said to be dextral when the mouth is on the observer's right as he holds it facing him, with the spire upwards
dextrórsa	turned to the right
diáphana	transparent
dilitátus	expanded
dilitáta	expanded
dicifórmis	circular, quoit-shaped
dórsal	pertaining to the back
dúbia	doubtful
ecarináta	with no keel
edéntula	toothless
efascíata	having no band or stripe
élegans	elegant
elongáta	lengthened
epidérmis	thin skin covering shells
épiphragm	a film secreted by the animal to cover the mouth of the shell
epizóna	marked above (the periphery)
equiláteral	having equal sides
ericétorum	inhabiting heaths
exálbida	whitish
excaváta	hollowed out
exígua	small
fasciáta	banded
fílament	thread
flámmea	with flame-shaped markings
flavéscens	yellowish
flávus	yellow
fluvátilis	inhabiting rivers
fontánus	inhabiting springs
fontinalis	inhabiting springs
foot	a flexible muscular process by which mollusks travel
frágilis	fragile
fúlva	tawny
fúsca	dark brown
fúscolabiata	dark mouthed
fuscéscens	dusky
fúsiform	spindle-shaped
gagátes	jet
gálloprovinciális	of the Gallic province
gastrópoda	a class of univalve mollusks, the lower surface of whose belly forms the foot
genus	in natural history a sub-divi-

	sion of an Order; a genus is sub-divided into species
géomálacus	earth mollusk
gibbósa	swollen
gíbbous	protuberant
gláber	smooth
glábra	smooth
globósa	globose
glutinósa	sticky, slimy
grácilis	slender
gracílior	rather slender
grándis	large
granuláta	granulated, with small grain-like markings
gregarious	living in colonies
grisea	grey
hábitat	dwelling place
háliotídea	ear-shaped; from Haliotis, the "Venus" ear shell
hélix	a screw, coil
herbívorous	feeding on vegetable matter
híspid	hairy
híspida	hairy
hispidósa	hairy
hýaline	glassy
hyalinia	the name of a genus of glassy shells
hyálozonáta	with a translucent band
hýbrida	a cross between two species
hydróbia	living in water
hypnórum	living among the moss (hypnum)
hypozóna	banded below
incarnáta	flesh-colored
inconspícua	not easily observed
incrassáta	thickened, coarse
indígenous	born in the country; native
inflåta	blown out, swollen
inopérculata	not having an operculum
instábilis	fluctuating; not adhering to the typical form
intermédia	varying between 2 distinct forms
involúta	folding inwards
iridéscent	colored like a rainbow
isómya	a sub-order of mollusks with equal adductor muscles
labiáta	with an enlarged lip
labiósa	with an enlarged lip
lacunósa	with hollows on the surface
lactéscens	milky white
lacústris	inhabiting lakes or ponds
laevigáta	smoothed
laévis	properly spelled levis - smooth
laeviúscula	somewhat smooth
lamellata	furnished with plaits or folds
lamellibránchiáta	an order of mollusks with leaf-like gills
lámina	a plate
laminåta	furnished with plaits
lapicída	stone-cutter
látior	broader
lentíginosa	freckled with markings like those on some beans
leúcolóma	bordered with white
leúcozóna	banded with white
libéllula	named after a dragonfly
lígament	the elastic substance connecting the valves of a bivalve shell
lilacína	lilac
límax	a slug
limnáea	inhabiting stagnant water
lineáta	marked with lines
lineoláta	marked with lines
lingual dentition	the arrangement of teeth on the tongue of a mollusk
lip	the lip of a shell is the edge of the mouth
longiscáta	lengthened
lúbricóides	somewhat smooth
luctuósa	of a sad (i.e. dingy) color
lúnule	the oval, depressed space in front of the umbones, and opposite the ligament of some bivalves
lútea	yellowish
lúteofasciáta	banded with yellow
lúteolabiáta	yellow lipped
maculáta	spotted
maculósa	spotted
mágna	large
májor	larger
mantle	a flexible outgrowth of the body, resembling a cloak or hood, which contains glands that secrete the colouring matter of the shell
márgaritácea	pearly
margarítifera	pearl-bearing
marginåta	having a rim or border
marmórea	with marble-like markings
maúra	dark like a Moor
máximus	largest
membranáceous	composed of fine-spun fibers
micróstoma	having a small mouth
míllum	a grain of millet
mínimus	smallest
minor	smaller
minutíssima	very minute
mollúsc	a soft-bodied animal
montánus	inhabiting mountains
múcus	slime
mucronáta	pointed
muscórum	inhabiting moss
nácreous	pearly
nána	dwarf
nautiléus	like a nautilus in shape
nemorális	inhabiting groves
nemorósa	inhabiting groves
nígra	black
nigréscens	blackish
nítens	shining
nitídulus	rather shiny
nítidis	shiny
núcleus	tip of spire of a univalve
obésa	swollen
oblíterata	markings absent (in color)
oblónga	oblong
obscúrus	hidden
obtusális	blunt
obvolúta	wrapped up
ochroleúca	whitish yellow
ochrácea	yellow
óctodentáta	with eight teeth
olivácea	olive-color
opérculated	furnished with an operculum
opérculum	a covering or lid; a hardened plate attached to the foot of the animals of many univalves, which closes like a door when the animal withdraws into the shell
order	in natural history the subdivision of a Class
orifice	a hole
ornata	ornamented
ovalis	oval
ovata	oval
oviparous	producing eggs
ovovaviparous	producing eggs that are hatched internally
pállens	pale
pállida	pale
pállido-dorsális	pale on the back
paludestrína	inhabiting marshes
palústris	living in marshes
párvula	small
pátula	extended
pédicle	a foot stalk
pelecýpoda	axe-footed; term for bivalves
pellúcida	transparent
penúltimate	last but one
péregra	traveller
períphery	the circumference of the body-whorl of a univalve shell
péristome	the rim of the mouth of bivalve
pervérsa	turned the wrong way
phýsa	a bubble
pícta	painted, ornamented
pictórum	belonging to painters
pisána	names after the town of Pisa
pisidióides	resembling a Pisidium
pisídium	resembling a pea
planórbis	a flat coil
plicátion	a fold; the thickened process which resembles a tooth in the mouth of a univalve
plúmbea	lead colored
pomátia	having a lid or covering
ponderósa	thick and heavy
polymórpha	many-shaped
prodúcta	lengthened
pulchélla	minutely beautiful
púlmononranchiáta	order of mollusks with lungs
punctáta	marked with minute spots
púpa	a chrysalis
púra	clear
pusíllum	small
pútris	stinking
pygmaea	minute
pyramidális	shaped like a pyramid
pyramidáta	shaped like a pyramid
pýriform	pear-shaped
quádridentáta	with four teeth
radiáta	rayed
radiátula	slightly rayed
rava	tawny
reflexa	bent back
retículáta	marked like a network with cross-striations
reveláta	revealed, discovered
rhómbea	four-sided
ríngens	grinning like a dog, i.e. show-

	ing the teeth
rivícola	an inhabitant of streams
roseolabiata	pink lipped
róseum	pink
rostráta	beaked
rotúnda	round
rotundáta	rounded
rubélla	reddish
rúbra	reddish
rubéscens	reddish
rúfa	red
ruféscens	reddish
rufilábris	red-lipped
rufúla	reddish
rugósa	wrinkled
rupéstris	inhabiting rocks
rupícola	an inhabitant of rocks
scálifórmis	shaped like a Scalaria (a spiral marine shell) applied to monstrosities with the whorls disunited
scar	"muscular" are the depressions formed by the attachment of the muscles holding the parts of a bivalve together
scútulum	a small shield
secále	a grain of rye
segmentína	having the whorls divided by partitions
séptum	(plural septa) a division
serícea	silky
séssile	situated on a flat surface, not raised on a stalk
shagréened	covered with small granules
sexdentáta	with six teeth
símilis	resembling (another species)
símplex	with a single fold
sinístral	opposed to dextral, with left-handed opening
sinistrórsa	turned to the left
sínuate	curved
síphon	a tube
sólida	solid
solídula	somewhat solid
spécies	the subdivisions of a genus
specífic	belonging to a species
sphaérium	shaped like a globe
spire	all the whorls of a univalve except the lowest
spirórbis	having a circular spire
spléndens	shining
stagnáliformis	shaped like L. stagnalis
stagnális	inhabiting marshes
stenogýra	having compressed whorls
striae	fine lines
stríated	marked with fine lines
strícta	compressed
strigáta	streaked
sub-álbida	whitish
sub-anguláta	with a somewhat sharp angle
sub-apérta	somewhat open
sub-cylíndrica	somewhat cylindrical
sub-fúsca	somewhat tawny
sub-glóbosa	somewhat rounded
sub-marítima	leaving near the sea coast
sub-rúfa	somewhat red
sub-scaláris	somewhat scaliform
sub-striáta	somewhat striated
succínea	amber colored
succíneaefórmis	shaped like a Succinea
suffúsa	suffused
sutúre	the furrow between the whorls of a univalve
sylvática	inhabiting the woods
sýnonym	a name that has the same meaning as another name
tentaculáta	furnished with tentacles
tenúior	more slender
ténuis	slender
terréstris	inhabiting the land
terréstrial	inhabiting the land
testacélla	a small shell
testáceous	having a hard shell
tíncta	dyed
trídens	with three teeth
tridentáta	with three teeth
trífasciáta	with three bands
trístis	sad-colored
trochóides	shaped like a marine shell Trochus, i.e. pyramidal
truncáte	ending abruptly
truncátula	slightly truncate
tubérculate	furnished with pimples
tumídula	somewhat swollen
túmidus	swollen
týpe	a standard of comparison
týpical	resembling the type
umbilícus	the navel; applied to univalve shells, the cavity formed by the whorls when they do not form a solid axis or columella
úmbo	the knob or boss in the center of a shield; applied to bivalves, the umbones (or beaks) are protuberances by the hinge, which constituted the infant shell
unidentáta	having one tooth
undulátа	marked with wavy lines
unícolor	on one color
únio	a pearl
univalve	(a shell), consisting of one piece
valváta	having a valve (i.e. operculum)
valve	a complete part of a univalve shell
variegáta	variegated
variety	varieties are members of a species that deviate constantly from the type in form, size, color or markings
ventricósa	swollen
ventrósa	swollen
vértigo	a twist
viréscens, viridans	greenish
viridescénti-alba	greenish white
virídula	greenish
vítrea	glassy
vitrína	transparent like glass
vivípara	producing young alive
vórtex	whirlpool
vulgáris	common
whorl	a twist of a spiral shell
zonáta	banded
zonites	like a girdle, circular

JOURNEY TO THE BAY OF ANGELS

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dant. I was startled to see a large octopus just under the water's surface - his head was larger than mine and he had long tentacles; I noticed a second octopus nearby and then a third one. They were not concerned by our lights, so we enjoyed watching them change colors. I could see all kinds of sponges, crabs, kelp, sea cucumbers, sea fans, sea anemones and other growth covering the rocks, but decided that the octopus has cleaned out all the shells. We came to an area where the fish and octopus were conspicuous by their absence - we saw the reason, a very large eel hiding in the rock. This was his territory, he was king here and darned if he would tolerate fish or octopus in his kingdom. The only shells we found were common limpets.

We had more adventurous days ahead, but those are for another time. A word of caution to those considering a trip down Baja. Baja is still quite primitive in most areas - be prepared to rough it. The Mexican government has built a series of El Presidente hotels and also quite a few trailer parks (including one at Bahia de los Angeles) with complete facilities, but they are still far apart.

Enjoy Baja California!

An ABC System for the Recent Gastropoda

By HANS-HELLMUT STEIN

Rictaxis	B1 o1 o1	. rupicola	B3 o6 o2	. scalator	A1 o3 o3	Seilarex	A2 o5 11
Ridleya	B3 1o o1	Ruthenica	B3 o6 o2	Scalenostoma	A2 o7 o1	Seilopsis	A2 o5 11
Riebeckia	B3 o7 o2	Ruthia	A3 o2 o1	Scalina	A2 o6 o1	. selenites Fisch.	B3 o8 o3
Rigiconus	A3 o4 o2	Ruthvenia	B3 1o o1	Scalinella	A2 o4 o6	Selenochlamys	B3 11 o4
Rima	B3 14 o5			Scaliola	A2 o5 15	Selenophaedusa	B3 o6 o2
Rimella	A2 1o o3			Scalptia	A3 o3 o6	Selenoptyx	B3 o6 o2
Rimula	A1 o1 o4			Scansicochlea	B3 o9 o1	Selma	A2 o7 o3
. rimula Lowe	B3 14 o5			. scapha Morch	A1 o4 o1	Semibittium	A2 o5 1o
Ringicella	B3 o9 o2	Sabaeola	B3 o6 o2	. scapha Gray	A3 o3 o5	Semibulimus	B3 14 o3
Ringicula	B1 o1 o2	Sabatia	B1 o3 o1	Scaphander	B1 o3 o1	Semicassis	A2 14 o1
Ringiculina	B1 o1 o2	. sabatina	B1 o3 o1	Scphella	A3 o3 o5	. semiclausaria	B3 o9 o1
. risella	A2 o3 o2	. sabia	A2 o8 o2	. scaphula Gray	A3 o3 o1	Semifruticicola	B3 14 o5
Risellopsis	A2 o3 o2	Sabinea	A2 o4 o1	.scaphula Swain	A3 o3 o1	Semifusus	A3 o2 o3
Rissoa	A2 o4 o3	Sabinella	A2 o7 o1	. scarabaea Oken	B2 o4 o1	Semilimax	B3 11 o1
Risoelja	A2 o4 11	. sabljaria	B3 14 o5	. scarabaeus Mont.	B2 o4 o1	Seminella	A3 o2 o1
Rissoina	A2 o4 o3	Sacculosiphonaria	B2 o1 o1	Scarabella	B3 o3 o4	Semiretusa	B1 o2 o5
Rissoinella	A2 o4 o3	Sacculus	A2 11 o6	Scarinella	B3 o9 o2	Semiricinula	A3 o1 o1
Rissolina	A2 o4 o3	. sadleriana	A2 o4 o1	Schasichella	A1 o4 o6	Semirugata	B3 o6 o2
. rissomangelia	A3 o4 o4	Saduniella	A2 o4 o1	Schilderia	A2 11 o1	. semisinus	A2 o5 13
Rissopsis	A2 o4 o3	Saeronia	B3 o9 o1	Schismope	A1 o1 o3	Semisulcospira	A2 o5 14
Rissostomia	A2 o4 o3	Sagda	B3 13 o6	Schistoloma	A2 o1 o6	Semitrivia	A2 11 o5
.ritena Gray	A1 o4 o1	Sallarex	A2 o5 11?	Schistophallus	B3 11 o2	Semivertagus	A2 o5 1o
Riuguhdrillia	A3 o4 o1	. salssetia	B3 1o o1	Schistopinax	A1 o4 o6	. semperia Gro.	A1 o1 o4
. rivicola	B2 o3 o1	Sakiella	B3 12 o4	Schistobrachium	B5 o2 o7	Semperula	B4 o2 o1
Rivularia	A2 o1 o2	Salasiella Streb.	B3 13 o5	. schizochellus	A2 o5 14	. senectus	A1 o3 o4
. rivulina	A2 o5 16	Salassia	B1 o6 o1	Schizoglossa	B3 o8 o4	. seniculus	B3 o6 o1
Rixa	A1 o1 o4	Salassiella Dall	B1 o6 o1	. schizostoma Lea	A2 o5 14	Senilauria	B3 o3 o4
Rizzolia	B8 1o o1	Salinator	B2 o1 o6	Schizotrochus	A1 o1 o3	Separatista	A2 o1 o1
Robillardia	A2 o7 o3?	. salpingophorus	A2 o1 o1	Scholvienia	B3 o9 o1	. septa Berry	A2 14 o2
Robinsonia	A2 o5 16	Samla	B8 11 o1	Schrammia	A1 o4 o6	Septaria	A1 o4 o1
Robusta	B3 o6 o2	Samoana	B3 o9 o1	Schwartzia	A2 o4 o3	Serbica	B3 o6 o2
. rochbrunia	A2 o3 o3	. sancara	B8 o7 o1	Schwartziella	A2 o4 o3	Serenia	A2 o5 o8
Rochia	A1 o3 o1	Sandahlia	B3 o3 o3	. sciaphila	B3 14 o5	Sericata	B3 o6 o2
Rolleia	A2 o3 o4	. sandalium part.	A2 o9 o3	Scissilabra	A1 o3 o6	Sericipupa	B3 o3 o1
Rollus	A3 o4 o2	Sandalium	A1 o4 o1	Scissurella	A1 o1 o3	Serina	B3 o3 o6
Roperia	A3 o2 o5	. sandella	A3 o3 o1	Scissurona	A1 o1 o3	Sericohaminoea	B1 o2 o2
. rosenia Hesse	B3 o6 o2	Sanhaliotis	A1 o1 o2	. sclerodoris	B8 o2 o2	Sermyla	A2 o5 13
Rosenia	A2 o7 o3	. sansania	B3 1o o3	Scolodonta	B3 o8 o1	. serpaea	B3 o7 o4
Roseniella	B3 o6 o2	Santacharis	B3 o9 o1	. scolymus	A3 o3 o3	Serpho	B3 1o o1
Rossiteria	A1 o3 o1	. sao Adams	B1 o2 o5	Sconsia	A2 14 o1	. serpuloides	A2 o5 o4
Rossmaessleria	B3 14 o5	Saotoma	A3 o3 o5	. scopelophila	B3 o3 o3	Serpulorbis	A2 o5 o4
Rostanga	B8 o2 o1	Sarama	B3 12 o2	Scopulosa	B3 o6 o2	Serrata	A3 o3 o7
Rostellaria	A2 1o o3	Sarasinula	B4 o1 o2	Scrinium	B3 o4 o1	Serrulina	B3 o6 o2
Rostellariella	A2 1o o3	Sarcopterus	B1 o3 o4	Scrobifera	B3 o6 o2	Sesara	B3 12 o2
. rostellum	A2 1o o3	Sarmaticus	A1 o3 o4	Scrobs	A2 o4 o3	Sesteria	B3 o3 o6
. rostrisepta	A1 o2 o3	. sarnia	B2 o4 o1	Scrupus	A2 o3 o1	. setia Adams	A2 o4 o3
Rotadiscus	B3 1o o1	. sasakia	B3 12 o4	Sculptaria	B3 o6 o4	Setidiscus	B3 13 o1
. rotella	A1 o3 o1	Sasakina	B3 12 o4	Sculptassiminea	A2 o4 o6	Setipellis	B3 13 o6
. rotula	B3 12 o2	Sassia	A2 14 o2	Sculptia	A3 o3 o6	Sewertzowia	B3 o3 o6
Rotungia	B3 12 o1	Satalina	B3 12 o4	Sculptiferusaccia	B3 o7 o1	Sheldonia	B3 12 o3
. rowellia	B2 o1 o2	Sataria	A2 o4 o2	Scurria	A1 o2 o2	Siamopaludina	A2 o1 o2
. roxania	B1 o3 o1	Satiella	B3 12 o2	Scutalus	B3 o9 o1	Sicania	B3 o6 o2
Roxaniella	B1 o2 o2	. satsuma	B3 14 o2	. scutella Brod.	A1 o4 o3	Sicilaria	B3 o6 o2
Roya	A1 o3 o2	Saulea	A2 o1 o3	Scutellastra	A1 o2 o1	. sidonia	B4 o1 o4
Roybellia	B3 12 o2	Savatiera	A3 o2 o2	. scutellina Gray	A1 o4 o3	. sidula	B2 o4 o1
Royella	A2 o5 o9	Saxurinator	A2 o4 o3	. scutulus Mont.	B2 o1 o1	Sierraia	A2 o4 o2
Rubellatoma	A3 o4 o1	. scabrella	A3 o4 o4	Scutus	A1 o1 o4	. sieversia	B3 11 o2
Rudens	B3 14 o3	Scabricola	A3 o3 o2	. scutum	A1 o1 o4	Sigaluta	A3 o3 o5
. rudolpha	A3 o1 o1	Scabricula	A3 o3 o2	Scyllaea	B8 o6 o4	Sigapatella	A2 o9 o3
. rufina	B3 11 o2	Scabrina	A2 o1 o1	. scyphus	B3 o3 o2	Sigaretornus	A2 o5 18
Rufospira	B3 o6 o2	Scabronassa	A3 o2 o4	Searlesia	A3 o2 o2	Sigaretotrema	A2 13 o1
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Coloniconcha B3 14 o2
Colostracon B1 o1 o1
Colpodaspis B1 o4 o2
Conulinus B3 o3 o6
Coronalvania A2 o4 o3
Coryphillopsis B8 12 o2
Costasiella B6 o3 o3
Costellina A2 o4 o3
Cottonia B3 o3 o5
Craciliturbonilla B1 o6 o1
Cratenopsis B8 1o o2
Creonella B1 o6 o1
Crisilla A2 o4 o3
Crisillosetia A2 o4 o3
Crucibranchaea B5 o2 o7
Cyclostremiscus A2 o4 18
Cylindriturbonilla B1 o6 o1
Cylindronenia B3 o6 o2
Cyrenaeus B3 o3 o6
Cyrtoturbonilla B1 o6 o1

Deceballia B3 11 o2
Dinotropis B3 14 o4
Dolichena B3 o3 o6
Disococoncha B3 14 o2
Doliella B1 o6 o1
. dollocassis A2 14 o1
Dondice B8 1o o1

Eccritopoma A2 o3 o4
Echinochila B8 o3 o3
Elatiella A2 o4 o3
Eocithara A3 o3 o4
Episcymia A2 o4 18
Erectidens B3 13 o3
Eremita B3 14 o5
Eriptycha B1 o1 o2
Erymodon B3 13 o3
Eua B3 o1 o2

Euhaliotis A1 o1 o2
Eulerema A1 o3 o6
Eurotis A1 o1 o2
Euspinacassis A2 14 o1
Exohaliotis A1 o1 o2

Facelinops B8 1o o1
Festilyria A3 o3 o5
Filopaludina A2 o1 o2
Flemellia A2 o4 o3
Folletta B8 o3 o3

Gallodosconsia A2 14 o1
Globisetia A2 o4 o3
Globotrochus B3 14 o2
Grandeliacus A2 o5 o3
Granodomus B3 14 o2
Grellada B8 o3 o3
Guestieria B3 11 o5
. gyrodisca A2 o8 o1

Halolimnohelix B3 14 o3
Hemicena B3 o6 o2
Hiona B3 12 o2
Hispaniolana B3 14 o2

Ischnostrophina B3 o9 o5

Kalitinaia B3 14 o5
Klemmia B3 o3 o5
Kokotschashvilia B3 14 o5
Kororia B3 12 o2
Kusaiea B3 12 o2

Lanzia A2 o4 o3
Lepidopsium B3 14 o3
Liavenustia A2 o4 o3
Lilacina A2 o4 o3
Limacia B8 o3 o3
Liocarenus B1 o1 o1
Liracassis A2 14 o1
Lissembryon B3 14 o2

Magniturbonilla B1 o6 o1
Malinchea B3 o9 o5
Mamillocyliohna B1 o3 o1
Mamilloretusa B1 o2 o5
Manoscutum A1 o1 o4
Maoristylus B3 o9 o1
Massotiella A2 o4 o3
Mauicassis A2 14 o1
Maxactaeon B1 o1 o1
Megachrysia B3 14 o2
. megacyclotus A2 o1 o1
Megaxis B3 o9 o5
Mendana B3 12 o2
. mesopteryx P&O A2 o4 18
Mexicyclotus A2 o1 o1
Microhedyle B8 o7 o2
Miogalea A2 14 o1
Miradiscops B3 11 o5
Morisonietta B1 o6 o1
Multiturbonilla A2 o4 o3

Nesiohelix B3 14 o3
Newboldius B3 o9 o3
Nisostomia B1 o6 o1
Nititurboella A2 o4 o3
Notovoluta A3 o3 o5

Occultator B3 11 o5

Odontocymbiola	A3	o3	o5	Questleria	B3	11	o5	Siamopaludina	A2	o1	o2
Ovinotis	A1	o1	o2					Sigaluta	A3	o3	o5
				Radiatia	A2	o4	o3	Sinaenigma	B3	11	o2
Panastoma	A1	o3	o6	Retusophiline	B1	o3	o2	Setia	A2	o4	o3
Paramastus	B3	o3	o6	Ringactaeon	B1	o1	o2	Semelimacella	B3	11	o2
Paramoria	A3	o3	o5	Rivomarginella	A3	o3	o7	Sinotaia	A2	o1	o2
Paravolvulella	B1	o2	o5	Rolandia	B8	1o	o2	Solidens	B3	13	o3
Paua	A1	o1	o2					Spelaeodiscus	B3	o3	o5
Perparthenina	B1	o6	o1	Saduniella	A2	o1	o2	Sphaeratys	B1	o2	o2
Philingwynia	B1	o3	o2	Salpingoma	B3	o3	o5	Streptostylus	B3	13	o5
Philinoglossa	B8	o7	o2	Saxurinator	A2	o4	o3	Strioturbonilla	B1	o6	o1
Philinorbis	B1	o3	o2	Schichihela	A2	14	o1	Sultana	B3	o9	o3
Pictoscala	A2	o6	o1	Schismotis	A1	o1	o2	Systellomphalus	A2	o4	18
Plicatra	B1	o1	o2	Schizobrachium	B5	o2	o7				
Prionoglossa	B5	o2	o4	. sconsia	A2	14	o1	Taenioraphe	B3	13	o1
Prionoplax	B3	o9	o5	Semelimacella	B3	11	o1	Taringa	B8	o2	o2
Proaspastus	B3	o9	o1	Seminerita	A1	o4	o1	Tenellia	B8	11	o2
Puposyrnola	B1	o6	o1	Serigea	B8	o3	o1	Thaanumella	A2	o4	o6
Pyruconus	A3	o4	o2	. setia Adams	A2	o4	o3	Tibersyrnola	B1	o6	o1
								Torobaena	B3	14	o3
								Torreychrysias	B3	14	o2
								Trachychloritis	B3	14	o2
								Trachydolium	A2	14	o1
								Tralia	B2	14	o1
								Trinchesa	B8	1o	o2
								Tubusia	B3	o9	o3
								Turriconus	A3	o4	o2
								Usahaliotis	A1	o1	o2
								Variturbonilla	B1	o6	o1
								Vitrinellops	A2	o4	18
								Vitrinorbis	A2	o4	18
								Woodringilla	A2	o4	18
								Yunquea	B3	13	o6

The winner of the Second Anniversary raffle by Carfel Seashell Museum (Manila) was Mr. W. S. Stetson of North Carolina. In the above photograph, Mrs. Joyce White accepting the prize, a Cypraea aurantium, on behalf of Mr. Stetson. See Carfel's ad elsewhere for information on how you can become a winner.

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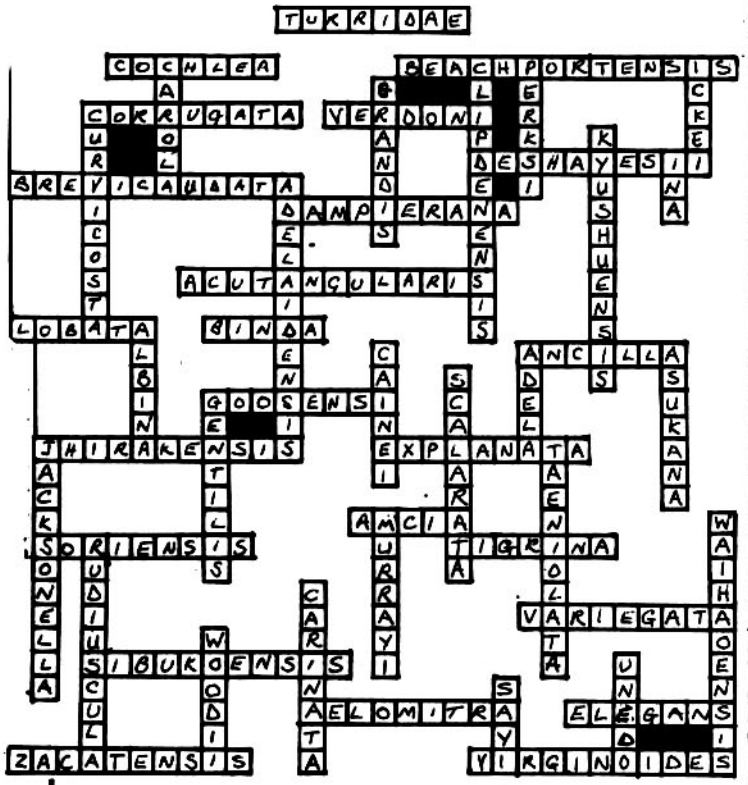

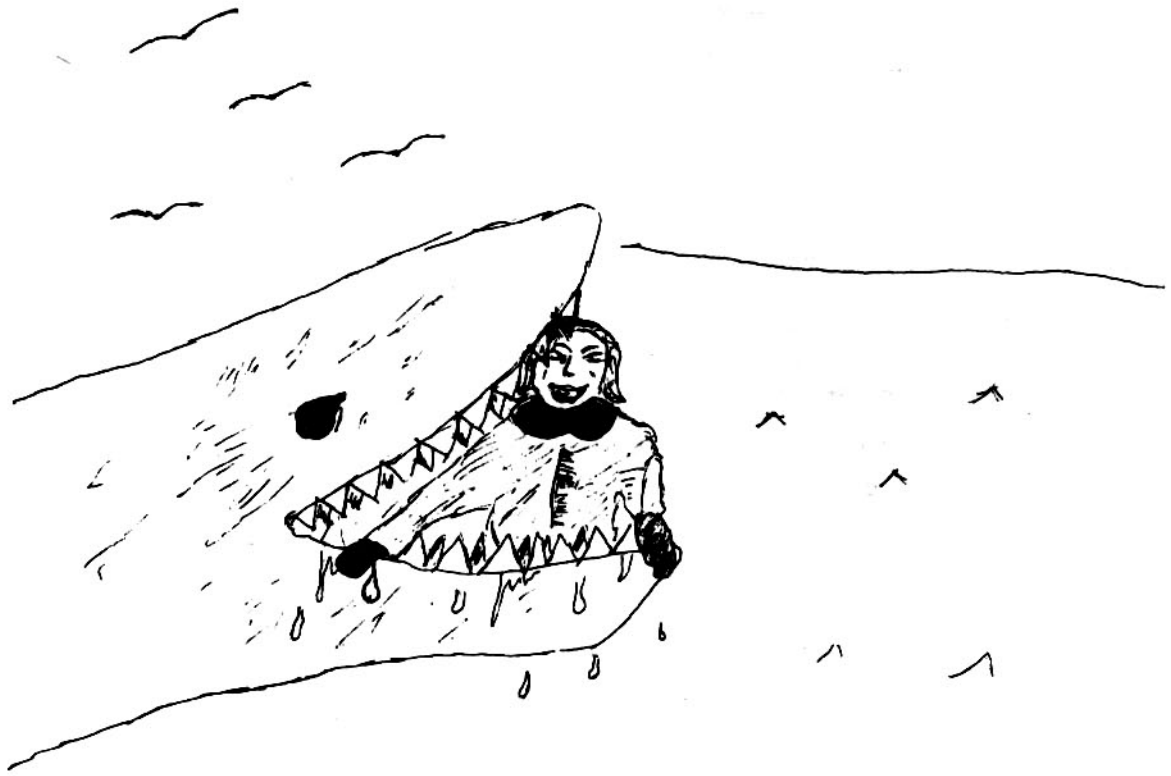

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