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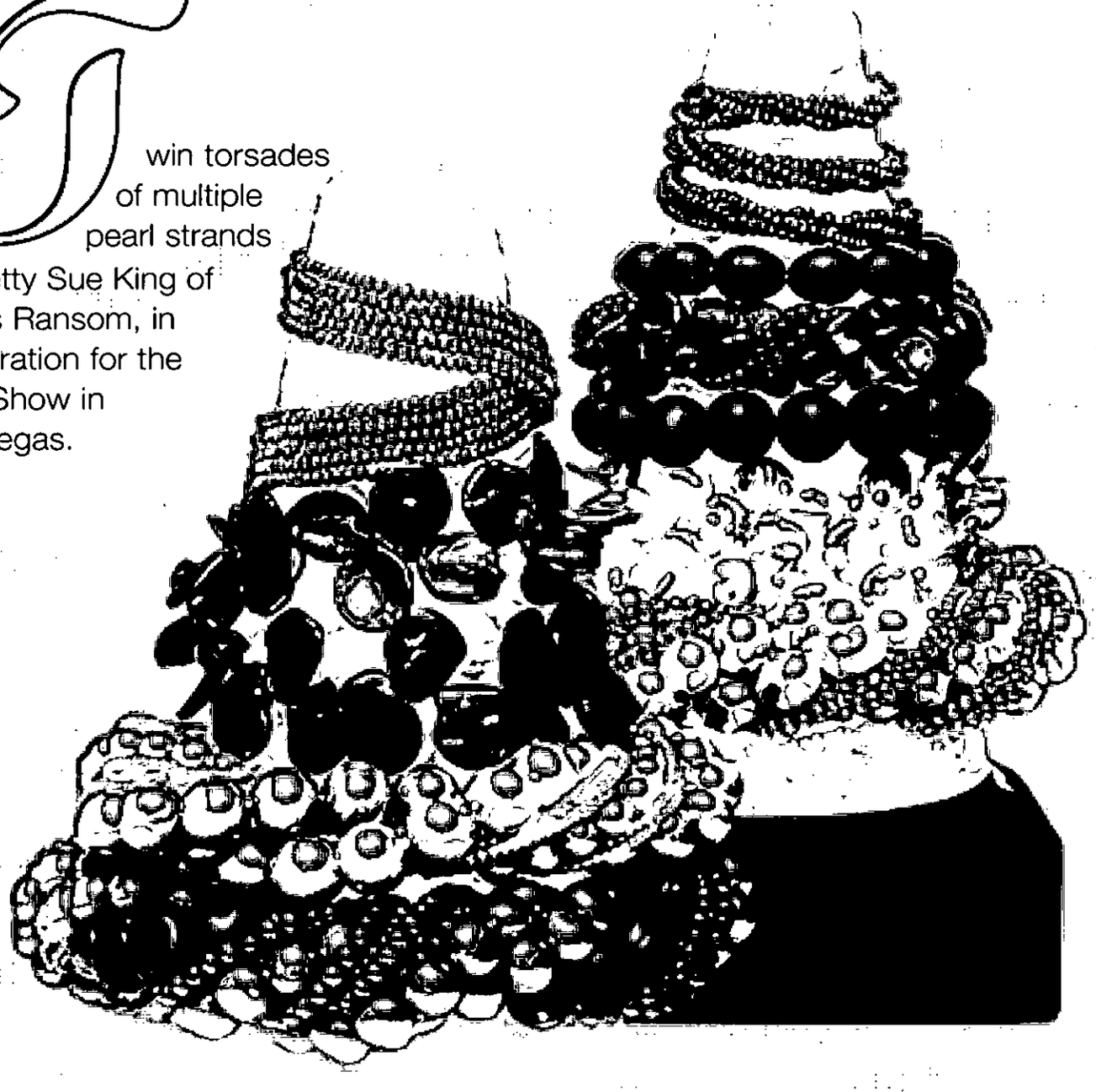
PEARL WORLD
The International Pearling Journal

Twin torsades of multiple pearl strands by Betty Sue King of King's Ransom, in preparation for the JCK Show in Las Vegas.



EDITORIAL

It's getting more and more difficult these days to write glowing accounts of pearl success stories in these troubled times for all luxury goods... much less pearls.

We have always tried not to be blowing smoke up readers' skirts (or kilts) about events transpiring in the pearl industry. And that's been a constant for us, going on over 18 years now.

So this is why this issue is heavier on interesting history, and lighter on baloney about potential or possible recovery of fortunes in the business.

We note other publications having similar (if not worse) problems at present. *Jewellery News Asia* has been reduced to flapping their fingers yet again about the excessively moribund *World Pearl Forum* held months ago in Dubai. Why they had to revert to this old hash once again escapes many of us: it's over and done with, and it seems evident to have been pretty much of an unmitigated disaster, full of sound and fury, signifying very little.

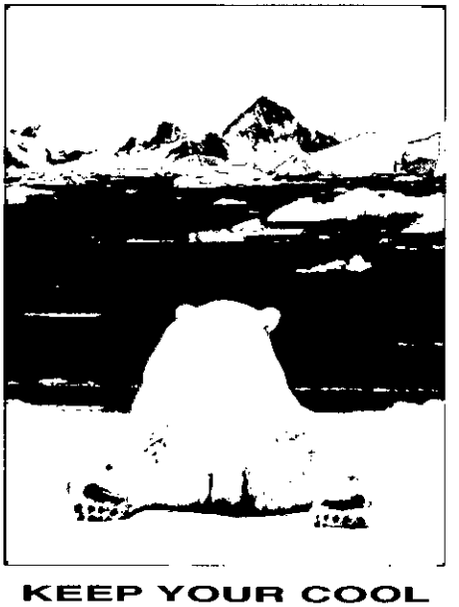
As one onlooker commented rather adroitly: *Totally agree with you on the past several issues of* Jewellery News Asia *rehashing the dismal World Pearl Forum. They must be cutting back on their once-upon-a-time fine reportage, perhaps having fired most everyone like JCK magazine has done. The Dubai confab folks did nothing to establish themselves as a new or exciting entity in the pearl business. Suggest everyone stop beating their gums about this monumental failure, and cease and desist trying to make a silk purse out of a sow's ear. Dubai will never become an important pearl destination. Fogettaboutit. It's a done deal. Water under the bridge. Not even Paspaley, Wan or Jewelmer's infusion of goods on tender could untarnish this event.*

Which leads us to the plight of other publications ostensibly covering pearl news. *JCK* magazine idiotically jettisoned their ace pearl reporter, Gary Roskin, and then followed this debacle by canning most everybody else in sight shortly later. Which leads us to speculate on the probable eventual demise of this once-venerated magazine.

Modern Jeweler, too. Their new May issue didn't touch on anything to do with pearling (only a triple ugly spread on a hideously coiffed and made-up redheaded model was notable). *Colored Stone*, too. It, too, seems destined for oblivion.

Enough grousing. It's awfully hot here in the desert (weeks of 100°F-plus heat already here in what used to be springtime for us), so we'll just keep trying to muddle through these turbulent times, and try to keep paddling to keep above the rising waters of pearldom... like so many others these days.

We hope to report more optimistically in the days and months to come.



KEEP YOUR COOL

PEARL WORLD
The International Pearling Journal

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FROM POVERTY TO PEARLS

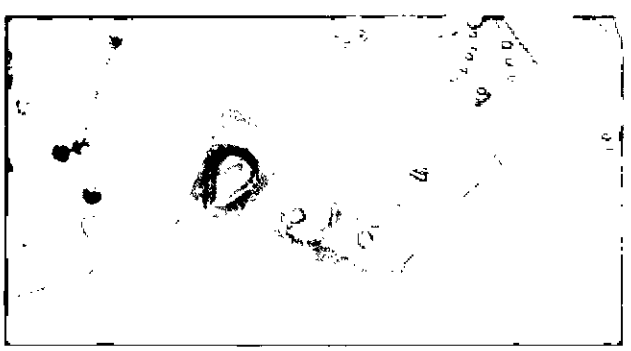
The Zanzibar Women's Success Story

PLANTING THE SEEDS

How were the seeds of a mabé farming project planted on the faraway island of Zanzibar, in the Indian Ocean off the East Africa coast of Tanzania?

The women of the Fumba Peninsula have always depended on oysters and other bivalves for their food and economic sustenance. However, uncontrolled harvesting had led to a decline in stocks.

The USAID-funded Sustainable Coastal Communities and Ecosystem (SUCCESS) Program, carried out by the Coastal Resources Center at the University of Rhode Island, the University of Hawaii-Hilo, the Western Indian Ocean Marine Science Association, and the Institute of Marine Sciences, saw an opportunity to work with the women seashell gleaners to improve management of the bivalves by bringing back the stocks to healthy levels, while providing them with new ways to increase their income.



It started with SUCCESS working with a group of women and men from Bweleo village to produce simple jewelry from seashells. Until now, they had simply discarded the shells once they had removed the bivalve's flesh for food.

SUCCESS, however, trained the group to keep the shells and polish pieces of them to make necklaces, earrings, and bracelets.

Since the project began, the most entrepreneurial individuals have earned US $40-$50 per month from selling this shell jewelry.

One woman, Rahma Mussa, who has sold about 60 pieces, enthusiastically said, "I am saving my money to buy my own polishing machine and to build a house for my mother."

The next step after this basic shell jewelry making was to train the women and men to cultivate mabé- an activity with the potential to increase their income even further and improve their coastal livelihoods.

"It is not a full time job, but a high profit undertaking that we

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"Zanzibar" from page 3

can do along with other income generating activities," said a community leader and entrepreneur. She sees the jewelry making from shells and from mabé as having helped empower the women. Equally important to providing additional income generating options, these successful livelihood activities have increased villagers' support of bivalve management.

They now have four "no-take" marine life zones, an associated co-management plan for the fish and shellfish resource, and new village by-laws governing the area.

Empowered women are taking on local stewardship of the intertidal resources through community-based management, and are committed to and motivated by the initial response to the jewelry sales and the first harvest of mabé pearls. The group has over one hundred additional oysters in the water, promising higher future returns.

Newly skilled members of the mabé cooperative on the Fumba Peninsula have gained valuable experience in polishing an oyster shell, which maximizes the use of the half-pearl harvest.

Taking the plunge

For many of the women of Fumba, they literally took a plunge on the mabé initiative, as the project required them to swim and work underwater to cultivate and harvest the pearls.

Despite being coastal people, many did not know how to swim—a contrary concept similar to the many U.S. commercial boat fishermen who likewise do not know how.

There was also the consideration, as Muslim women, of respecting their religious edict of covering up in public. Using their ingenuity, they exchanged their brightly colored, full-length kangas for special bathing wraps they designed for wearing in the water.

It was a small concession to make for what they gained. Safia Hashim of Bweleo village, now a pearl farming entrepreneur who is now harvesting the half-pearls, explained how embracing the mabé initiative has helped empower the women. "It is different from former days when only husbands worked to support the family. Today men and women share the responsibility of earning money. My husband (a traditional fisherman) even helped pay for my trip to the trade fairs in Mombasa and Nairobi, Kenya, to sell my jewelry.

"Coastal community lives have greatly improved. Now we can afford better housing, education, food, clothing, and other necessities."

As a living illustration of raising of the villagers' standard of living, Safia is now building a house for her husband and six children.

The villagers have also learned how to use the tools of the jewelry trade, cutting the mabé from the shells, and polishing and buffing them to bring out the best of their captivating, rainbow-like sheen.

In addition the mabé themselves, less expensive jewelry is being fashioned from the ground and buffed shells themselves, and the men of the Fumba Peninsula have become eager participants in the operation, under the guidance of the SUCCESS team.

Growing the business

The half-pearl story is only half-told, and any future progress must be made in half-steps. As uplifting and gratifying as is the success of the women of Zanzibar, it opens them up to a new way of life that must be slowly assimilated, much in the way their mabé are carefully cultivated over time.

For villagers whose annual household income averaged US $1,000 per year, newfound wealth must be carefully managed, and not change their world overnight.

The mabé cultivation, harvest, polishing, setting and sales has started raising the quality of life of the Fumba Peninsula villagers. More importantly, the skills they have learned have been translated into their other daily livelihoods with seashell jewelry, and into their business transactions in agriculture and fish marketing. Thanks to the involvement of the SUCCESS Program and their university facilitators, new outside investors who discover the allure of the mabé, such as professional jewelers and designers, will see

The brilliance of the mabé, shown with culture "seeds," reflects the overall success and achievements of the Zanzibari women.

their money in this growing cottage industry used in a way that will not disrupt the daily rhythms of the Zanzibaris, but be used to further spread their new knowledge and talents to other coastal residents to help them to move up from poverty.

The USAID Mabé in East Africa initiative is a direct replication of the University of Hawaii-Hilo's pearl cultivation training provided to islanders in the South Pacific. Now those skills have been successfully transported to and utilized in East Africa.

People interested in helping support the Zanzibar Mabé initiative can become involved by

1. Providing a cash donation to the initiative;
2. Providing in-kind donations to the initiative;
3. Purchasing unique pieces of mabé jewelry; or
4. Providing a cash donation to CRC or IMS to replicate this success in other villages. ❖

For more information, and to become involved with this mabé initiative, please contact:

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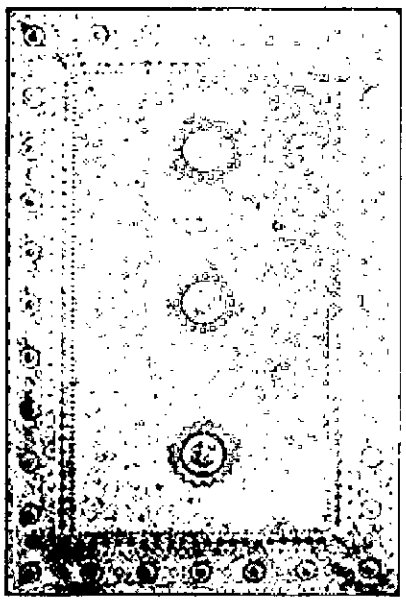
or Peter Bazar of Imperial
at PBazar@Pearls.com

The Baroda Pearl Carpet

The Maharaja of Baroda, Gaekwar Khande Rao, is the party responsible for one of the most magnificent pearl creations this world has ever seen. The Baroda Pearl Carpet is a work of art; more than 1.5 million pearls were sewn together by Gujarat jewelers to make this massive (2.72 x 1.62M) masterpiece.



Some say the carpet consists of 2.2 million pearls and beads. Apparently nobody has bothered to count, go figure. But let's consider 1.5 million, the official estimate. Considering a generous average of one pearl per 500 gulf oysters, the carpet represents 750,000,000 million oyster souls. Kokichi Mikimoto, in perfect adept of Shinto and Buddhist religions, dedicated a temple for the souls of all the oysters who produced his pearls. Gaekwar Khande Rao, however, had no such considerations.

The Baroda Pearl Carpet went on the auction block recently. It attracted well-deserved attention, another museum piece following the recent double-strand necklace sharing the same name.

I know a couple of you are yawning out there. This is after all, old news. The carpet set a Qatar auction record three weeks ago, selling for $5.5 million. But it was sold to an undisclosed buyer!

So who are the tall poppies capable dishing up $5.5 million for a piece of pearling history in this dire economy? That's a lot of moolah for a secret purchase.

The undisclosed buyer is The Qatar Museum Authority. They purchased the carpet, and it is soon to be a masterpiece for some future "pearl project" in Qatar; the centerpiece, no doubt. ❖

Our thanks to the all-encompassing eye of The Pearl Professor (viz. http://www.pearl-professor.com) for another of his/her (?) always engrossing blogs on the high jinks and/or low jinks of the pearl profession.

WEIRD FACTS

The largest cell in the human body is the female egg and the smallest is the male sperm.

A full bladder is roughly the size of a soft ball.

It takes the food seven seconds to get from your mouth to your stomach.

One human hair can support 3 kg (6 lb).

Human thighbones are stronger than concrete.

The attachment of human muscles to skin is what causes dimples.

The average man's penis is three times the length of his thumb.

A woman's heart beats faster than a man's.

If the average male never shaved, his beard would be 13 feet long when he died.

Men with hairless chests are more likely to get cirrhosis of the liver than men with hair.

There are about one trillion bacteria on each of your feet.

Side by side, 2000 cells from the human body could cover about one square inch.

Women blink twice as often as men.

The average person's skin weighs twice as much as the brain.

When you are looking at someone you love, your pupils dilate. . . they do the same when you are looking at someone you hate!

Your ears secrete more earwax when you are afraid than when you aren't.

Your body uses 300 muscles to balance itself when you are standing still.

If saliva cannot dissolve something, you cannot taste it.

The average woman is five inches shorter than the average man.

. . . . . Still looking at your thumb, aren't you?

The history of the Atlantic pearl oyster industry in Venezuela and Colombia

by Clyde L. MacKenzie, Jr.

Around the year 1500, discoveries by Spanish explorers of sources of pearls, gold, and spices in the New World were a powerful stimulus for Spain to expand into the Americas. Samples of these resources, which Christopher Columbus and later crews brought back to Spain, so aroused public enthusiasm in Spain that navigators, explorers, and adventurers began to organize expeditions to seek the treasures of lands beyond the "Western Ocean." Columbus first saw the pearls in the Gulf of Paria, Venezuela, on his third voyage, where local Indians bad brought them from the Caribbean coast of Venezuela located to the northwest.

The Spanish subsequently organized harvesting programs for pearl oysters in Venezuela and Colombia and began to ship huge quantities of pearls to Spain and other European countries for ladies' adornment. The first Spanish town in the New World was established in 1528 on the Venezuelan island of Cubagua to serve as a center for harvesting pearl oysters and collecting pearls. The pearls from Venezuela, whose northeast shores became known as the "Pearl Coast," were relatively small, weighing 2-5 carats, but they were harvested in the largest quantities of any location in the New World.

Within a decade or two following the discovery of the Venezuelan pearls, the Spanish found pearls and developed programs to harvest them on beds around islands off the Pacific Coast of Panama and in the Gulf of California. They also searched for pearls in what is now the United States, but found none in its marine environments.

By the late 1500s, the pearl oysters in Venezuela and Colombia had become much scarcer as a result of intensive fishing by hundreds of divers. Documentation of the pearl production may be the first records of resource declines in any of the world's marine fisheries that were brought about by intensive harvesting stimulated by strong market demand. In this case, large beds of natural pearl oysters that had been scarcely harvested beforehand were harvested intensely, albeit by primitive hand methods, and the beds were slowly depleted.

In 1948, Paul S. Galtsoff of the U.S. Bureau of Commercial Fisheries (now the National Marine Fisheries Service, NOAA) spent two months on Margarita Island, Venezuela, at the request of the Venezuelan Government which wanted him to recommend measures for managing its pearl oyster industry. This followed his similar stay in Panama for the same purpose. Galtsoff reviewed the history of the Venezuelan pearl oyster industry, made observations and recommended research and management strategies, and later described them in a paper.

Nothing has appeared in the international literature regarding this fishery since his paper was published. The senior author visited Margarita Island from January 20-31, 2002, to determine the history of this fishery industry between 1948 and 2002, collect additional earlier historical material, and photograph pertinent scenes. L. Troccoli and L. B. Leon S. have had long associations with fisheries in the Margarita Island-Cubagua Island-Coche Island region and contributed to this paper which published information about the fishery, the biology and ecology of the pearl oysters, and additional photographs.

The Pearl Oyster in the Caribbean Sea

The species of pearl oyster in the Caribbean Sea is the Atlantic pearl-oyster, *Pinctada imbricata Roding*

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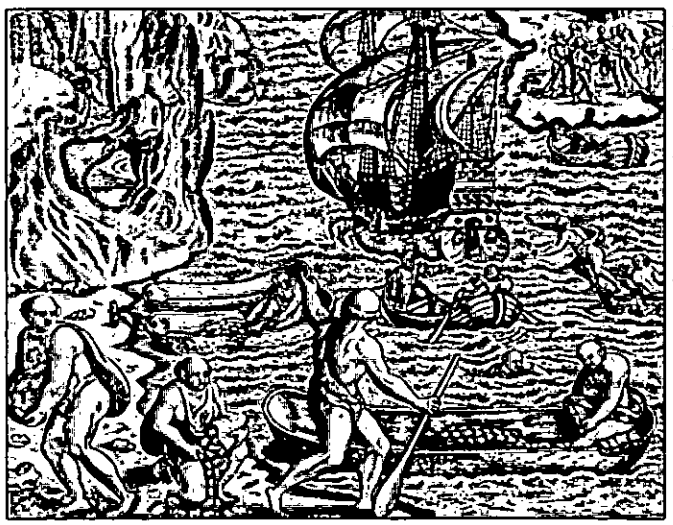

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1798. It ranges beyond the Caribbean Sea to as far north as North Carolina and south to Brazil. The main fisheries for it have been off the coasts of Venezuela and northeastern Colombia. In Venezuela, the harvesting has been centered on beds near the clustered islands of Margarita Island, Cubagua Island, and Coche Island, 12-18 km off its northern coast Colombia's pearl oyster fishery was 1,000 km to the west on beds off the Guajira Peninsula close to the Venezuelan border. Bohlander (1992) reported that the explorer Alonso de Ojeda, in about 1500, observed people fishing for pearl oysters in what is now Lake Maracaibo, Colombia, but pearl oyster harvests there have not been described elsewhere to our knowledge.

The shells (valves) of pearl oysters are somewhat similar to some other oyster species. Its left valve is more concave than the right, and it has a byssal opening, a structure not universal in oysters. The valves, which rarely exceed 7 cm in length, have three sections: a periostracum, a prismatic layer, and a nacre layer. The color of the outer surface of the valves varies from white to bronze and occasionally to black.

Owing to its relatively small size and because its valves are thin, Atlantic pearl-oysters have not been used in the mother-of-pearl trade, which deals in ornaments, knife handles, and buttons from the larger pearl oyster shells harvested off the west coast of North America and in Asia. By 1900, thousands of tons of the pearl oyster shells lay in heaps along the Venezuelan coasts and in smaller quantities on the Colombian coast, where they had been left for centuries by oyster shuckers.

Pearl Oyster Biology

At the time of Galtsoff's survey in 1948, knowledge of the spawning, setting, and growth of the pearl oyster was scarce, but it was known that its larvae will set on hard objects with a clean surface, and growth of young pearl oysters is rapid. Some biological information relating to reproduction has since been gathered.

The Atlantic pearl-oyster is a protantric hermaphrodite. The small mature pearl oysters are males; the large pearl oysters are females. Their gonad surrounds their digestive diverticulum. Sperm and eggs are spawned into the water where fertilization takes place. The unfertilized eggs are 47-50[micro] in diameter; the sperm are 60[micro] long.

In a laboratory study, the larvae resulting after fertilization took 20-25 days to grow to settlement size: 215[micro] Occurring in the tropics at lat. 11-12°N, this pearl oyster has a relatively long spawning season as do many tropical species. Reproduction takes place throughout the year, as shown by juveniles less than 5 mm long being present during all months, but setting is heaviest from June into November and December when water temperatures are highest.

Water temperatures rise from about 24-25°C to 26-28.5°C during May to November, when the oysters spawn, and their condition index, determined by the volumetric method, drops from about 65-70% to 40-50%.

This index is lowest during October and November. The Las Cabeceras bed, the largest remaining bed, had the highest recruitment of pearl oyster spat of the beds surveyed. The oysters grow from settlement size to about 7 cm within 14 months.

Ecology of Pearl Oyster Beds

The Atlantic pearl oyster inhabits clear waters. It does not occur where changes in temperature, salinity, and oxygen are large or on muddy bottoms. Its ready-to-set larvae attach with a byssus to hard substrates including other pearl oysters, rocks, dead coral and octocorals, other molluscan shells, and barnacles. The oysters retain this attachment with several byssal threads throughout their lives unless, while seed, they are torn free by fishermen.

Empty pearl oyster shells apparently do not accumulate beneath live pearl oysters as empty shells do in beds of the eastern oyster, *Crassostrea virginica,* in Canada and the United States. As an example, the oysters on the centuries-old Las Cabeceras pearl oyster bed near Cubagua Island rest on a base of sand rather than a deep base of empty pearl oyster shells. In some locations, eastern oysters rest on bases of shells at least 7 m deep.

The relatively shallow regions (down to at least 20 m) surrounding the islands of Margarita, Cubagua, and Coche and those off the peninsula of La Guajira and in Chengue Bay, Colombia, become enriched with nutrients (mainly nitrates, silicates, and phosphates) from December through February each year, when extra strong easterly winds cause upwelling that brings waters from the nearby ocean depths into the shallows.

Water temperatures that usually are about 26-28°C in summer become 2-3°C cooler and the salinity increases by about 2 per thousand] to nearly 36 per thousand]. The nutrients stimulate a large increase in phytoplankton that feeds fish (mainly sardines, *Sardinella aurita*) and mollusks (i.e. pearl oysters and mussels, *Perna perna*) that increase sharply in overall size but especially the sizes of their gonads throughout this period, in advance of spawning. The fisheries for these resources benefit enormously.

The taxonomic list of mollusks associated with *P. imbricata* on and near the Las Cabeceras bed includes 89 species: 48 gastropods, 34 bivalves, 6 cephalopods, and 1 chiton.

In 1948, northeastern Venezuela had about 76 identified pearl oyster beds, nearly all of which were too small for worthwhile harvesting. The beds were located in the same areas as they had been historically, i.e. between Margarita Island and the Peninsula de Araya on the Venezuelan mainland, in depths from 4 to 20 m; several more beds were located off the north and northeastern shores of Margarita Island. The largest beds were at least 2.5 km across, and the most productive was the Las Cabeceras bed just east of Cubagua Island.

In Colombia, pearl oysters were harvested from a bottom area that extended for 150 km just off the coast of Guajira. In 1994, a survey of the abandoned beds found concentrations of live pearl oysters that ranged from 0.05 to 2.77 oysters/m. Pearl oysters larger than 5 cm (marketable size) ranged

from 25% to 49% of the total oysters. In one location, of the 493 pearl oysters that were opened, 17 had pearls (3.4%), most of which were around 2.5 mm in diameter, while in another location 279 pearl oysters had 12 pearls (4.3%) about 1.5 min in diameter. The pearls lacked the shape and luster required of good quality gems and were too scarce for commercial harvesting. Settlement densities of pearl oyster spat (juveniles), nonetheless, appeared to be sufficient to support a program of pearl culture which would include collecting spat on shells and other materials.

Urban observed aspects of *P. imbricata* reproduction in Chengue Bay, Venezuela, in 1997 and 1998. Chengue Bay is located on the north coast of Venezuela 150 km west of the Guajira pearl oyster area described by Borrero et al. and 14 km north northeast of the city of Santa Marta. Some natural stocks of *P. imbricata* are present in this bay. Urban found the highest abundances of their larvae in November 1997 (1 collection: 0.8 larvae/m. and in January through March, 1998 (1 collection each month: 1.0 larva/m., average), but some larvae were collected in nearly every month. Spat were collected in bags of plastic mesh (onion bags) squeezed into net bags.

Urban also identified two principal groups of predators consuming the pearl oyster spat: gastropods and crabs. The gastropods consisted of three species of the genus *Cymatium*, and the crabs belonged to three families: *Portunidae*, *Xanthidae*, and *Majidae*. The spiny lobster, *Panulis argus*, also preyed on the spat, but its abundance was lower than the other species.

The surviving oysters grew to market size within 12 months. Urban concurred with Borrero et al. that the Atlantic pearl-oyster produced sufficiently large numbers of spat to support a culture program, but he expressed uncertainty about it because he observed a high mortality in the spat.

Historical Methods of Harvesting Pearl Oysters

Through history, pearl oysters have been harvested by diving and dredging. Before 1500, natives harvested pearl oysters by diving without gear, and this method continued to the early 1960s. Hardhat diving lasted from about 1912 to 1963. Dredging, which began in a rudimentary way in the 1500s, was intermittent over time, but done regularly throughout the 1900s and in 2000 and 2001.

Pearl Diving

Descriptions of divers gathering pearl oysters are available from a few sources. Venezuelan Indians harvested oysters by diving to the bottom with a basket containing a weight and collecting them by hand. They dove without clothes, masks, or flippers. After 1-1.5 minutes on the bottom, they returned to the surface to breathe and deliver the pearl oysters they collected in the basket. They ate the oysters and kept the pearls found in some of them .

Pearl oyster harvesting by enslaved Indians in the early 1500s was described by Oviedo y Valdez (1535), . From four to seven divers in each canoe paddled under the supervision of their master from Cubagua Island to places where the oysters were most abundant and anchored the boat. The divers each weighted themselves with a rock. Use of a rock enabled them to harvest longer, because they descended to the bottom more quickly. By thus expending less energy, they could hold their breath longer.

The rock apparently was on a line and was retrieved by a tender in the canoe after the diver reached the bottom, though this can only be assumed as no description is available. Divers gathered as many oysters as they could in a bag they carried before having to return to the surface for air. The divers were forced to make many daily trips to the bottom.

A more recent and true story, famous on Margarita Island, relates to a diver, named Domingo, in about 1912. Domingo was harvesting pearl oysters on the Las Cabeceras bed off Cubagua Island when a sting ray, *Rajiformes*, stung his leg. He was able to rise to the surface and other divers brought him ashore. His poisoned leg swelled. A doctor told him the leg would have to be amputated or he likely would die. He did not want to lose his leg because he would not be able to work any more and his family would starve. Domingo and his wife prayed to their patron saint, Virgen del Valle, asking her to save his leg. They promised to give her a fine pearl if she did. His leg soon recovered, and, during the first day he returned to diving, he saw an extra large oyster on the bottom. He

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brought it to the surface, and, upon opening it, saw a large pearl. It was 17 mm long and was shaped like a leg except for 2 projections at one end. His friends urged him to sell it to obtain a large amount of money. He was offered 100,000 Bolivars, which he refused saying, "No, the pearl belongs to the saint, and I will give it to her." He did and the pearl now rests on the crown of a statue of the saint in a church museum on Margarita Island. The pearl's unusual shape added substantially to local interest in the story.

In the 1930s and 1940s, divers went to the beds in small sailboats and sometimes were assisted by one or two tenders. Working without mask or flippers in 5-9 m of water, they swam to the bottom quickly and filled their bags with as many oysters as they could before returning to the surface to breathe. Tenders in the boats retrieved their bags of oysters from the bottom using a rope and emptied them. The tenders picked out the large oysters and tossed any remaining material overboard.

Dredging

Galtsoff described the pearl oyster dredge as a light, cast iron frame with a scraping blade to which a net bag is attached. The bag was maintained slightly above the bottom by 4-5 wooden sticks attached to its bottom to prevent it from being torn by rocks and corals. According to the present law (Art. 17, Chapter III, Ley de Pesca de Perlas, 1944), the size of a dredge cannot exceed 100 cm wide by 80 cm high. The dredges weigh 914 kg. The dredging boats that operated until the 1950s were about 6 m long and were propelled by sail. They had a crew of five men, four of whom tossed out and pulled up the two dredges and also culled and packed the oysters, while the fifth man handled the sail and rudder. The dredging boats harvested mostly on sand bottoms.

In 2002, observations were made on a boat dredging for oysters on the Las Cabeceras bed. The 6 m boat was propelled by an outboard motor and had a crew of three, all barefoot. The crew was allowed to tow one dredge (it had a 20 mm diameter towing rope) and could not use mechanical means to retrieve it. The crew located good harvesting locations by sighting and lining up prominent structures and points on land. They made several tows.

Each time, they towed the dredge for 10-15 min, and two men pulled it up by hand for emptying while the third man handled the engine. The dredge usually had 1-1.5 bu of material in each lift: molluscan shells, pearl oyster "keepers" that ranged from 5 to 6 cm long, undersized pearl oysters attached by their byssuses to oysters and shells, sand dollars (as large as 15 cm in diameter), mussels, at least four species of starfish, barnacles, bryozoans, octopi that were commonly 10 cm long, sea urchins, crabs, and gastropods.

The crew dumped the material onto the floor of the boat, tossed the dredge over again, and then searched through the material for keeper pearl oysters. They pulled them from the undersized oysters and mussels, tossed them into a shallow plastic tub, which when full they emptied into sacks. The remaining material which comprised at least 95% of the original volume was tossed overboard. At the end of the fishing day, the boat returned to the beach where the pearl oysters were cooked and shucked. In the 1990s, oyster dredging boats had crews of four to five men .

Hardhat Diving

The hardhat divers, who harvested pearl oysters from 1912 to 1963, ranged from 18 to 70 years old. They were taught how to use the gear and harvest oysters by relatives from generation to generation, but the training took only one day. The worst problem for a diver was leg cramps due to the cool water, and some older divers had heart attacks. A man needed an annual certificate of health, especially relating to his heart, to obtain permission from government officials to use the hardhat gear.

In the mid 1940s, the boats used in hardhat diving, all under sail, were each equipped with a hand-operated, two-cylinder piston air pump, a hardhat suit and helmet, and about 175 m of rubber hose and signal line. They had 7-man crews: the diver, two men who worked together turning the wheels that operated the pump driving air down to him, a man who relieved the pumpers, two lineman, and a cook.

The original suits were made of rubber, but nylon was used after World War II. Imported from Europe and the United States, the suits were similar to jumpsuits with rubber at the waist as a belt. The first helmets had lead skirts that laid over the diver's chest and back. Together, they weighed 25 kg. The helmet and heavy lead boots he wore on his feet maintained him steadily on the bottom.

The hardhat divers worked every day that had light to moderate winds. They harvested mostly on bottoms consisting of mixed corals, shells, and rocks as these had the better pearl oysters than bottoms consisting of sand. Upon reaching a harvesting location, the crew anchored the boat and helped the diver into his suit. He first slipped on wool pants, a long sleeve shirt, socks, and then the suit. Next he put on knee pads and leather caps over the ends of his fingers to protect them from cuts and abrasions, and finally he pat on the helmet and boots. The suit lasted about 3 months unless it was torn on coral sooner.

When the diver was ready, the air hose and signal line from the boat to the diver were let out 46-50 m, with the extra hose and line remaining on the boat, and then the diver climbed onto a ladder and the crew lowered him to the bottom by the signal line and air hose. The diver jerked the line twice to signal he had reached bottom. He remained in the water harvesting for 2-3 hours without coming up for rest, food, or water. The helmet had a regulator valve that the diver could close to inflate his suit when he wanted to ascend to the surface.

While harvesting, the diver could see objects at least 30 m away through the clear water including other divers; divers had a personal code not to enter one another's harvesting area. Harvesting pearl oysters was like picking

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fruit. The diver got down on one knee, picked up clusters of oysters, removed the "flowers" (seed), and put the large oysters in piles. When he yanked on the signal rope, the cook and standby man lowered a metal net to the bottom. The diver filled it with oysters, signaled, and the crew pulled it up to the boat, removed any mussels and stray seed oysters, and put the oysters in sacks. Three netfuls filled a sack, and a sack contained 875-1,350 oysters.

Some crews brought food along with them, while others caught fish with hooks and lines while the diver speared some fish and gathered some mussels to eat. A boat brought the pearl oyster crews fresh water to drink. Each day, a diver spent 5-6 hours on the bottom. The daily harvest was 15-20 sacks of oysters/boat; the least a boat harvested was about 6 sacks/day. During a season, a diving crew harvested about 1,000 carats of pearls. Between harvesting seasons, the divers and crews caught fish to sell or found other odd jobs to earn money.

The Discovery of Pearls in the New World

The existence of pearls in the New World became known in Spain after Admiral Christopher Columbus' third voyage. On his first voyage, in 1492, he landed in the Bahamas and then explored Cuba and Hispanola (Haiti and the Dominican Republic). On his third voyage, in 1498, Columbus reached the South American mainland near what is now the Gulf of Paria near the Orinoco River in Venezuela and saw the natives with pearls and gold. Women boarded his ship wearing necklaces of seeds interspersed with fine pearls. They said the pearls came from areas off the coast of the Peninsula de Araya in the Caribbean Sea as far as 100 km away. Columbus then sailed past Margarita Island, Cubagua Island, and Coche Island and went back to Hispanola, missing the sources of the pearls on those islands. In 1499, Alonso de Hojeda was the first Spaniard to discover the pearl resources of the three islands.

In 1499, Columbus sent two of his ships back to Spain with some pearls. Later in 1499, Peralonso Nino, former pilot of Columbus' ships *Santa Maria* and *Nina*, captained a ship that sailed from Spain to further explore what was to become the "Pearl Coast," i.e. collectively, Margarita Island, Cubagua Island, Coche Island, and the Peninsula de Araya.

Nino traded bells, pins, bracelets, strings of crystal, rings, and other objects with the natives for their pearls, and in 1500 returned to Spain with between 11 and 44 kg of pearls. This trip by Nino was the first to the new continent that was economically successful. Trading in pearls soon expanded to become the business of directed pearl fishing and permanent settlements near the pearl oyster grounds were established.

The Founding of Nueva Cadiz: The First Spanish Town

In 1509, King Ferdinand II of Spain and his representatives directed that a permanent settlement be established on Cubagua Island from where crews in canoes would go to the beds and harvest pearl oysters, and it would also serve as a collection center. From there, the pearls then would be sent to the ports of Santo Domingo, San Juan, and Havana, and then on to Spain.

The Spaniards forced the Indians living on the islands into slavery, and made the men paddle canoes to the beds and dive for the pearl oysters. Whenever more divers were needed, the Spaniards brought slaves from the Venezuelan mainland and the Bahamas. The Taino Indians of the Bahamas were considered good harvesters because they had experience diving for queen conchs, *Strombus gigas*, one of their staple foods. The Spaniards paid as much as 150 ducats for each slave.

In 1512, the first Spanish settlement, consisting of a group of huts made of palm trees, was established on Cubagua Island. In 1520, the native Indians on the Venezuelan mainland, located about 15 km south of Cubagua, rebelled in retaliation against raids by Spanish crews. This forced a temporary abandonment of the Cubaguan settlement by the 300 Spanish settlers because they were dependent on supplies, mainly food, from the mainland.

In 1528, the settlement was restored with about 1,000 Spaniards. This was the first Spanish town founded in South America and the New World and was named Nueva Cadiz. Between 1530 and 1535, about 1,500 people lived in the town, and it enjoyed its greatest prosperity.

The officials of Nueva Cadiz sorted the pearls into different grades, each being given a value in gold. The shades of pearls in the various grades could be white, yellow, or pink. Individual buyers selected the colors they liked best; any price differences between the different colors are unknown. They shipped an average of 800,000 pesos worth of pearls to Europe annually.

From 1510 to 1537, pearl harvesting spread. Initially concentrated on the oyster beds near Cubagua Island, harvesting later expanded to other beds off the south coast of Peninsula de Macanao on Margarita Island, off Coche Island, off the coast of the Peninsula de Araya on the Venezuelan mainland, and eventually off the coast of the Guajira Peninsula in Colombia.

The Spanish government then issued special rules to maintain the fishery and the supply of pearls. Among them were: 1) Ranches (groups of huts for sleeping and for storing oysters and pearls) would be established near the pearl oyster beds, 2) each ranch would have a large box with two locks in which to safeguard the pearls, and 3) the ranches would obtain canoes, each armed and manned by no less than 12 slaves.

In 1541, Nueva Cadiz was destroyed by a hurricane, and the site was abandoned by 1545, mainly because the pearl oysters on nearby beds had become much scarcer owing to heavy harvesting. After that, Cubagua Island was gradually deserted.

In about the year 1570, the Venezuelan State of Nueva Esparta, comprising Margarita Island, Cubagua Island, and Coche Island, was founded. Its official seal depicts a string of pearls and a canoe paddled by divers.

Slaves Diving for Pearls: Indians and Blacks

In the 1500s, local Indians were

the first enslaved to dive for pearl oysters for the Spanish; Black slaves later replaced them. Spanish government officials recognized the necessity of protecting the pearl resources and preserving the lives of Indian divers, so they issued several "humanitarian" measures. They sought to limit: 1) pearl fishing to the summer so the divers could always work in warm water, 2) the work of divers to 4 hours a day at depths not exceeding 14.5 m, and 3) the performance of extra work. They decreed that the divers should receive good food, a pint of wine a day, clothing, and hammocks for sleeping. Hammocks kept sleepers away from crawling insects, especially ants, and also lizards, scorpions, and snakes, and they are more comfortable to lie on than the damp, bare ground.

However, these well-meaning measures remained on paper and not the slightest attempt was made to enforce them, because the overseers had little concern for the well-being of their slaves. A monk, named Bartholomew de Las Casas, who apparently was present at the sites, reported that the divers were treated harshly. Even when out of breath and fatigued, they were permitted only short respites between dives. On land, they were given small amounts of food, and they had to sleep on the ground. These slaves consequently lived only about a year after they were forced to dive for their conquerers.

During the 1500s, slaves of African origin began to replace Indian slaves in many parts of the New World. The first notice of this was in 1526 when 30 black slaves were brought to Cubagua Island. A Royal Decree of 25 June 1558 prohibited the future use of Indians in pearl fishing and said that only blacks could be used for this purpose.

Mendez-Arocha (1963) quotes Francisco de Los Cobol who described some aspects of the pearl oyster fishery operations and the collection of pearls by the black divers. The slave owners rented them out to work in the pearl fishery. The boats, some with as many as 24 black slaves, left the beaches in the morning under the direction of slave masters, paddled to a pearl oyster bed, and harvested oysters.

After a sufficient oyster supply was gathered, they returned to Cubagua Island and ate some food that had been prepared by slaves left behind on the beach. They then sat around piles of the pearl oysters and opened them with knives under the watchful eyes of supervisors whose job was to prevent stealing. Each had a small bagful of pearls at the end of the day. But stealing did occur and the slaves often gave the stolen pearls back to their owner. As a reward, their owner gave them a big party along with some clothes and shoes every 15-30 days.

Pearls Valuable to Spain

During the first half of the 1500s, large quantities of Venezuelan pearls were shipped to Europe, and, in 1527, pearl production reached its maximum, 1,380 kg. From 1513 to 1530, at least 118 million pearls were harvested near Cubagua Island. Seville, Spain, became the center of the pearl market, where Garcilaso de la Vega wrote that pearls from Venezuela and Colombia were so abundant "they were sold in a heap in the India House ... just as if they were some kind of seed." Portraits of European royalty at the time revealed many pearls embroidered on their dresses and in their headdresses, necklaces, and earrings. More natural pearls were harvested in Venezuela and Colombia at this time than elsewhere over any comparable period of time before or since.

The richness of the pearl grounds in the Margarita Island-Cubagua Island--Coche Island area can also be seen from the following records of Royal Treasury officials on Hispanola; the Royal Treasury kept 20% of the pearls harvested in Venezuelan waters. In the month of January, 1529, at least 12,000 ounces (340 kg) of pearls, or the equivalent of 17 million carats were taken from the pearl beds off Coche Island. In June 1533, a vessel that sailed from Spain carried at least 340 kg of pearls. In July 1534, another vessel received for shipment 2 boxes of pearls from Cubagua Island; one contained 1,600 ounces (45 kg) of "common" pearls, while another contained 8,000 ounces (227 kg) of small pearls. On January 24, 1553, the royal officials at Cubagua Island gave several boxes of pearls to one vessel. The Treasury's record books showed that the value of pearls averaged more than 800,000 pesos annually up to 1530.

In the 26-year period between 1576 and 1602, twenty-one ships carrying pearls sailed from Margarita Island. The most important pearl merchants were in Santo Domingo and

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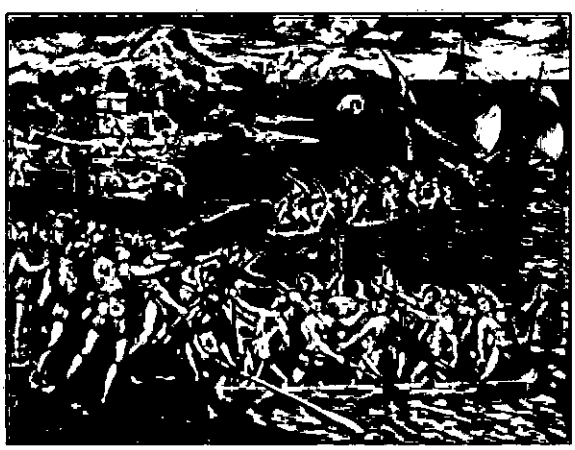

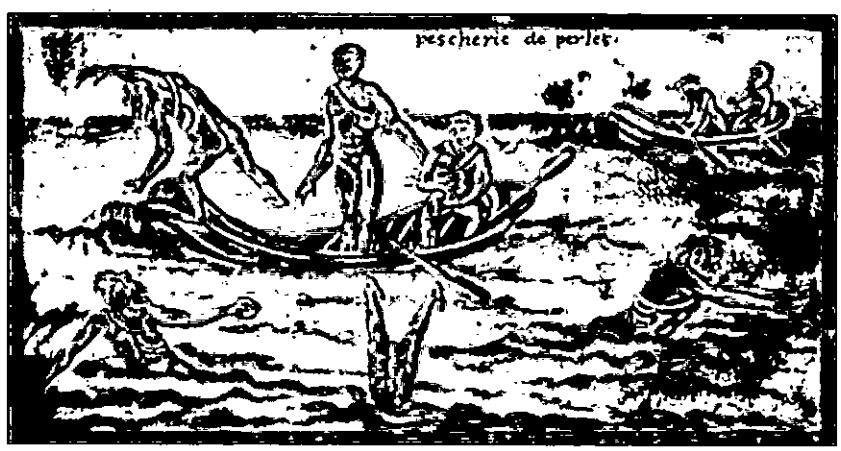

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San Juan, while the most important European markets were Seville and also Amberes, Spain; Venice, Italy; and Lisbon, Portugal.

Pearl Oyster Bed Depletions

Oviedo y Valdes (1535) said the Spaniards were so aggressive in searching for pearls they were not content with just using divers to get them, so beginning in 1528 they used nets and crude dredges. They took such a quantity that the oysters were no longer found in abundance on the shallowest beds.

In the mid 1500s, many pearl fishermen and their divers moved from the partially-depleted Venezuelan beds to more recently discovered pearl oyster beds off the coast of the Guajira Peninsula in Colombia). The pearl oyster beds were a few hundred meters to several km off the coast, where the depths were from 3 to 10 m, and they covered a total area of about 68 km. Individual beds ranged in size from a few square meters to 17 km. Most were concentrated between the latitudes of the towns of Manaure and Arema. Little is known of the pearl oyster fishery in Colombia, except that it was considerably smaller than the one in Venezuela. Pearl oyster harvesting in Colombia went well at first, but the stocks declined fairly quickly, and thereafter it may have been intermittent. Middens containing shells of pearl oysters and other mollusks are scattered along this coast from Porpoktin to Cabo de la Vela.

Most harvesting crews returned to Venezuela, where, in 1576, new pearl oyster beds were discovered around Cubagua Island and Coche Island. About 2,000 black slaves were imported to exploit them.

By the late 1500s, Venezuelan pearl production had fallen sharply, largely due to a scarcity of oysters. The harvesting rate had been rapid. Each boat sometimes collected as many as 35,000 oysters in 2-3 weeks.

Other reasons for the lower pearl production were: 1) the local Indians became deadly foes, 2) many Spaniards left Venezuela for the rich pearl oyster grounds in Panama and the Gulf of California (3), and 3) the market for natural pearls became weaker because imitation pearls were being manufactured in Venice and elsewhere in Europe, and diamonds had become became a popular gem.

1600s to Mid-1800s

Galtsoff believed that after 1600 the pearl oyster fishery continued on a gradually diminishing scale. By the 1620s, only 130 black divers were left in the Margarita Island area, and by 1683, harvesting had practically ceased. Besides a scarcity of oysters, sea-going pirates made frequent raids to take any valuable products from Margarita Island, Cubagua Island, and Coche Island, making it difficult to continue pearling as a worthwhile industry.

The Spanish colonists eventually became aware of the principle of conserving natural resources. Mosk (1934) found one report written in 1613 that said it was fruitless to take pearl oysters from the beds near Margarita Island because they were full of small oysters and to take them would be a detriment to the interests of the pearl fishery and the Royal Treasury. Otherwise, little information exists about the pearl oyster industry in Venezuela during the 1600s, all of the 1700s, and the first half of the 1800s, perhaps because it was insubstantial. On a trip to Venezuela in the early 1800's, Humboldt (1814-29), said the pearl oysters had greatly multiplied after the 1600s and 1700) due to little harvesting.

1845 to 1948

Pearl oyster fishery started up again in about 1845, and for several years thereafter an average of 45 kg of pearls/yr were landed. The oysters were harvested by divers and with dredges towed by sail boats. In 1853, the government prohibited the use of dredges, and, by 1857, the landings were only slightly above 11 kg. Between 1857 and 1895, there were small intermittent pearl landings. An ounce (28.35 g = 192 carats) of good quality pearls there sold for US$29-98 and inferior pearls for US$16-20.

In the 1890s, increased market prices for pearls stimulated a regrowth of the Venezuelan pearl oyster industry. This coincided with a period of prosperity in Europe and the United States.

In 1895, the use of hardhat gear was tried for the first time near Margarita Island, but the divers and dredgers opposed its use. In 1899, Porlamar, the principal city of Margarita Island, had 7 licensed pearl buyers.

In the early 1900s, the Venezuelan government granted concessions to individuals and companies for harvesting pearls in defined areas and for limited periods, and exacted a 10% royalty on the value of their pearl sales. It also prohibited oyster harvesting in some years when they were scarce. The total annual value of the pearls harvested was about US$350,000.

Large-scale Hardhat Diving

Beginning in 1912, the use of hardhat gear to harvest pearl oysters began on a large scale while harvesting by divers and dredgers continued in Venezuela. The hardhat divers worked at depths not exceeding about 16 m.

Cervigon provided some details about the pearl oyster fishery between 1918 and 1930. In 1918, it included about 400 boats, all using sail. There were 145 hardhat divers, about 150 dredging boats, and 100 divers. They sailed from ports on Margarita Island and from the port of Mariquada on the mainland. Most boats were about 7-7.5 m long, but some ranged to 9 m long, and they were under contract or under a manager. Individual managers had as many as 15-20 boats or 3-5 divers harvesting pearl oysters for them. The hardhat divers were controlled by 25 separate managers. Harvests were conducted from Mondays through Saturdays, and one could see the sails from the south shores of Margarita Island. During the June to December off-season, pearl oyster harvesters earned a living by fin fishing and working ashore.

Cervigon said each boat sailed back to its port and its pearl oyster sacks were transferred to floating rafts that were anchored about 50 m from

shore. Each raft had about six men and women who shucked the oysters with ordinary knives. Shucking often was done the day after the oysters were harvested, because they were easier to open and find the pearls. When the shuckers opened each oyster, they lifted the edge of the meat with their knife and looked for pearls located between it and the mantle. Another method was to spread out the meats and let them rot and dry before looking through them. It took them about 2 hours to shuck a day's pearl oyster harvest. An inspector on each raft made sure the shuckers did not steal any pearls.

Most pearls were sold in Porlamar. Through the years, the industry used various terminologies for the grades of pearls. In the mid-1900s, the pearls were grouped into four grades: 1) *de vistas* (symmetrical, good color and luster, and weighing more than 2 g and at least 7 mm in diameter), 2) *redondas* (similar to the de vista, but smaller and almost round), 3) *barroques* (irregularly shaped), and 4) *mostacilla* (poor quality and small).

In addition to these grades there were seed pearls, 1-2 mm in diameter. Between 1918 and 1924, pearls sold in Venezuela for between US$3.85-5.80/carat, depending on their shape and brilliance. In 1923, pearl production in Venezuela had a value of US$500,000. In 1932, the pearl production was 437 kg (2,185,505 carats), but it declined afterward, except for 1943 when pearl production was 1,000 kg (4,998,257 carats).

Over the years, scarcities of pearl oysters on the beds limited harvests, but when the beds were left undisturbed the oysters became more abundant as a result of oyster larval settlement and growth. During the 1900s, government authorities used this knowledge to conserve the pearl oysters by closing the fishery for a season or two and then reopening it for a season or more. In 1936, the fishery was closed but, in 1937, it was reactivated. (Note: the average landings over a period of years may have been about the same had the beds not been closed for a season or two).

Pearl Industry in Colombia

In the first few decades of the 1900s, pearl oysters were harvested off the coast of Guajira, Colombia. Most harvesting was done in the offshore area between the towns of Pajaro and Cabo de la Vela. Men harvested the oysters by diving without masks or flippers, little different from 400 years before. Four or five divers in each small boat went out to the beds, harvested, and carried the oysters back to shore, where women shucked them and removed the pearls. Local merchants purchased the pearls and sold them in Europe, mainly in France and Germany. Pearl oyster harvests in Colombia ended in about 1940.

Harvesting Regulations

Galtsoff said the harvesting of pearl oysters was regulated by the "Ley de Pesca de Perlas" established in 1944. It permitted harvesting for 4 months, between January 1 and April 30. Each year, a resolution (in a compilation of laws) of the Margarita Island Ministry of Agriculture announced the opening of the season 60 days before the opening date (Article 5, Chapter II, *Ley de Pesca de Perlas*). The harvesting in any area or part of it could be ordered closed by this Ministry. The action would be promulgated upon the information the Ministry received from the fisheries administrator regarding oyster abundances on the beds.

The Ministry could also limit the number of diving boats operating, and it could temporarily prohibit their use (Article 8, Chapter II). It also had the right to limit the number of dredges used on each boat, but it was required by law to reconcile the interests of the various classes of applicants (Article 9, Chapter II). The law (Article 10, Chapter II) required that undersized oysters (under about 5 cm long), commonly *called conchas en flor* ("shells in flower"), be immediately returned to the bottom.

Some earlier laws relating to crew sizes remained in effect:

--Dredgers: No more than the master and six fishermen were allowed on a boat.

--Hardhat divers: Only one hardhat diver and six helpers were allowed on a boat.

--Divers: Only the master and six fishermen (inclusive of the free divers) were allowed on a boat.

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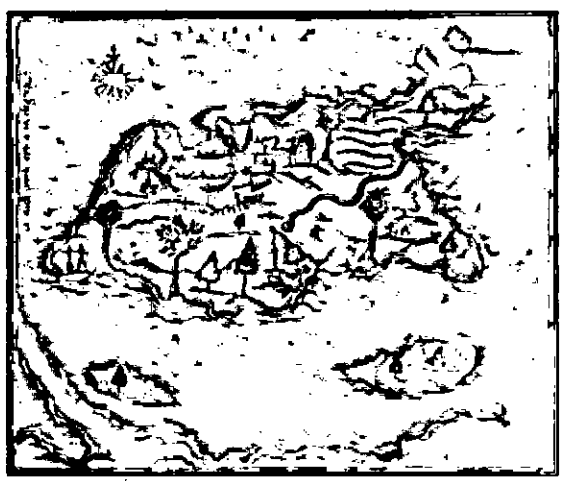

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Harvesting and Shucking

Galtsoff and Cervigon described the pearl oyster fishery and the selling of pearls in the mid to late 1940s. The same three methods used for harvesting oysters earlier in the 1900s were employed. The number of boats or units harvesting can be estimated from the number of licenses issued: 412 for dredging, 28 for hardhat diving, and 1 for diving, but the numbers of boats harvesting each day were less than the number of licenses issued.

The licenses were issued for each month and the number issued varied slightly by month. The 1945 season was the first that was limited to 4 months. Out of that 120-day period, the boats had about 60 days of effective oyster harvesting. The shorter season in 1945 allowed the oysters to become more abundant, so government officials allowed harvesting for 3 consecutive years, 1945, 1946, and 1947.

In those years, 3,000 people were directly engaged in the pearl fishery. In 1947, the landings of oysters and pearls taken by each method were 330,034 sacks (877,427 carats of pearls) by dredging, 29,003 sacks (155,000 carats of pearls) by hardhat divers, and 100 sacks (300 carats of pearls) by divers. The pearl oyster harvest was about 11,000 tons of whole oysters.

Galtsoff said the pearl oysters had become scarcer during 1947 and the administrators closed the beds in 1948. He thought the administrative control was beneficial, because it protected the oyster resource from excessive harvesting, but he recognized that the fishermen, shuckers, and their families, and the markets suffered, though, from the irregularity and uncertainty in their industry. But were the bed closings really beneficial when the fishermen left the undersized oysters on the beds anyway? Though it is difficult to know without controls, the average landings over time might have been at least as high had the seasons never been closed.

Galtsoff and Cervigon said a complex scheme of dividing the proceeds of the fishermen's catch was governed by local tradition and custom. For a dredging boat: 1.5 shares went to the owner of the boat, 4 shares went to the owner of the dredges (2 for each dredge), 1.5 shares went to the master who was responsible for selecting and finding the oyster beds, 1 share to each crewman, and 1 share to each of the two shuckers.

But the division of proceeds was different in the case of a diving boat, 50% of the money from the sale of the pearls went to the person who owned or outfitted the boat; of this amount, he paid half of the license fee and gave 33% of the balance to the diver. The rest was his. The remaining 50% was divided among the crew. First, the cost of any food and half of the license fee was deducted; the balance then was divided into 14 shares, of which 6 shares were paid to the diver, and 8 shares were equally divided among the remaining crew.

Galtsoff observed that most hardhat divers were middle aged. Younger men were reluctant to become professional divers. He believed if the trend continued the scarcity of experienced divers might lead to the complete abandonment of hardhat diving. His prediction was accurate because harvesting by hardhat diving did decline and it ended about 15 years later.

After harvesting, the pearl oysters were taken ashore to be shucked. Most were taken to Isla Caribe, where large shell heaps, some nearly 6 in high, laid about where shuckers had left them after many years of pearl oystering. The heaps had deep holes or trenches that had been dug by women and children who searched for pearls among the discarded shells.

The shucking crews lived in small cabins on the shore during the oyster seasons. They removed most of the pearls as they opened them, but they also cooked the oyster meat in drums holding about 200 liters of water to obtain any pearls that they may have missed. They stirred the boiling mixtures with paddles, and any pearls remaining in the meat were collected later from the bottom of the drums.

The shuckers saved some oyster meat for preparing simple meals for themselves, but discarded most with the shells they dropped to the ground in front of their feet. As the shells and meat accumulated, hundreds of flies swarmed around each pile. The contrast between the beauty of the pearls and the miserable working conditions of the people who produced them was striking. The average yield per sack of oysters was 4.5 carats (1-2 marketable pearls).

Selling Pearls

The fishermen sold their pearls to licensed buyers in Porlamar or directly to tourists and visitors on Margarita Island. At the beginning of the oyster harvesting seasons, there were nine operating buyers who opened their offices to appraise, sort, and purchase pearls. Fishermen brought the pearls to buyers' offices in a handkerchief or piece of cloth, and the pearls were

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spread on a green woolen cloth that covered a table. The buyer picked out and set aside the best pearls, and then, using a small, shallow silver scoop, he put the remaining pearls into a set of copper cups, 7-10 cm in diameter, with perforated discs containing holes that ranged from 1 to 6.5 mm in diameter. The largest holes retained pearls of more than 8 grains (about 2.5 carats). The buyer weighed the groups of different sizes of pearls separately and quoted his prices for them. He then poured each size grouping of pearls into small cotton bags, or wrapped them in brown paper and stored them in boxes.

In April 1948, the buyers were paying an estimated 2.5 bolivars (US$0.35)/ carat for fairly good pearls. If the fishermen thought the price was too low, they visited other buyers for a better price. Whenever the price offered by all the buyers was unacceptable, the fishermen turned their pearls over to the fisheries administrator's office in Porlamar for official appraisal and disposal of the pearls through the Government Bank.

The bank paid the value determined by official appraisers minus a 10% commission. The pearls became government property and the bank sold them when market prices were higher. In 1947, the bank purchased US$250,000 worth of pearls.

Most pearls were exported to Europe, India, and China. Pink pearls, common in Venezuela, were highly desired in Europe, while India and China imported large quantities of tiny seed pearls.

In India, many seed pearls were used to "treat" children's eyes. One or two seed pearls were placed under babies' eyelids for several minutes in the belief this made their eyes darker and shiny. Adult Indians and Chinese ate seed pearls, whole and ground into powder, because of the belief they benefitted their health. Relatively small numbers of pearls and of only the highest quality were distributed in the United States through wholesalers in New York City; they wanted only white pearls with high luster.

Venezuelan Pearl Oyster Industry, 1948-2002

During the 54 years between Galtsoff's stay in 1948 and 2002, the pearl oyster industry in Venezuela changed substantially, as pearl harvests nearly ended. This came about during the 1950s and 196's, when a massive production of saltwater cultured pearls, mainly from Japan, inundated the jewelry markets of the world. The cultured pearls were prettier, larger, and more nearly round than most natural pearls, and they sold at much lower prices than natural pearls.

By 1940, the Japanese culturists were producing about 10 million pearls annually. In later years, cultured pearls were produced by other countries bordering the western Pacific Ocean and some Pacific islands as well.

As these pearls gained acceptance, the prices of natural pearls crashed and their industries in Venezuela and other countries became tiny remnants of what they had been.

In addition, since the late 1960s, China has been producing substantial quantities of freshwater cultured pearls for jewelry markets, and they are much cheaper than the Asian saltwater cultured pearls. Freshwater pearl culture also had somewhat limited success in the United States.

After 1950, the price of Venezuelan pearls did not exceed US$1.20/carat, and, in 1961, the price was US$0.52/ carat for the best quality pearls and US$0.33/carat for the poorer quality pearls.

Such prices contrasted sharply with those during the years 1918 to 1924 when they ranged from US$3.85 to $5.80/carat. Venezuelan pearl production fell from 360 kg in 1947 to roughly 2 kg in 1969.

Fishery Changes

The changes in the Venezuelan pearl oyster fishery featured:

1. the sale of nearly all oyster meats to people for food, to provide nearly the entire income for the fishery,
2. large declines in the numbers of oyster beds, boats, and fishermen and other industry people,
3. abandonment of diving, including hardhat diving, leaving dredging as the means of harvesting oysters,
4. a switch from sails to outboard motors to propel dredging boats, and
5. a shortening of the oyster season.

The remnant harvesters and shuckers were able to keep the industry going, although on a small scale, by selling the meat beginning in about 1960. Soon afterward, government officials mandated that whole oysters had to be cooked when they were brought in from the beds. This was a sanitary measure as it was believed bacterial counts in live oysters would rise to unsafe levels in the warm air before people ate them. Cooking pearl oysters does not affect the luster of the pearls in them.

Some of the 76 beds, other than the Las Cabeceras and Los Frailes beds listed as surveyed in 1943, may still have had some oysters in 2002, but they were too scarce to support commercial harvests. Perhaps the harvesting switch to dredging was a major cause in the decline in oyster abundance. Can abundances of pearl oysters that lie on a substrate of sand be sustained when fishermen dredge intensely for the market-sized oysters each year, or, were unidentified environmental factors part of the cause? These are questions for further research.

Fewer people now are involved in the fishery. The number fell from the 3,000 in 1947 to about 300 people (fishermen, shuckers, and vendors) in 2002.

In recent years, the government has restricted pearl oyster harvesting to January and February as a conservation measure, thus shortening the season from 4 to 2 months. It issues a license to each fisherman-owner of a dredging boat for US$35 that allows him and his crew to harvest pearl oysters for a season. The license is issued to 30-45 boats. Each is limited to a harvest of no more than 10 sacks or 600 kg of oysters (about 10 bushels)/day.

During the 2000 season, estimated landings for all the dredge boats were roughly 500 tons of live pearl oysters (about 20,000 bushels). They represented a tiny component of the landings of marine products in Nueva Esparta, only about 0.2% of the total.

This contrasts with data in 1945, 1946, and 1947, when Galtsoff said the pearl landings comprised from 6.8 to 14.1% of the landings.

Status of Pearl Oyster Beds

The large Las Cabeceras bed and the small Los Frailes beds off northeastern Margarita Island have oyster abundances large enough for commercial harvesting. The Las Cabeceras bed, which begins 200-300 m east of Cubagua Island, now is about 4 km long, 2 km across, and it is under about 8 m of water. The Los Frailes beds lie just west of the Los Frailes Islands under about 5.5 m of water.

Las Cabeceras Bed

The oysters and other biota on the Las Cabeceras Bed are concentrated in dark patches that stand out from the yellow sand between them when viewed through the clear water from a drifting boat. The patches are 18-25 m across and about half of the sand bottom is covered by the patches. The oysters here are relatively young: few are more than 18 months old because nearly all oysters above 5 cm long are harvested each season.

During recent harvest seasons, from 30 to 40 boats have been dredging oysters on the Las Cabeceras bed every day during calm periods. The boats are driven by outboard motors (40-75 hp) and are mostly 6-7 m long, while the largest are 8-9.3 m long. Each day, at about 3-4 a.m., 20-30 boats leave for the bed from 3 ports on Margarita Island and about 10 come from the mainland; the latter harvest illegally as by law they are restricted to beds near the Venezuelan mainland, but they find few oysters there.

The Margarita Island boats reach the bed in about 30 minutes and each crew tosses out their one dredge to begin harvesting. The dredges do not have the wooden sticks on their bottoms to protect their meshes that Galtsoff had described because this bottom is entirely sand. The fishermen probably dredge up and return nearly all the biota and shells lying on the bed at least once during every harvesting season.

MANZANILLO--LOS FRAILES AREA

A tiny industry harvests and processes mussels and pearl oysters in the Manzanillo--Los Frailes area. During the oyster season, on every day with light to moderate winds, two boats from Manzanillo motor about 12 km to the beds off the Los Frailes islands. Each boat has about five men, all divers, who take turns harvesting mussels and oysters using hookah outfits (equipment that includes an air compressor on the boat and a long air hose to the face mask worn by the diver).

Considerable fin fishing takes place in the area, so the harvesting is done by diving because it is believed dredging will degrade the fish habitat. The two boats harvest a total of 30 sacks of mostly mussels, but also some pearl oysters. They are sold to shucking groups in Manzanillo.

Processing & Marketing Oysters

Most oysters harvested from the Las Cabeceras bed are processed on the shores of Punta de Piedra, Margarita Island. Each boat has a location on the shore where its harvested oysters are cooked and shucked.

The boats return to shore with their oysters at 7-10 a.m. The fishermen in each boat carry the sacks of oysters ashore and set them beside 1-2 tubs of boiling water heated by gas torches. They then wade in the water and anchor their boats perpendicularly to shore.

Two members of each crew, using a 2 m stick, then lift one of the sacks into a tub and leave the oysters cooking for 20 minutes. Using the stick, they then lift it from the tub and empty the steaming oysters onto a table surrounded by a crew of sitting shuckers, and then continue handling the remaining oysters in the same manner.

The shuckers typically are the wives and children of the fishermen. They open the oysters with kitchen knives and toss their meat into a common bowl in the center of the table. Every few minutes, the shuckers toss an oyster or mussel meat into their mouths to eat. A group of 8 shuckers opens a sack of oysters in 10 min.

In Manzanillo, the mussels and oysters are also cooked in tubs, shucked, and the meat is sold. Any excess of live mussels and oysters is stored in baskets subtidally along the Manzanillo shore.

About 80% of the oyster meat on Margarita Island now is eaten in soups and stews, and some are creamed. The women shuckers take some meat home to eat, and the men take the bulk of it to sell. Buyers pay the fishermen US$2.00/ kg for the meat, and sell them for US$2.67/kg to local food markets, restaurants, and hotels.

The meat is also peddled along the streets, where vendors add chile and onion and carry them warmed in a pan on their heads. Customers purchase them in plastic bags to eat as a snack.

On swimming beaches, different vendors sell some pearl oysters along with mangrove oysters, *Crassostrea rhizophorae,* both raw on the half-shell for $1.30/dozen, on paper plates to small family parties or groups of friends. People eat them and then toss the empty shells and plates into 50-gallon waste barrels. Fishermen harvest the mangrove oysters in La Restigna Lagoon on Margarita Island. The meat of raw and cooked pearl oysters is far more "chewy" and has a poorer flavor than mangrove oysters that are somewhat sweet. The remaining meat is ferried to the mainland where it brings about US$4.00/kg.

Selling Pearls and Shells

As they open the oysters, shuckers find a small number of marketable pearls and save them in their pockets. The pearls are sort of a prize or bonus for the shuckers, who sell their small collections whenever they need some extra money. Each makes US$80-100/ year selling pearls to dealers, such as Flor Avila-Vivas, the largest pearl wholesaler in Porlamar, to jewelry shops, to tourists on beaches, and some at their doors.

In 2001, Ms. Avila-Vivas bought 2 kg of pearls from 25 to 30 families. They bring these to her in vials (about 150 pearls/vial), small match boxes, and

"Atlantic Pearls" to page 20

"Atlantic Pearls" from page 19

little bags. She purchases the pearls by weight. A vial of pearls typically brings fishermen US$6.67. She has little sale for tiny seed pearls, but the shuckers insist she take them. They also bring her some blister pearls; pearls which are attached to the inside surfaces of oyster shells. Ms. Avila-Vivas' shop also cuts some shells that are especially shiny into round or oval shapes and sells them as pins and necklaces. Shuckers bring her fewer pearls each year as the oyster stocks are believed to be dwindling.

Recommendation for Oyster Bed Management

Galtsoff recognized that oyster abundance would increase if shells were spread on the harvesting beds, and he described and photographed the large shell piles on Isla Caribe that were available for this purpose. But he believed more biological information was needed to determine the periods of intense setting of oyster larvae and the locations where the larvae set most densely before this was done.

He recommended studying the effects of oyster predators and possible parasites and diseases. The length of Galtsoff's stay in Venezuela was too short for him to implement any of his recommendations. Some studies relating to biology were carried out later, though these may have been done without knowledge of Galtsoff's recommendations. For example, the timing of oyster spawning and setting of larvae are now known, but shelling the beds was hardly ever done. ❖

Sources: *Luna commons.org*

Ed. Around the time we came across the above article, we were sent the following brief piece on what is occurring these days on Cubagua which ties in with the history of pearling in this area. We include it in its entirety, to depict the ravages of pearling when it is allowed to go unchecked. It is a cautionary tale for

CUBAGUA JOURNAL

In Venezuela, Trying to Map Out Blueprint for Lost City

By SIMON ROMERO
Published: February 24, 2009

Nueva Cádiz was the hub of a commodities boom by 1515.

CUBAGUA, Venezuela — The first living things to greet a visitor on this desert island are the dogs. More than a dozen roam through the ruins of Nueva Cádiz, as if signaling that the city that flourished here five centuries ago at the start of the European conquest belongs to them now.

Scholars and archaeologists occasionally drop by the ruins of Nueva Cádiz for a glimpse into the dawn of the Spanish conquest.

Nueva Cádiz was the hub of a commodities boom by 1515.

Amid their howling, a weathered sign next to a garbage pile briefly describes the rise and fall of Nueva Cádiz, by 1515 a slaving center and the flash point for Latin America's first frenzied commodities boom, built around pearls. By 1541, the sign says, "The depleted oyster beds put a final end to the city."

So it went for Cubagua. Before the conquistador Hernán Cortés plundered the riches of Mexico's Aztec empire, Spain established a thriving outpost here on one of the Lesser Antilles's most desolate islands, which is so dry that water supplies have to be imported from the mainland and nearby islands (as they were for Nueva Cádiz).

Spanish officials sent the enslaved here and killed off Caribbean ethnic groups, like the Lucayans brought from the Bahamas as pearl divers. The Spanish laid out avenues and built an imposing city of limestone that was intended to serve as a base for conquering the rest of South America. Then, suddenly, they abandoned it.

Nueva Cádiz is now largely forgotten, even in Venezuela. Scholars occasionally drop by for a glimpse into the dawn of the Spanish conquest, and archaeologists sometimes obtain permits to dig here. Otherwise Cubagua's ruins, which might rank among the most important post-Columbian archaeological sites in the Americas, are a lost city — in effect, if not in name.

"To this day I do not understand why anyone would build a city here," said Enrique Suárez, 60, a fisherman who lives in a house built of driftwood and discarded tin on the edge of the ruins.

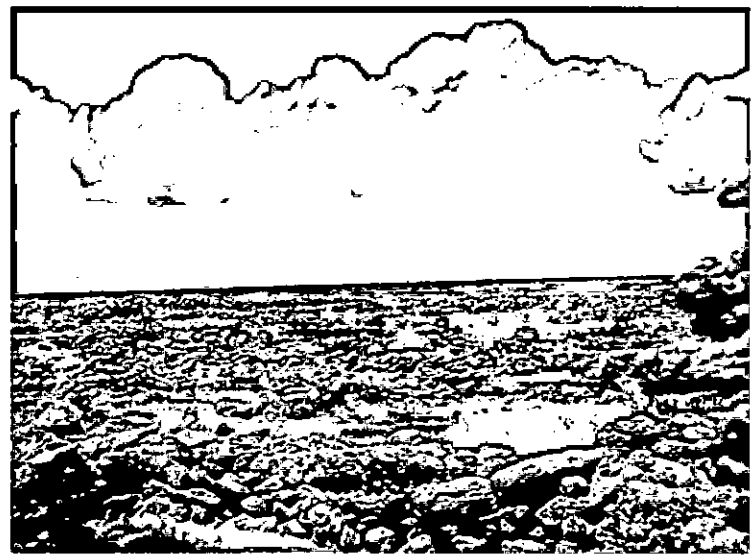
Left vulnerable to the elements and mainland looters, the city's walls now stand no more than a few feet high. A concrete historical marker erected in the early 1990s lies ravaged by vandals.

Cubagua's entire population today numbers fewer than 100, all of them fishermen like Mr. Suárez and their families. They live on what they catch, in Mr. Suárez's case on a recent morning a stingray that he was drying in the scorching

sun. Later, he said he would prepare the stingray with some salt and garlic.

For diversion, he raises fighting cocks and feeds some of the feral dogs. Apart from his small boat, his only mainland tie seemed to be a red flag on his roof emblazoned with the letters P.S.U.V. — the initials of President Hugo Chávez's Socialist party and a symbol of a revolution that has not yet arrived in Cubagua.

"We are living in almost complete solitude out here," Mr. Suárez said, "and that is the way we like it."



Scholars and archaeologists occasionally drop by the ruins of Nueva Cádiz for a glimpse into the dawn of the Spanish conquest.

Archaeologists occasionally disrupt this idyll. Last year, a team led by a Venezuelan, Jorge Armand, disembarked here and found shrubs and garbage covering the ruins. The fishermen were using the ruins of Nueva Cádiz as an open air outhouse, Mr. Armand said.

"Here was a city built by the Spanish to last five centuries, and today it is hardly even on the margins of our consciousness," Mr. Armand said. "Paradoxically, thanks to this neglect, the ruins have been more or less preserved."

Before Mr. Chávez rose to power a decade ago, developers planned to build one of the Caribbean's largest resort complexes on Cubagua, with 8,000 hotel rooms, two aquariums, a highway system, two 18-hole golf courses and a desalination plant to provide fresh water. But opposition from environmentalists and historians scuttled the project.

About two years ago, Mr. Chávez's government unveiled its own plan to develop Cubagua, roughly a 10-square-mile outcrop. It called for a small port, a museum, a school and a health clinic, and for the fishermen to be trained so they could go to work in tourism cooperatives.

But money for the project vanished from the Institute of Cultural Patrimony, according to published reports in Caracas. Mr. Armand called in January for a federal investigation into claims of corruption surrounding the project.

The wait for justice in Venezuela can take years, decades, perhaps longer. Meanwhile, Cubagua still beckons to the occasional wayfarer, like Peter Muilenburg, who wrote an account in the 1990s of the island's place in Caribbean history, describing its "anarchy, greed, and wealth."

Tourists snorkeled amid wreckage off the island of Cubagua, a 10-square-mile outcrop in the Caribbean.

Stephen G. Bloom, an American who is publishing a history of pearls this year titled "Tears of Mermaids," traveled to Cubagua in 2008.

"There were a bunch of wild dogs guarding something of amazingly valuable historical importance," said Mr. Bloom. "I found it immensely sad."

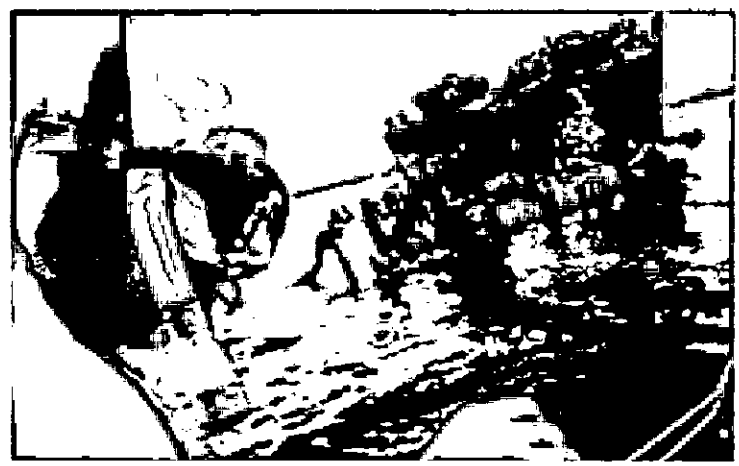
Archaeologists and economic historians also see a parable for today's oil-rich Venezuela. Nueva Cádiz exploded as a New World epicenter for commodity exploitation, and fell just as quickly when the population of oysters in its hammerhead-infested waters crashed after just a few decades.

"Will other areas of Venezuela resemble Cubagua when the oil industry disappears?" asked Mr. Armand, the archaeologist.

Skeptics counter that it is far too early to even pose such a question. Venezuela, after all, boasts some of the largest oil reserves outside the Middle East.

But even that bounty may not shield complex oil projects from obsolescence someday. Competition from new energy technologies moves forward. Abrupt shifts in the global economy whipsaw different industries. As a former Saudi oil minister once put it, the Stone Age did not end because we ran out of stones.

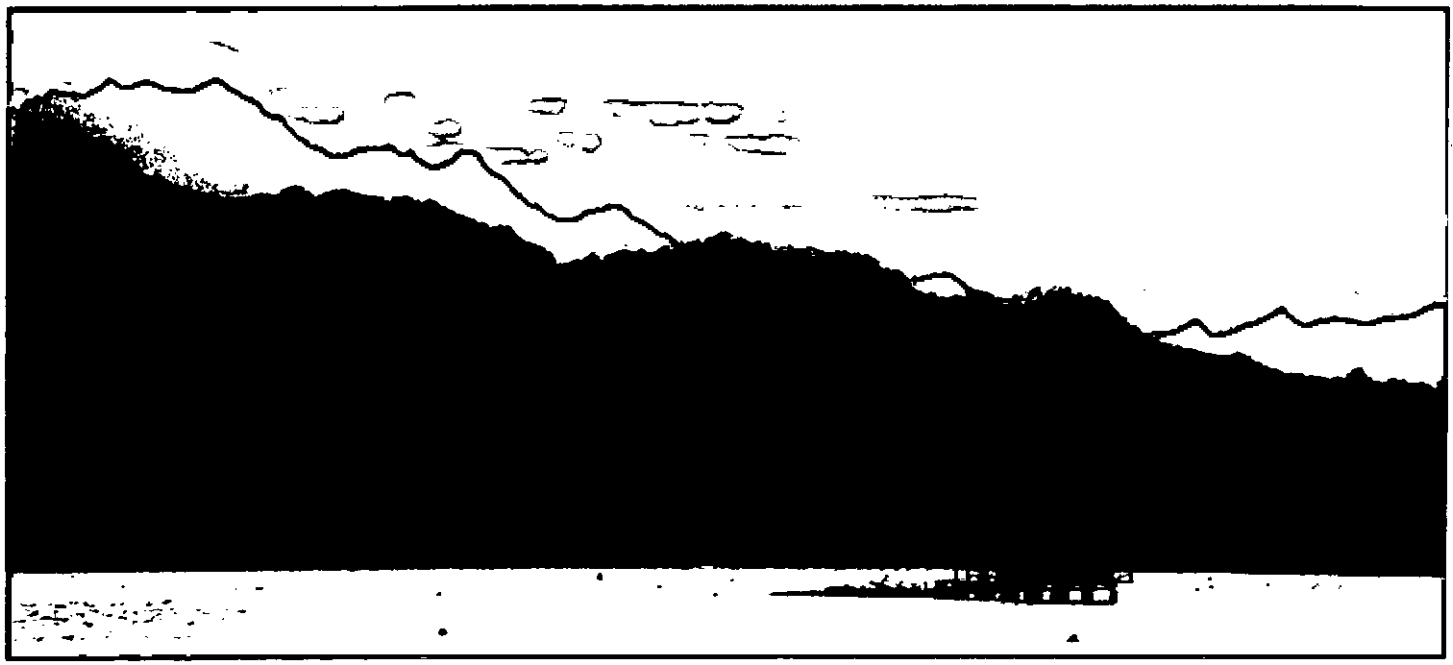
The pearl industry's evolution points to one possible outcome. Even today, Cubagua's fishermen still find tiny pearls in oysters. But even if these pearls resemble the gems once lusted after by European royalty, they are nearly worthless compared with the gumball-size pearls now cultivated in Asia.



Tourists snorkel amid wreckage off the island of Cubagua, a 10-square-mile outcrop in the Caribbean.

"The oyster's meat is now worth more than its pearl," said Cornelio Marcano, 37, a fisherman who lives on Cubagua. "After all, what is more important?" he asked. "Food for one's belly or a pearl?" ❖

Source: Meridith Kohut for *The New York Times*.



J HUNTER FIJI PEARLS

It's that time of year again when J Hunter Fiji Pearls makes its annual trek to Japan to hold its annual auction of exquisite Fiji pearls. This year, the event is to be held in Yokohama on June 29th. Those lucky enough to be invited to this auction and fortunate enough to bid on and win the lot of their choice, will have an array of exquisite colors, shapes and sizes to bring home to work with.

We were delighted to receive their first newsletter (which came out this past May), and reacquainting ourselves with the company's philosophy which the founder, Justin Hunter, expressed so eloquently: "Our newsletter will come to you along with our harvests, twice a year. We hope you will get to know us better and will learn what is important to us as a company and as individuals.

"J Hunter Pearls is about community. We are farming pearls in partnership with the Fijian people, while working to protect the environment.

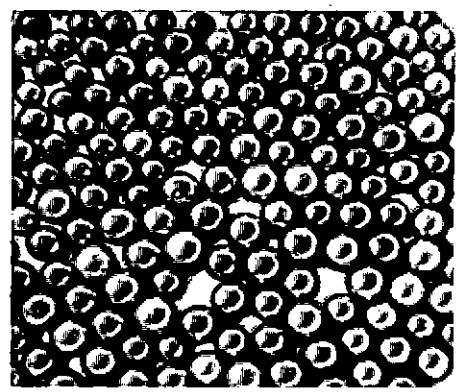
"J Hunter Pearls is about beauty. Our focus is on creating natural gems that surpass your expectations. We want to thank each and every one of you who have contributed to our success."

One designer's vision

A celebrated New York City designer, Donna Vock of Donna Vock Designs and Provockative Gems, NYC, featured these Fiji Pearls in her orchid centerpiece for the NY Botanical Garden Annual Orchid Dinner. Donna was honored with her design (below) being selected to grace the President's table.

Movers and the shakers of the country attended this event which raised over $600,000 for one of New York's premier cultural institutions.

When asked to create a centerpiece for the Annual Orchid



Dinner, Donna replied, " I immediately dreamed up a festive homage to a place near and dear to my designing heart, Fiji! Not only do more than 300 varieties of orchid call the island home, it also happens to be a place where the world's most colorful pearls are now being cultivated.

"Unique among gemstones, pearls are organic. And like these amazing orchids, their colors are natural. Fiji pearls are remarkable for their intense hues and are featured prominently in my fine jewelry collections."

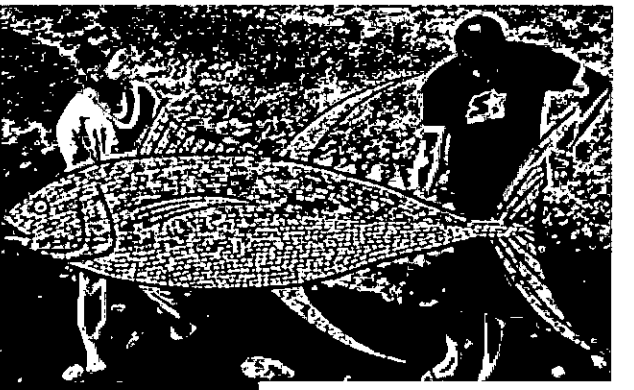
Community involvement

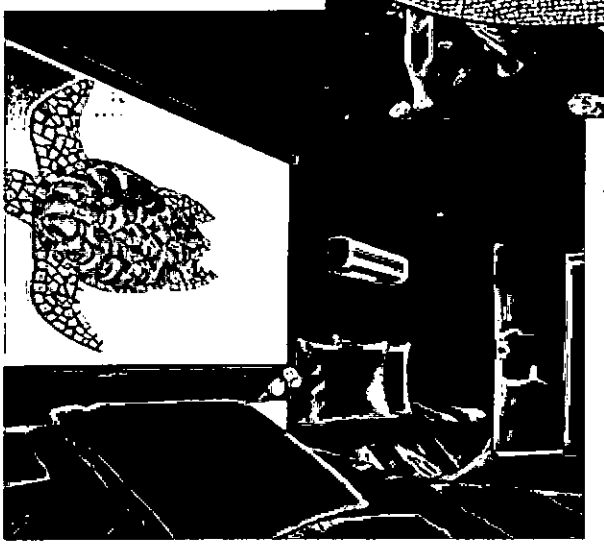
One of the unique aspects of the J Hunter Fiji Pearls operation is its adherence to Fijiian cultural considerations. One fine example is J Hunter Fiji Pearls' new farm which is a 240-hectare lease in Buca Bay, just off the island of Kioa, granted by the Department of Lands last year which is located in pristine waters, ideal for farming expansion.

"It is encouraging to be working with a wonderful group of fishing right owners led by the Kioa Island Council and the Turaga Tui Cakau, Ratu Naigama Lalabalavu who has great vision for his people. We are honored to work with him and his people to bring much needed jobs to the Kioa area," said Justin Hunter.

Another example of community involvement is the company's involvement in the area of native arts and crafts. A keen advocate of local art, J Hunter Pearls has commissioned Savusavu based artist Katrina Brown over the last two years to create a series of sea life from the mother of pearl shell.

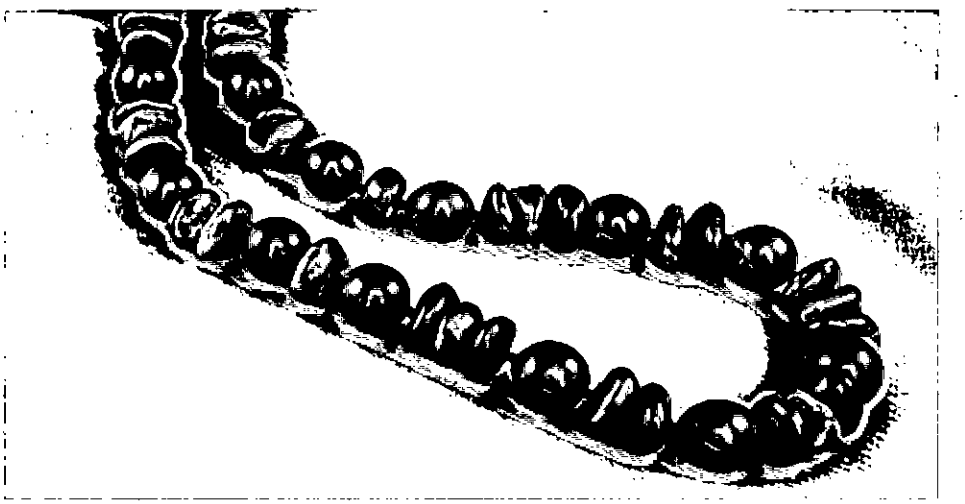
Working with mosaic for over a decade, Katrina fell in love with the organic nature of the shell and set to work on creating spectacular MOP pieces for sale by J Hunter.





"In Fiji we are limited with the range of tiles available in stores. Given the opportunity to work with the mother of pearl shell was thrilling because of the range of colors and reflective nature of the shell.

"I have always focused on our beautiful marine life and working with the oyster shell has added another dimension to my mosaics and allowed me to explore a whole new direction," said the artist. ❖



Above: Fire and Ice were the inspiration for this necklace, combining the warmth and silkiness of J Hunter's renowned copper colored baroques with the glitter and texture of glacial colored keshi pearls. 10.8 -12mm, 18".

Right: We invite you all to visit us in Savusavu and see firsthand why J Hunter's pearls are so special.