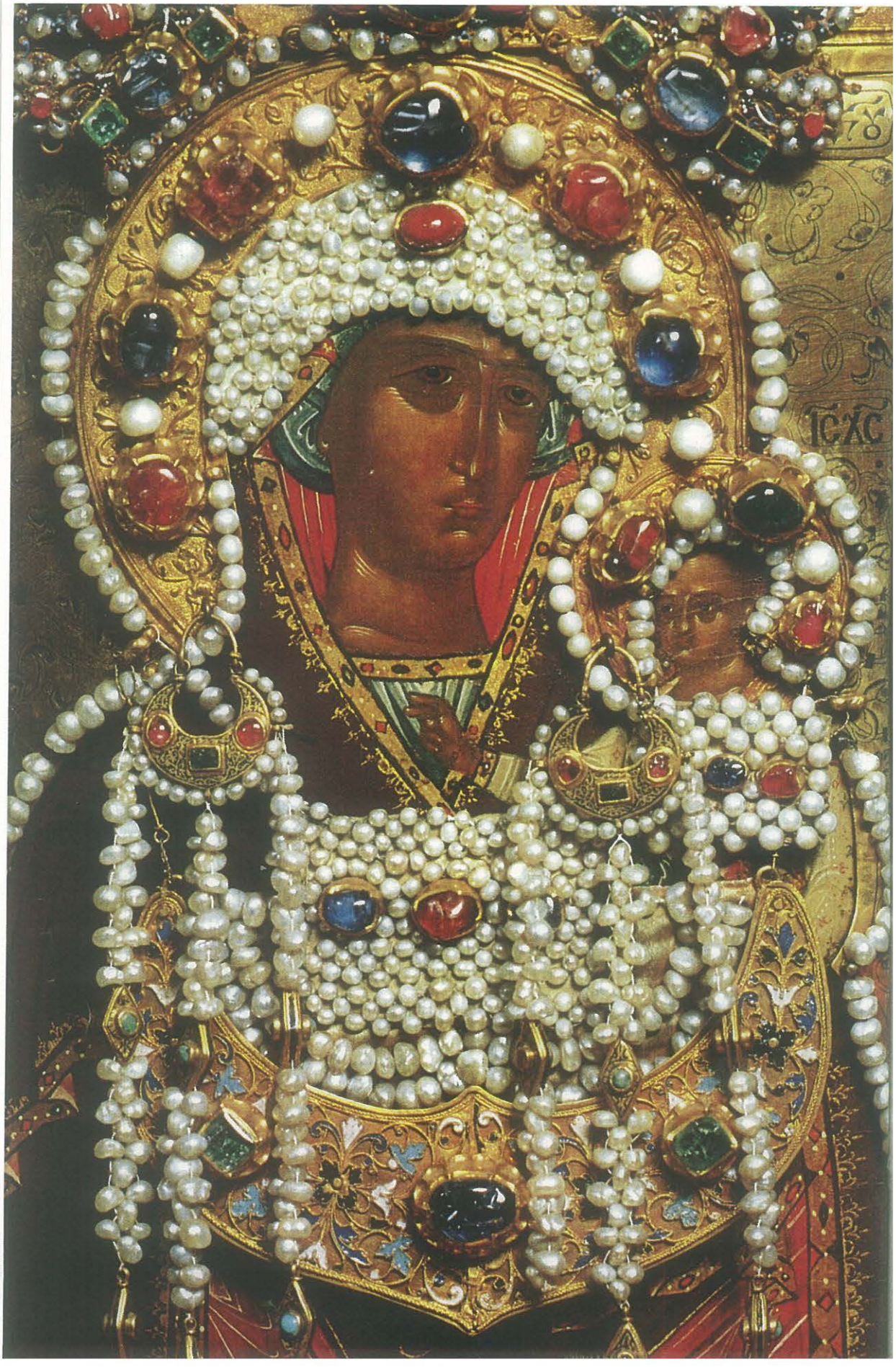
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The Pearl

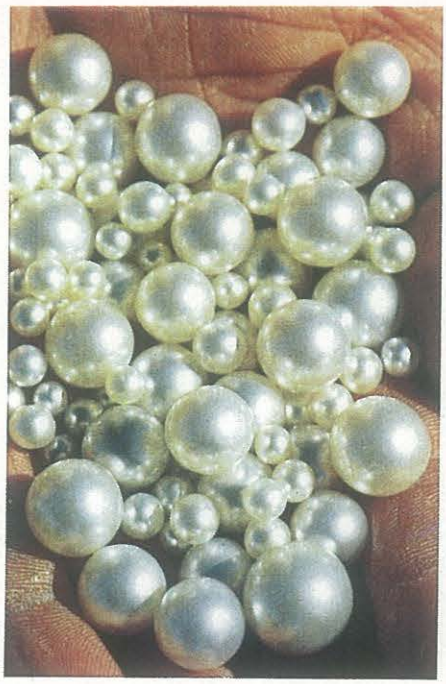
ARTICLE AND PHOTOGRAPHS BY
FRED WARD
BLACK STAR

Again, the kingdom of heaven is like unto a merchant man, seeking goodly pearls: Who, when he had found one pearl of great price, went and sold all that he had, and bought it. MATTHEW 13:45-46

THE EARLY AUTUMN AIR was chill and crisp, and we hoped a clear sun would soon warm us. In the distance a few birds made their statements, but the overpowering sounds were from an endless series of tugs dragging their barges downstream and the droning "thump-thumps" of our gasoline dive compressor. Sitting across from me in a flat-bottomed boat in the middle of the Tennessee River, John Latendresse, thinning hair slicked back, cigarette in one hand and his third Diet Coke of the morning in the other, was the very picture of a man with a mission. Considering the chocolate-colored water, the president of both the Tennessee Shell Company, Inc., and American Pearl Farms accurately observed, "I don't suppose this looks too much like pearl country."

John, as wily, dedicated, and opinionated an entrepreneur as any Yankee trader, manages his global affairs from Camden, a tiny backwater Tennessee town. Ironically, in a business conceived and controlled by Japan and tightly guarded as a national secret, the very heart of cultured saltwater pearls *(shinju)* is a purely American product.

Cultured pearls represent a somewhat forced partnership between man and mollusk that exploits the creature's ability to secrete concentric micro-layers of protective coating around foreign material. Implanting a shell nucleus and live tissue stimulates the production of the coating, called nacre, in the same way that mollusks form mother-of-pearl and natural pearls. "And I sell 60 to 65 percent of all shells used for those cultured-pearl nuclei," John said. "It's kinda satisfying, walking anywhere in the world, looking at a woman, and knowing that most of the necklace she's wearing came from right here."



*"**The hidden soul** of the oyster" to an ancient Chinese scribe, the pearl was among the first gems to adorn mankind. In the great religions it stands as a symbol of virtue, wisdom, and wealth. A veil of more than 700 natural pearls proclaims adoration for Madonna and Child on a 16th-century Russian icon (**facing page**).*

*Today the culturing of pearls makes them more available and affordable. Still, this exceptionally fine clutch of large cultured pearls and smaller natural finds from Australia (**above,** actual size) carries a price tag of $90,000.*

ICON: TREASURY OF THE MUNICH RESIDENCE, 35.5 BY 27.5 CM

"Right here" means the muddy bottoms of the Tennessee and Mississippi River Valleys, where divers crawl visionless in water so murky that counting their own fingers is impossible. John picked up an eight-inch-long washboard mussel the diver below had just tossed up. "The Japanese keep telling the world their nuclei by law have to be from the American pigtoe mussel, and that's bunk," John emphasized as he pitched the shell aside for another. "We haven't used those in quantity in years, since the agricultural pesticides got to 'em. We sell ten different mussel species [family Unionidae] and depend on four. The washboard alone is 50 percent or more of the business, and here's the reason." He grabbed an opened shell between thumb and forefinger. "See how thick this part is, nearly an inch, near the hinge? No others in the world have such composition and thickness. Ha, you can bet the Japanese wish there were. They must depend on the U. S. and on me because there's no other source. They can get up to 20 high-quality nuclei, or *kaku,* from each shell."

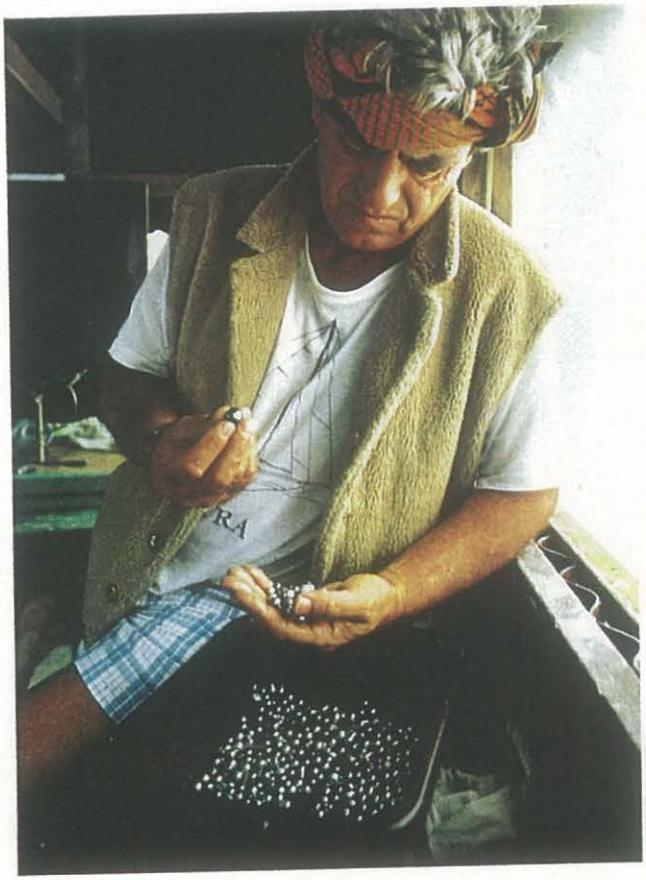
Needing John's American shells is relatively new because until this century all pearls, whether saltwater or freshwater,

were natural. Maurice Shire is a New York gem dealer with a lifetime of pearl experience. Courtly, gray-haired, and relaxed in a loose blue sweater at his Fifth Avenue office, he quickly warmed to the subject of naturals, obviously a first love.

"In the 1920s there were over 300 U. S. natural-pearl dealers. By the 1950s we were down to six, and now none. With no supply and no market, the business is dead." Maurice explained: "A natural pearl is pearl throughout, but a cultured pearl is mainly shell-bead nucleus with a very thin pearl coating. Look at an X ray to see just how

Tending a precious crop, *divers scrub garlands of* Pinctada margaritifera*—the black-pearl oyster of French Polynesia—here suspended in the lagoon of Marutea, an atoll 990 miles southeast of Tahiti. The pearls they hold, like virtually all sold today, are cultured. Using a process developed in Japan at the turn of the century, technicians earlier inserted shell beads that the oysters coat with nacre—the substance that also lines the shell as mother-of-pearl. Worldwide, of 100 oysters seeded, half may die or reject the bead. With luck, 20 of the harvested pearls will be marketable. Fewer than five will be gems.*

Beauty within the beast, *a 14-millimeter black pearl, shown life-size, emerges after two years in Marutea's lagoon. Reaching a foot in diameter, South Sea oysters produce pearls as large as 20 millimeters. Only a few species of oysters and freshwater mussels create quality pearls. Although color normally reflects the mother-of-pearl, variations abound. Pearls from the black-lipped oyster range from greenish black to light gray. And a single oyster can create pearls of different hue.*



Thousands of dollars in hand, *Jean-Claude Brouillet* ***(top)****, proprietor of Polynesie Perle on Marutea, examines part of his 1984 harvest of 22,000 black pearls. Oysters are hoisted ashore* ***(above)*** *during the winter, when nacre production slows and color and luster improve.*

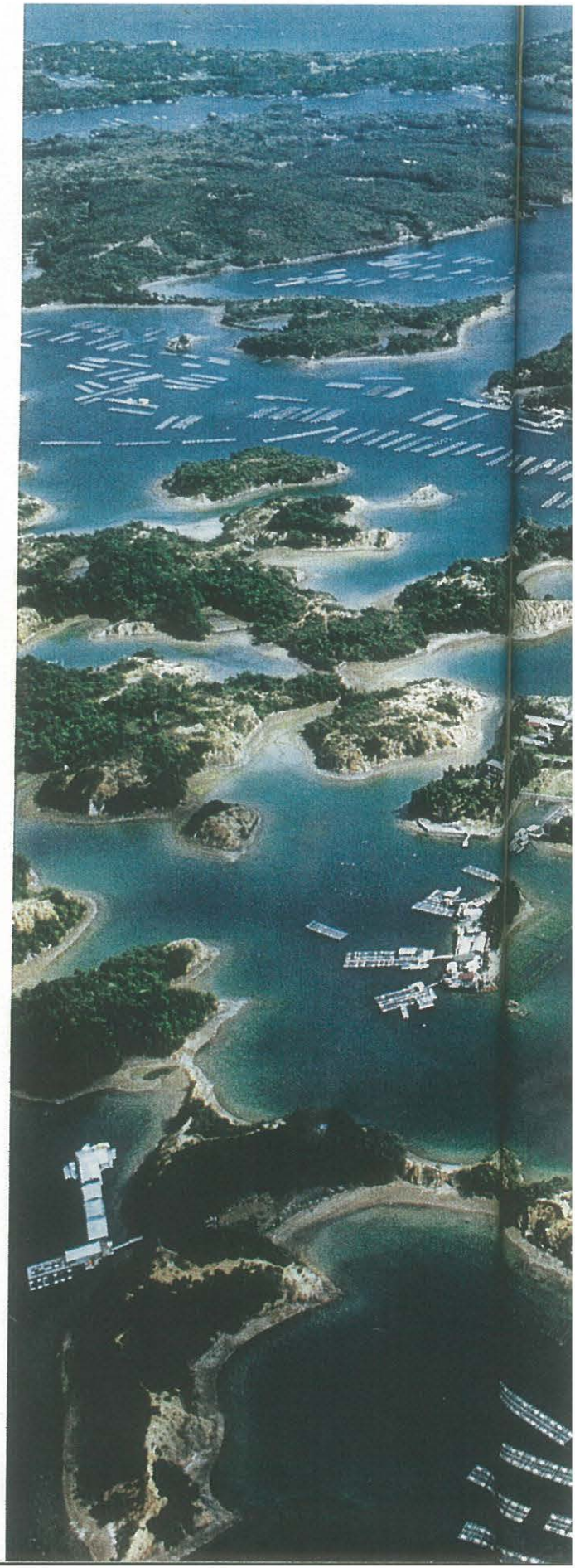
little pearl there is compared to bead. Genuine pearls—caused by an irritant such as a piece of shell, a snail, but probably not sand—are true accidents of nature that have a depth and luster and orient seldom found any more. But such treasures were always rare. Thousands of oysters had to be collected to produce only a handful of naturals, and most of them were off-color and not round."

Accumulating enough for a matched necklace used to take years. Trish Grey, an Australian pearl farmer, later emphasized that her firm once brought up a hundred tons of shells for mother-of-pearl sales without finding a single natural worth $100.

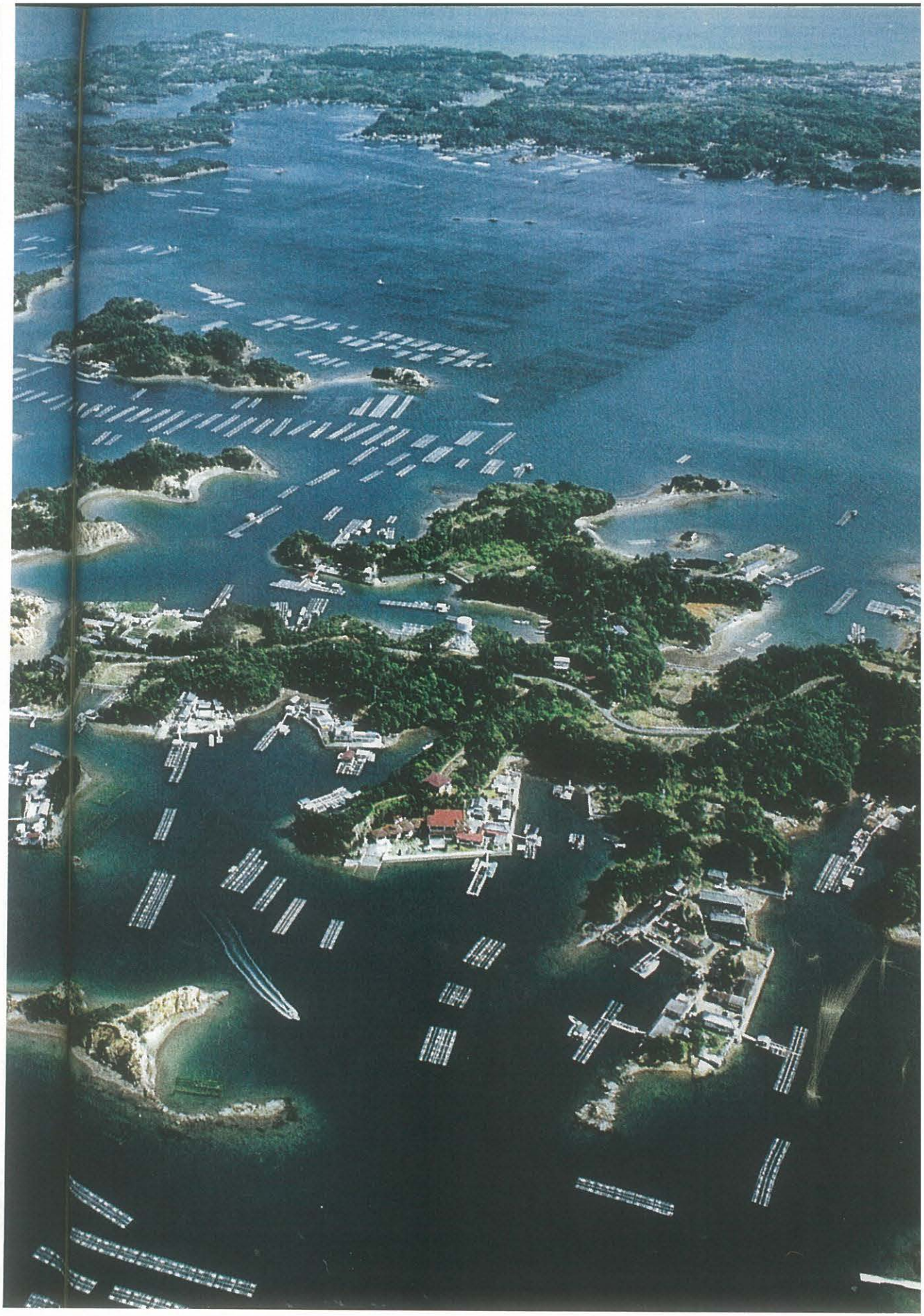
PEARLS are among the oldest and most universal of gems, indicators of wealth in the Bible, the Talmud, and the Koran. Unlike precious metals worked from ore or stones that needed to be faceted and polished, pearls arrived in an already beautiful form that ancient peoples could use. As I was to discover, Japanese technology and business drive have combined to alter nature's product considerably.

Before 3500 B.C., when American Indians and European tribesmen huddled in caves, civilized Mideast and Asian societies treasured pearls as supremely valuable possessions, rhapsodizing over them as symbols of purity, chastity, and feminine charms. Later, from the financial and marketing center in Bombay, the jewels found their way into royal collections throughout India, Persia, Egypt, and beyond.

Not all uses were so esoteric. American Hopewell Indians collected freshwater pearls by the thousands, to adorn themselves and to accompany the dead in crematory basins (page 221). Accidentally cracking their teeth when feeding on north-coast oysters caused Australian Aboriginals to consider pearls an inconvenience. Their children used the "worthless" nuisances as marbles. For thousands of years, until oil

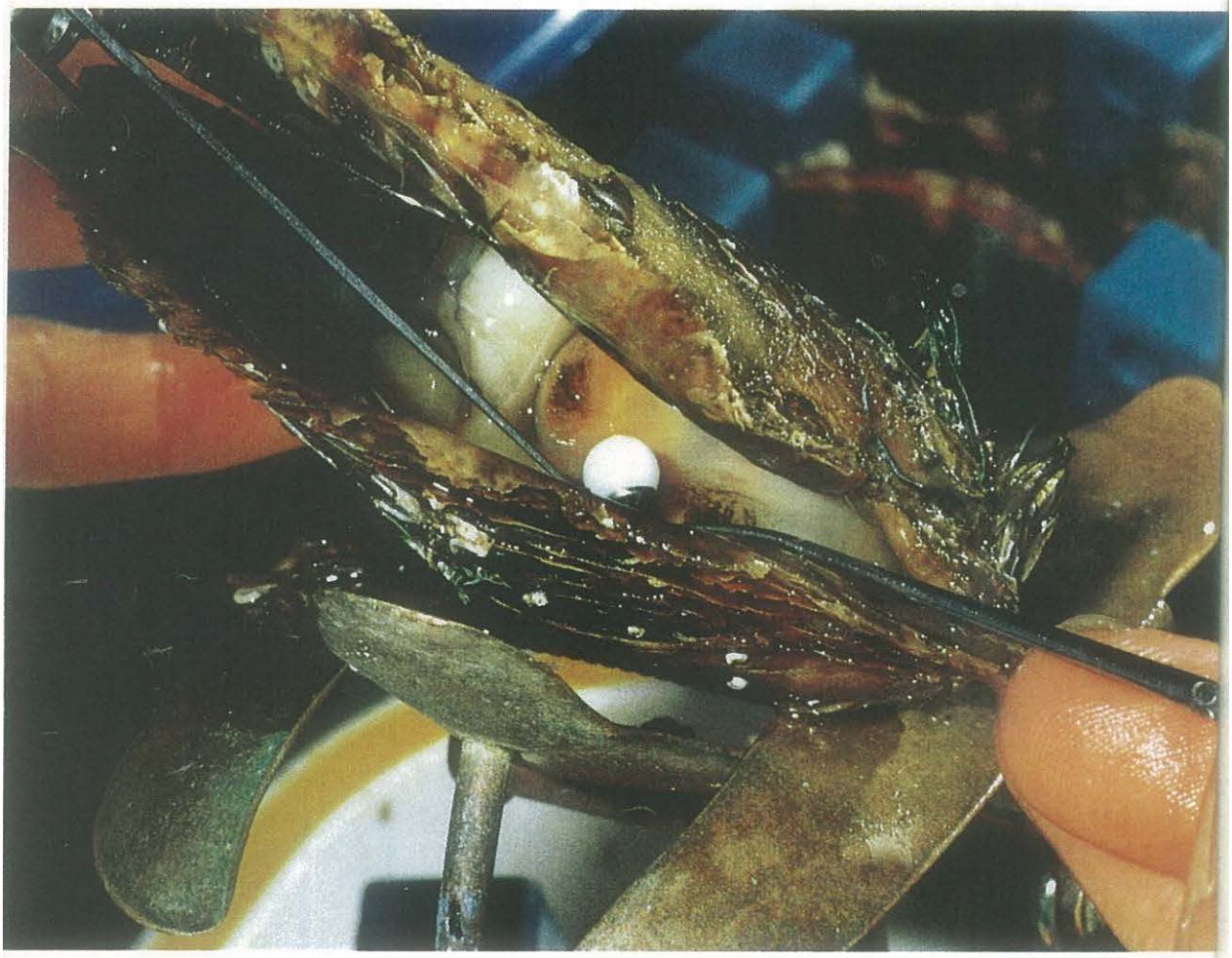


Cradle of the cultured pearl, *Japan's Ago Bay remains a lifeline of many pearl growers, whose bamboo rafts anchor baskets of akoya oysters. Japan guards culturing as a national resource and controls most of the pearl market.*



operations replaced pearling after World War II, the Persian Gulf provided most of the world's saltwater gems, and the small island of Bahrain, with its thousands of divers, was the industry's center.

WITH TODAY'S PEARLS available to almost any working woman, it is practically impossible to comprehend the extraordinary values our ancestors placed on the oyster accidents. Contemporary strands are relatively inexpensive because they are made from plentiful cultured pearls, which Bert Krashes of the Gemological Institute of America calls "semimanufactured products." Compared with other gems, the average cultured pearl is not costly. A necklace for $1,000, which may seem high, might have 56 beads, thus retailing at under $18 a pearl. Pricing was quite different with the

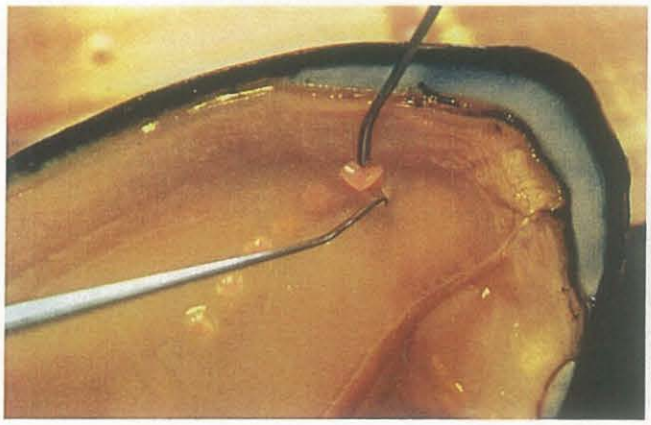


ancients, who had no regular supplies. Pearl fever reached its height in Rome. The historian Suetonius reported that the Roman general Vitellius paid for an entire campaign by selling just one of his mother's earrings. Pliny the Elder wrote in his *Historia Naturalis* that by the first century B.C. pearls were first in value among all precious things.

The craze reached its zenith at a remarkable banquet where Cleopatra is said to have wagered Marc Antony that she could give the most expensive dinner in history. As the astonished foreigner watched, the queen sat before an empty plate and a goblet of wine (or vinegar). Removing one of her huge, matched-pearl earrings, she crushed and dissolved it in the liquid, then drank. When she offered Antony the remaining earring, the bet was declared won. Pliny wrote that those pearls then were worth 60 million sesterces, or 1,875,000 ounces of fine silver.

The whole world of pearls changed between 1920 and 1930 as cultured pearls from Japan almost totally replaced naturals. Over the centuries many had tried to entice oysters to make more and better gems, but the encrusted mollusks held their secrets as tightly as their locked shells. The Chinese were successful with their famous pearl Buddhas, a steady product from the 12th to 20th century (page 216). Several small Buddha carvings of ivory, wood, stone, or metal castings were left cemented to the insides of freshwater mussel shells until they were coated with nacre, a technique used today in salt water to make *mabes*, or half-pearls.

The oyster's tantalizing mystery remained until the turn of this century, when three Japanese, working alone, almost simultaneously discovered secrets to pearl culturing that made the entire business possible. Tatsuhei Mise, a teenage carpenter,



With the deftness of surgeons, *operators nucleate three-year-old akoya oysters at the Mikimoto pearl farm in Ago Bay* ***(left top)****. After being crowded on a rack, an oyster relaxes and opens when alone. A wedge holds the gap until a clamp pries it wider for the insertion of a shell-bead nucleus* ***(left)*** *in a tiny slit made in the body. A snippet of another oyster's mantle must also be inserted to start nacre production. Weakened by being raised in captivity, few akoyas can now take beads larger than eight millimeters.*

Japan's freshwater-pearl culturing began in Lake Biwa in the late 1920s. Implants of mantle in the mantle of the iketcho *mussel* ***(top right)*** *yield pearls of nearly solid nacre in three years. Opened here, the mussel is usually parted less than an inch for the implant.*

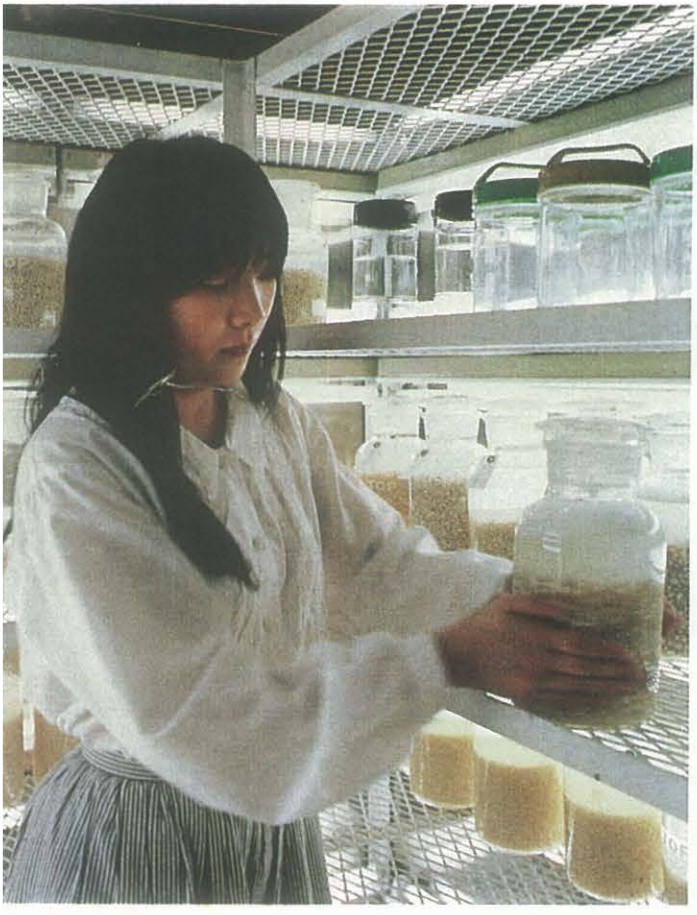
In the Shintone River, far from increasingly polluted Lake Biwa, innovative pearl farmer Syoichi Kitao has married the two culturing techniques by also nucleating mussels with shell beads for South Sea-size pearls ***(right)****. This one of ten millimeters might bring $1,000. His record is 17 millimeters.*

and Tokichi Nishikawa, a government marine biologist, separately reached the same vital conclusion: Excretions from the oyster's mantle tissue create mother-of-pearl. Imitating nature, these two experimenters inserted small mantle particles along with nuclei. Amazingly, their oysters yielded round pearls. So, after centuries of trials, the enigma was deciphered in less than a decade in a single feudal country.

The extraordinary work of both men was totally eclipsed by the flamboyance of the most famous pearl farmer of all time, Kokichi Mikimoto, son of a noodle vendor and founder of a cultured-pearl business that at its height had more than 12 million oysters producing 75 percent of the world's pearls. Facing financial ruin and community ridicule (serious indeed in Japan), Mikimoto and his wife, Ume, struggled doggedly in the 1890s, stuffing a great variety of possible irritants inside their oysters. Then in 1905 he found his first spheres. He had neither discovered the oysters' secrets nor had he repeatedly duplicated the effect, but his was success enough to receive a 1908 Japanese patent for the world's first cultured round pearl, even though Mise and Nishikawa preceded him.

A master showman, Mikimoto cultured oysters by the millions, met with the emperor, created incredible pearl concoctions in the shapes of Mount Vernon, the Liberty Bell (page 213), and pagodas for international expositions, and strove constantly to get his products accepted as real pearls.

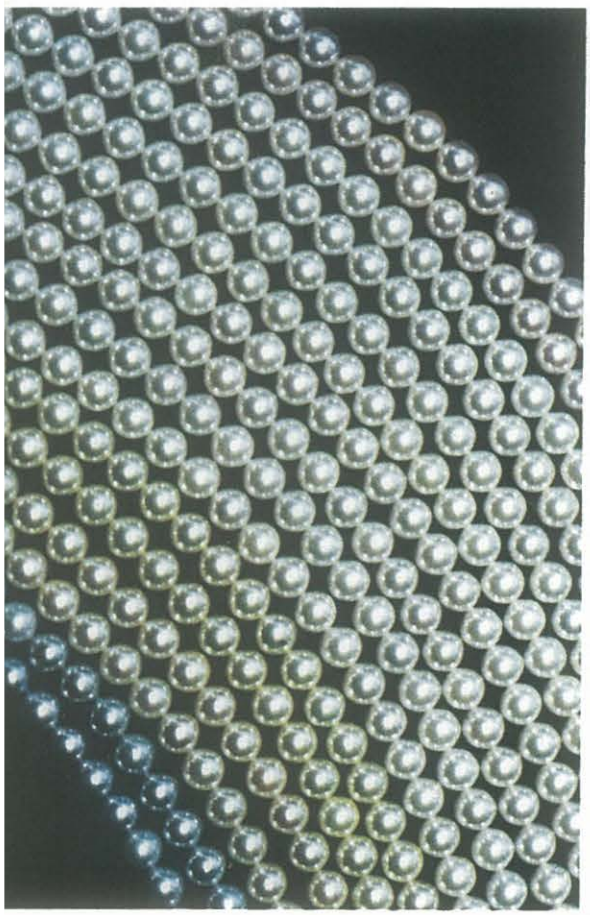
Except for the astronomical figures Romans were willing to spend on pearls, the natural gems were never higher prized or priced than in the 1920s, just as the new cultured products were becoming available. World War I was over, times were good, and women decorated themselves with all the pearls they could afford. Cartier even acquired its Fifth Avenue headquarters by trading two strands of naturals (priced then



Are Japanese pearls dyed? *Most industry officials deny it. But evidence gathered by author-photographer Fred Ward—backed by statements from U. S. and Japanese dealers—shows color is often enhanced. Only a drilled pearl can be dyed. This one* ***(above)****, drilled to be an earring, gets its pink tint from red dye in the conchiolin, the porous layer between the nacre and the nucleus. Japanese pearls tend to greenish yellow, though the natural palette runs from pink to blue* ***(right)****. An acknowledged practice is bleaching pearls to lighten color and remove dark surface impurities* ***(left)****.*

at more than a million dollars) for a matron's town house. After the stock-market crash, the "pearl crash" of 1930 collapsed natural prices. The Depression stifled America's wealthy, and World War II stopped production of both natural and cultured varieties. Naturals never resumed as the world turned entirely toward cultured pearls in the 1950s.

THE LOCAL ELECTRIC TRAIN that commutes between Nagoya and Toba whisked me past the marine scenery where Japanese pearl culturing began. Beside me, Toyohiko Kasuga, from the Mikimoto company's overseas operations, chronicled an oyster's year. "We used to use *ama,* the women divers, to supply new oysters for implanting, but now everyone grows spat, or baby oysters, in tanks, and puts them out into the bay in cages after 60 days. Only when they're three years old are they large and strong enough for the implanting operation." Rolling into Toba, we looked across at Pearl Island, the spot offshore where Mr. Mikimoto made his first pearls, now a tourist attraction. "This was his home," Mr. Kasuga continued, "but the waters were unsuitable for his culturing work, so he moved a little south to Ago Bay, which had ideal conditions."



Mikimoto's company is no longer alone either at Ago Bay or in pearls. Bamboo rafts with suspended oyster baskets *(kago)* fill so much of the available space that boats have to wind through the artificial islands (pages 198-9). Workers in baseball caps, windbreakers, and rubber boots dashed across the narrow stalks with no apparent fear of misstep as Mr. Kasuga finished his chronology. "Each oyster can tolerate one to six nuclei. We implant April to June, and harvest a year and a half later between November and January, because cold water makes better color and luster. Mr. Mikimoto left his implanted oysters in the water more than three years for maximum nacre thickness, and for decades other Japanese farmers followed, but things are changing now."

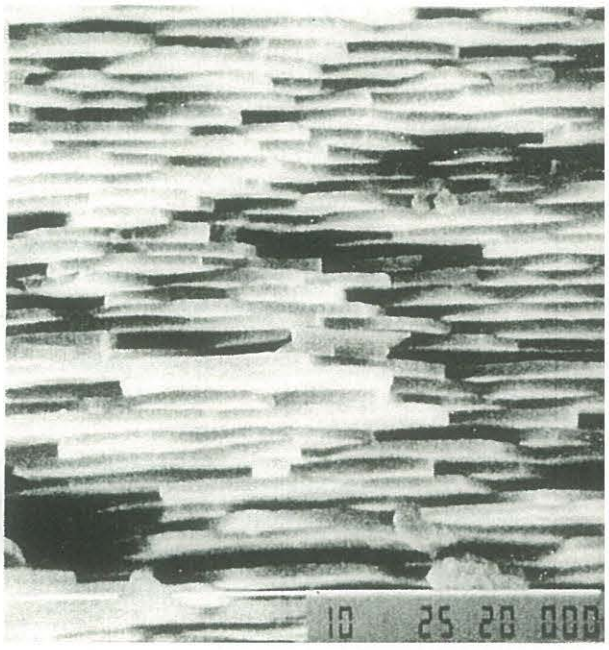
How much and how fast pearls are changing became more apparent to me over the next few weeks, as I realized shortcuts are being made both in culturing times and by artificial coloring. Shigeru Miki, an elderly adviser to Mikimoto's management, told me in Kobe, Japan's pearl-marketing center: "The most important quality of a cultured pearl is thickness of the nacre. It gives color, luster, and appearance. Pearls are among the softest of all gems [about 3 on the Mohs hardness scale of 1 to 10], and normal body fluids, as well as contact with perfumes, hair sprays, and acids, reduce the nacre. A thinly coated pearl won't last many years."

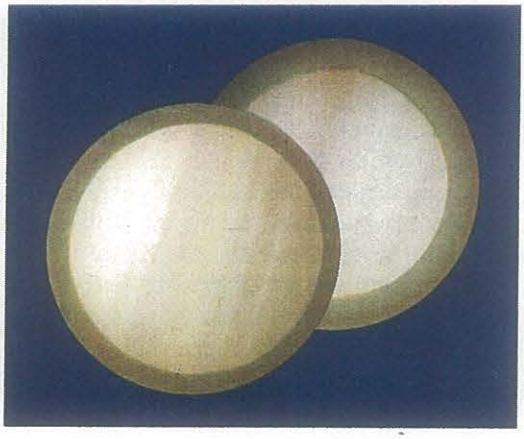
I visited the company's Tokyo research lab, where manager Hiroshi Komatsu said, "Our tests show the best luster [*teri*] and color occur with at least .35 millimeters of nacre, and Mikimoto pearls are always thicker. More nacre makes pearls stronger and gives depth, but it appears that only the top 200 micro-layers are actually visible. Less than 0.3 millimeters and you look through to the shell nucleus inside the pearl. We've found that in Japan we get about 0.2 millimeters of nacre growth in the first six months, so the new short-culture pearls should not pass the export inspection."

IN 1952 JAPAN established export-inspection offices in Tokyo and Kobe for the ostensible purposes of protecting the reputation of Japanese cultured pearls and improving quality. In the Kobe office my eyes adjusted to the darkened one-window viewing room with its deep gray walls, floors, and ceiling. Chief inspector Yasuhiko Funahara told me, "Pearls brought here by exporters are either passed or failed. The ones we don't accept are supposed to be sold in Japan only or destroyed."

A government official* in Tokyo was more forthright: "There is no actual standard. Colored and dyed pearls are passed, and there is little worry about trash pearls with thin coatings. It's such a small thing that we don't bother with them." Earlier, in a Hong Kong jewelry store, I had seen some truly horrible pearls with almost no nacre. I sought out one of the colony's leading gem importers, who laughed when I asked about the awful pearls I had just seen. "The whole idea of the Japanese export-inspection offices is a joke. Hong Kong gets junk Japanese pearls by the ton. We have no laws against them, and neither does the United States. A customer is free to buy what he sees and pays for. If a Japanese pearl farmer or exporter has bad pearls that either don't pass or are never presented for inspection, he just ships them here."

*Because of fear of economic reprisal, several of the author's sources asked that their names not be used.





Brothers in business, *wholesalers of the Japan Pearl Export and Processing Cooperative Association trade goods at a congenial monthly auction in Tokyo* ***(above left).***

Dealers worldwide are alarmed by the shrinking nacre thickness on pearls as some growers rush culturing time. Enlarged cross sections ***(above)*** *compare an acceptable pearl with 0.5-millimeter nacre after 18 months' growth, at right, with the 0.2-millimeter nacre achieved in little more than six months—increasingly common in Japanese pearl production.*

Magnified 5,600 times ***(top)****, nacre reveals its concentric layers of aragonite calcium carbonate. This growth pattern makes cultured and natural pearls feel rough when rubbed on the teeth.*

Just a few meters across from Ago Bay's Tatoku Island, where Mikimoto established the world's first culturing enterprise, Hirao Hamaguchi nimbly moved over his rafts at Yamakatsu Pearl Company. Although most Japanese pearl operators vigorously deny quality is diminishing, Mr. Hamaguchi freely discussed the changes. "Sure we culture less than a year. The medium-size beads we insert between April and June, we'll harvest in December. We even have a new business of letting seaweed farmers use our buoys between December and April, since we have no oysters suspended then."

When I expressed surprise at the revelation, Mr. Hamaguchi continued with a look at the recent past. "Before 1960 we kept the

oysters in the water for two and a half years. Then we dropped the time to one and a half years and held there until 1979. Now the culture takes six to eight months. It's all a matter of time and money."

None of this surprised industry insiders in the U. S., which buys three times as many pearls as any other country. Richard Reuter, president of the Cultured Pearl Association of America, a group of about 50 pearl dealers, observed, "Nacre thickness is almost all we ever talk about. Most of us simply can't understand what's going on. The Japanese support a huge public relations effort to link the mystique of pearls with Japan. In a country that's made its successes with quality and confidence, why are they damaging their reputation by making inferior goods? Thinly coated pearls won't last long enough to pass along to daughters. They'll crack, discolor, and become worthless."

I heard his opinion echoed during a pearl-grading seminar conducted for jewelers by the Gemological Institute of America. Several jewelers, who complained about rapidly climbing Japanese prices, told me pearls were a significant portion of their monthly sales. G.I.A. pearl instructor Jill Fisher was even more concerned about quality. "It is just a crime. The pearls are getting worse and worse as the nacre gets thinner. The coatings will crack and give way around the drill holes."

IN WHAT LOOKED like a preposterous game of marbles at Mikimoto's Toba factory, buckets of pearls were poured onto an inclined glass table for shape sorting. Only the rounds, called *happo-koro-gashi,* or eight-way-rollers, reached the far end. Most pearls are slightly oval. Teardrop or pear-shaped pearls, valuable for earrings, toppled off the table into side chutes. Because rounds are the most popular, they are also the most expensive. Baroque, or uneven, pearls are often the choice of young women who find their convolutions interesting or artistic and their prices lower.

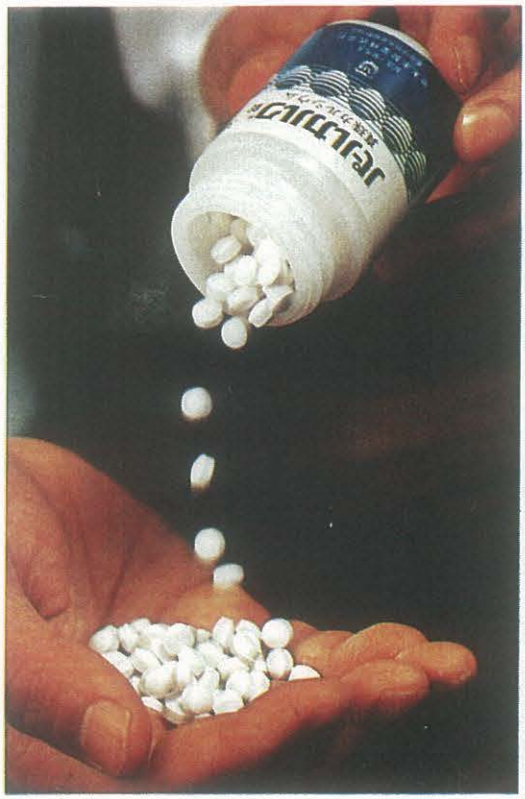
The more lustrous a pearl, the more valuable. After looking at hundreds of thousands of pearls and watching expert graders, I followed their examples. With a light at my back I studied the reflections on a handful of saltwater pearls. The more finely detailed and sharper the images of the light, the higher the luster. Viewing nacre by microscope, I saw that even deposits of hexagonal aragonite crystals of calcium carbonate give the best color and luster, whereas round or cracked crystals cause duller finishes.

A pearl's size is determined by the diameter of the nucleus inserted and its culture time. Before this century natural pearls might have grown for 10 to 20 years. Consequently, a few became quite large, sometimes over an inch long. Today's cultured pearls are made to fit the market and oysters available. Japan's *akoya* oysters, *Pinctada fucata* (Gould), measure only about four inches across since coastal waters have become polluted and tank breeding reduces hardiness.

Kimihiko Onishi, who manages an Ago Bay pearl farm, fingered a three-year-old oyster, pressing its yielding shells. "We used to get our akoya from the sea, which bounced the shells around a lot. They were tougher and healthier, so they could hold ten-millimeter pearls. Now we have trouble getting any over nine millimeters." I watched women operators insert seven- to eight-millimeter shell nuclei to get eight- to nine-millimeter pearls, allowing about 0.5 millimeters of nacre on a side. Equivalent-quality eight-millimeter necklaces generally sell for two to three times the cost of seven-millimeter strands. All sizes are made, down to two millimeters, and one oyster can culture several of the smaller pearls.

Saltwater pearls produced outside Japan also use nuclei cut from U. S. shells. Thriving in warm waters closer to the Equator, huge South Sea oysters, often over a foot in diameter, nurture the grandest pearls. In Broome, Australia, I walked among thousands of silver-lipped shells, *Pinctada maxima,* the world's largest pearl oyster, where nuclei as large as 12 millimeters culture pearls up to 20 millimeters. South Sea white pearls come from Burma, Thailand, the Philippines, Indonesia, and Australia. Iridescent peacock-hued Polynesian black pearls are the exotic creations of black-lipped oysters, *Pinctada margaritifera* (pages 196-7). So rare are large high-quality South Sea pearls, white or black, that they can sell for $4,000 to $40,000 each, making a necklace of 30 or so very expensive indeed.

Like nacre thickness, color has become a controversial issue in world pearl markets. Kunz and Stevenson could write in their 1908 epic work, *The Book of the Pearl,* that nothing was needed to enhance a pearl's beauty. But since then, men with their science have conspired to try. Some original Persian Gulf naturals were slightly altered by bleaching them in the hot Arabic sun after harvest. Not satisfied with nature's speed or consistency, Japanese technicians have perfected a system that even the Chinese want to follow. One South Sea pearl farmer described the processes as we examined some of his crop. "I would say that *all* Japanese pearls are bleached in hydrogen peroxide to clear spots and make them whiter. Then almost all of them are dyed to the colors that will sell."



*"**I owe my fine health** and long life to the two pearls I have swallowed every morning," claimed Kokichi Mikimoto, father of the cultured-pearl industry, who died in 1954 at age 96. The pharmaceutical branch of his company now grinds pearls and shells into calcium carbonate tablets for "pregnancies, weak bodies, tooth cavities, stomach acid, and allergies." Tons of pearls too flawed or tiny for jewelry go into medicines, cosmetics, and toothpaste in Japan and China.*

Vigorously denied by practically every pearl representative I saw, the fact remains that pearl dyeing is common in Japan, and no harvest has anywhere near as many pink pearls, or pearls so pink, as those displayed in showrooms. A Tokyo pearl company official told me that information is unavailable because Japanese take an oath not to reveal the culturing operation or discuss pearl alterations between oyster and market.

A few people in the business have decided it is time the public knows Japanese pearls are colored artificially. Hidesaburo Mogi is sales chief for Uyeda Jeweller, one of Tokyo's finest pearl shops. As we left the government pearl-inspection station one fall morning, he confided: "If you're talking about selling pearls just as they come from the oysters, I would have to say there are no Japanese pearls like that. Although I've been in the pearl business here for over 20 years, color treatment is the one thing I have never seen. It is a secret with every company, and no one will allow outsiders in."

JOHN LATENDRESSE, who with his Japanese wife, Chessy (page 218), is going to intensify competition with Japan by taking the first crop of Tennessee, Louisiana, and Texas freshwater pearls to market in 1987, says, "The Japanese used to soak pearls in a Mercurochrome solution, but the color faded in three to five years. Now they use a mixture of medicinal dyes. The dye seeps through the drill hole into the conchiolin layer between the shell nucleus and nacre. The color then shows through the pearl's translucent surface [page 202]."

Richard Reuter of the Cultured Pearl Association remains more concerned about nacre thickness than coloring, and even sees a positive side for his import business. "If the Japanese pearls weren't bleached and tinted, in a few years the necklace would be totally unmatched and unacceptable, and there would be no pearl business. We realize all Japanese cultured pearls are bleached and stabilized. What my company won't handle are artificial-looking pink colors."

Natural works of art, *needing no polishing or faceting to reveal their beauty, pearls were valued above all gems until diamonds gained top status in the early 19th century.*

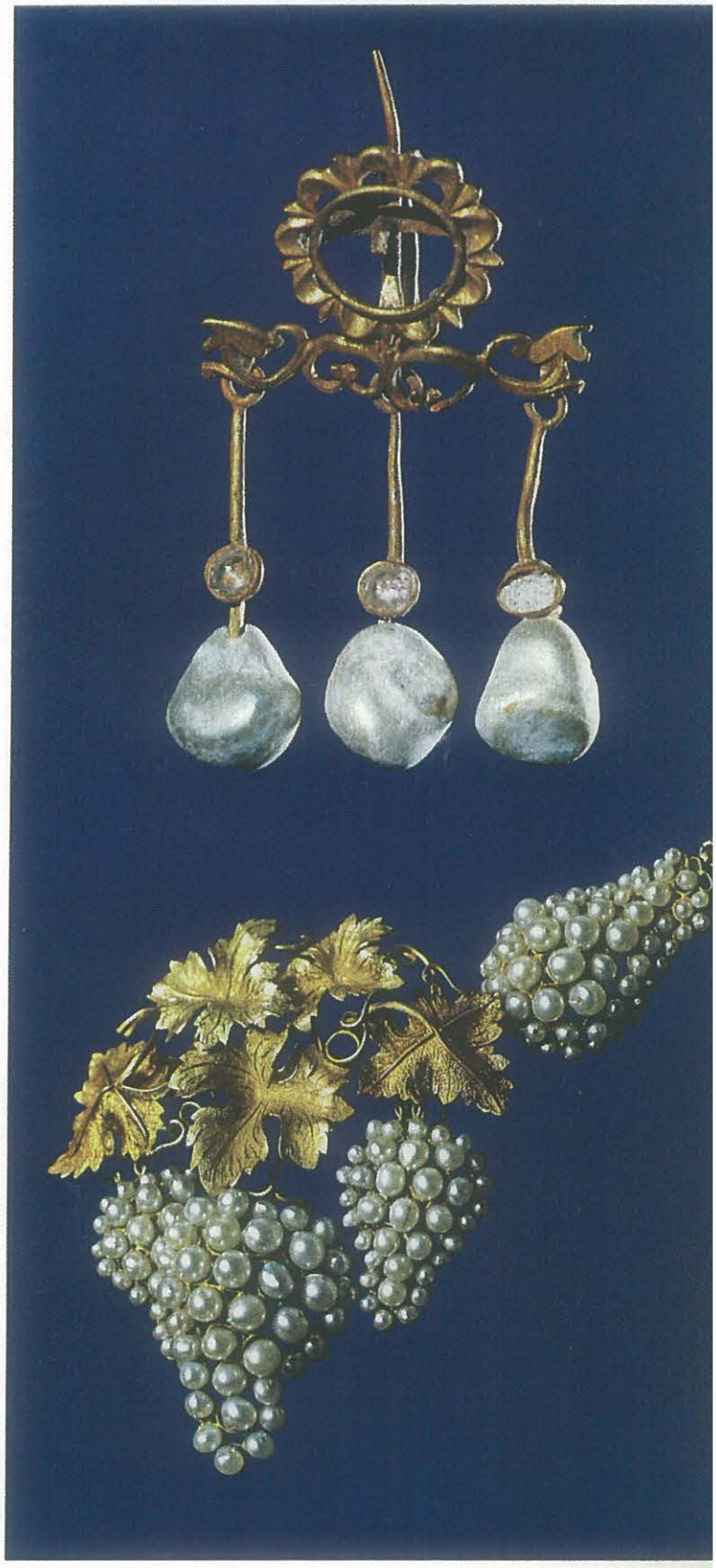
Before cultured pearls captured the market after World War II, the Persian Gulf supplied most of the world's natural saltwater pearls. Divers also wrested pearl oysters from the Indian Ocean, the Pacific, and the waters of the New World—touted as "the land of pearls" in 16th-century Spain.

Pearl mania reached its height during the Roman Empire. Quipped the satirist Seneca of the gem's popularity, "The lobes of our ladies have attained a special capacity for supporting a great number." An Egyptian earring of Greco-Roman design ***(top right)****, once fitted with a fourth pearl in its gold rosette, would have been in style at the legendary first-century B.C. banquet where Cleopatra impressed Marc Antony by crushing and drinking a costly pearl.*

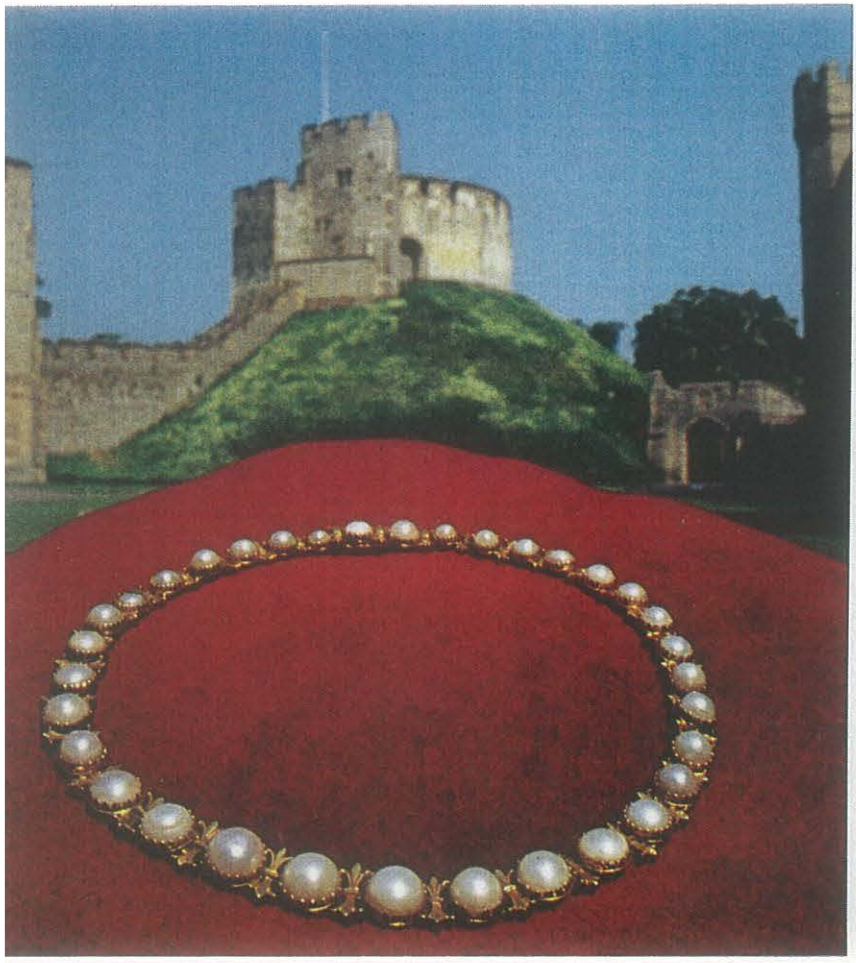
From the Roman Empire to the Renaissance, rulers issued edicts—in vain—to curtail wearing of pearls. In the hands of a late 16th-century artisan, a stupendous baroque pearl became the torso of a fighting merman ***(left)****. Later the pendant reached India, where its dangling ruby floret was added.*

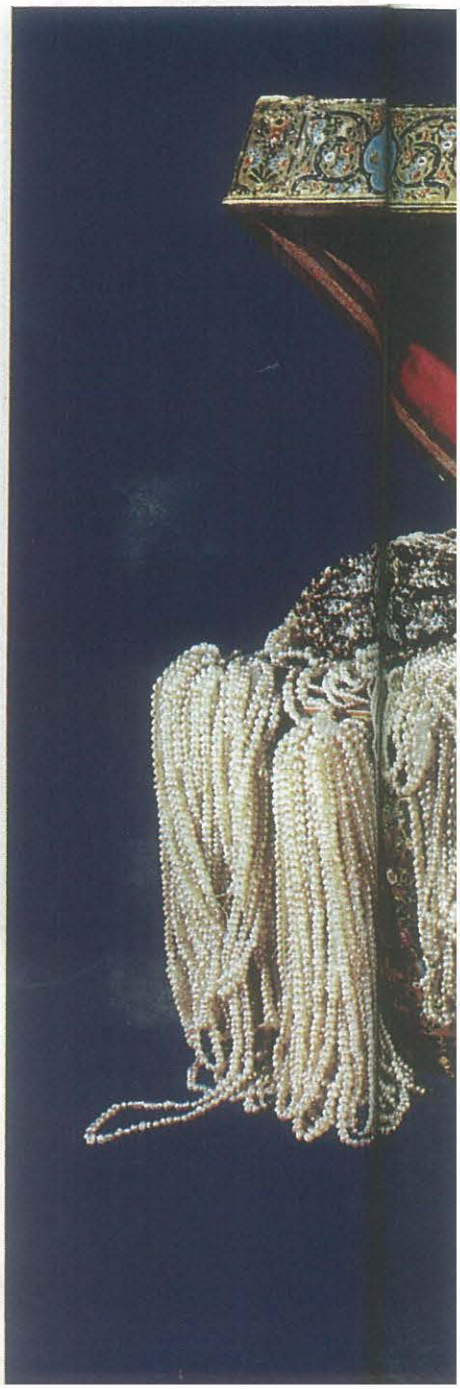
Reflecting the vogue for naturalism in mid-19th-century England, fruits of the sea were transformed into clusters of grapes for the centerpiece of a necklace ***(right)****.*

MERMAN: VICTORIA AND ALBERT MUSEUM. HEIGHT 10 CM
EARRING: NATIONAL MUSEUM, CAIRO. HEIGHT 3.6 CM
GRAPES: VICTORIA AND ALBERT MUSEUM, 8.9 CM



One thing is sure: Cultured-pearl colors are routinely altered to improve sales. Japanese cultured pearls may be silver, cream, pink, yellow, green, blue, or black. Many Japanese pearls have an inherent greenish yellow pigment that scientists strive to lessen with genetic engineering and better dyes. The actual cause of pearl color remains a mystery, even after 80 years of study. Numerous pearl farmers and operators told me the same story. Take one oyster and insert five shell nuclei from the same





Bounty of the Persian Gulf, *strands collected by the shahs of Iran still help back the nation's currency as part of the state jewels (**right,** photographed in 1977). Pearls dominate a crown (**top**) created in 1806 for Caroline of Baden, wife of Bavaria's first king, Maximilian I. Freshwater half-pearls from Scotland ring a late 16th-century choker probably owned by Mary Queen of Scots and recall the story passed in Rome that Julius Caesar invaded Britain "by hope of getting pearls."*

batch combined with five pieces of mantle sliced from one sacrificial oyster, then place the implanted oyster back into the sea. After a year, open it and find five different-colored pearls. Ask why, and no one knows.

Since the Japanese commercialized cultured pearls, they have dominated the market. It is no accident that only Burmese whites, a few Australian pearls, and some Polynesian blacks are sold outside the firm lock of Japan's exporters. Japan has tightly held the procedures for implanting nuclei, refusing to reveal them to foreigners, even though the Australian government asked.

Sea-weathered Bruce Farley of Roebuck Deep Pearls wiped a steady spray from his face as we headed for Broome. Pounding through offshore swells on a falling 30-foot tide over his five-square-mile ocean lease, he described how the Japanese tie up the world market. "If a country or individual wants to go into pearl farming, he gets the whole Japanese package. Japanese technicians do the operating and often tend the oysters,

CROWN: TREASURY OF THE MUNICH RESIDENCE, 17 BY 17 CM; CHEST: NATIONAL JEWELS OF IRAN, TEHRAN, LENGTH 42 CM, WIDTH 32 CM, HEIGHT 20 CM; CHOKER: DUKE OF NORFOLK, KG, ARUNDEL CASTLE, WEST SUSSEX, ENGLAND

Japanese harvest and sort the crop, and Japanese control the value of the pearls as they are shipped off to Japan for processing and marketing to the world. It's a take-it-or-leave-it proposition. Usually you buy the whole deal, as I do, or you get nothing."

The outback never seemed farther out or back than in wild and woolly Broome, on Australia's northwest corner, center of the country's pearling industry for nearly a century. In a time warp I climbed onto the planked porch of the green stilted Roebuck Bay Hotel and bar, accompanied by my anachronistic hostess, the smartly tailored co-director of Roebuck Deep Pearls, Trish Grey. We pushed through the swinging saloon doors, ambled by two suspended stuffed groupers, and moved out to the open-air dance floor featuring an abandoned Vietnam boat people's hull as a bandstand. With no apparent sense of understatement, Trish observed, "Broome is a little different from other towns."

"There's no other place in the world like it," confirmed Rand Dybdahl, pearl research officer with the Western Australian Marine Research Laboratories. "Almost all its history, however, has been with mother-of-pearl. Although they were valued, pearls were still considered by-products for over a century."

By the 1900s remote Broome was selling more than 75 percent of the world's mother-of-pearl, or "MOP." With a trio of favorite pastimes (drinking, gambling, fighting), it richly earned a raucous renown. Regular Sunday afternoon bare-knuckle fights rigidly followed the "Marquess of Queensberry Rules": No hitting below the belt, eye gouging, biting, kicking, or striking while down. Nine-pins was the game of preference, using real glass champagne bottles as pins. Naturally a case of the imported bubbly had to be consumed before the game could begin.

Broome changed its emphasis in 1957, with the first cultured-pearl production up the coast at Kuri Bay. "No one stayed just in MOP when millions might be made in pearls," Rand Dybdahl said. As he and others told me, there is trouble in paradise. First, Australian law requires any pearl licensee to be a British Commonwealth subject, but the Japanese barely tolerate anyone in pearls except themselves. They use front organizations in packaged, turnkey deals. An Australian gets the license and takes his share at the end, but Japanese companies do all the technical work and ship the entire crop to Japan. All but one or two of Australia's pearl farms are tied to the Japanese. And now there is a growing fear of oyster piracy.

"Am I worried?" asked Trish Grey. "Yes, because what Australia has are huge, wonderful white shells that make gorgeous pearls without bleaching or dyeing. If someone steals away with our live oysters to a cheap labor market and starts producing large white pearls, we will be ruined. The horror is, I think they'll do it too."

THE LITTLE seven-seat Piper banked over another of the doughnut-shaped atolls marking our way from Tahiti. Below, the purplish blue richness of the South Pacific changed abruptly to a thin circle of coral that encompassed an incredibly transparent, aquamarine lagoon. Beside me, tiny, French-speaking Véronique Ma'Arop, a vice president of Van Cleef & Arpels, Inc., and Essie Posin, vice president of Assael International Inc., shared a window. "The waters here are as beautiful as the pearls they produce," Véronique ventured. "I love big pearls. I get all I can every year. A single, high-quality 13-millimeter-or-larger round easily sells for $10,000. I still buy big white pearls from the Burmese February auction. But since the government nationalized the business and expelled the Japanese, their quantity and quality have been down. Now I look elsewhere. Besides, some of our special clients adore Polynesia's black pearls."

After six hours we landed at the home of Polynesie Perle on Marutea, a ten-mile-long atoll about a thousand miles southeast of Tahiti in the Tuamotu Archipelago. Alternately videotaping and waving at the end of the coral strip was the island's splashy French proprietor, Jean-Claude Brouillet, complete with orange and black bandanna, red Polynesian print shorts, thongs, and a smile as big as his ambitions.

Over the next hour, in heavily accented English, the burly raconteur, hotelier, author, former pilot, and African airline owner bubbled with enthusiasm about his

favorite subjects: women and black pearls. He laughed, told stories, poured drinks, directed the Polynesian cooks, debriefed our pilot, sent instructions to the Tahitian divers, spoke to his teenage son Vladimir about fresh seafood from the reef, cuddled his ten-year-old half-Tahitian son Toriki, directed manager Yannis Thomas about the next day's tasks, and thoroughly entertained Véronique, Essie, and me. We rested in the open-sided coral-and-shell-graveled public area beneath Jean-Claude's hut, a communal center that serves as kitchen, dining, and living rooms for the remote atoll visited by a supply ship only once a month.

MIKIMOTO PEARL ISLAND MUSEUM, TOBA, JAPAN. BELL HEIGHT 35.6 CM

***To woo the world** to his cultured pearls, Kokichi Mikimoto designed creations such as this replica of the Liberty Bell, studded with 12,250 pearls and 366 diamonds, for the 1939 New York World's Fair. He received a patent for the round cultured pearl in 1908, though two other experimenters had earlier successes. First widely sold in the 1920s, cultured pearls stirred debate among jewelers and scientists: Were they really pearls? Winning court cases and public opinion, Mikimoto ultimately triumphed.*

Later, warming to his after-dinner audience, Jean-Claude described Marutea's mixed blessings, while I lifted my sandaled feet to let the dozens of hermit crabs work over the floor for scraps. "Women are *mad* for black pearls now, and this atoll is *perfect* for them. We are in the middle of the ocean, *far, far* from any pollution, from pirates, or from temptations. The only problem is expense. I have to bring in everything for 35 staff members. That costs me a *million and a half dollars* a year. We had two *devastating* hurricanes within 12 weeks in 1983, rebuilt the entire camp twice, and that cost a *fortune*. But the island is perfect for pearls, with its lovely, clean lagoon, nine by sixteen kilometers that could be *filled* with oysters."

Next morning Yannis and I dived 40 feet into the clear lagoon to see his two holding systems for 65,000 nucleated oysters. Relaxing in our boat between dives, he noted, "We do full two-year cultures and aim for 1.5 to 2.5 millimeters of nacre on our black pearls, which range from 10 to 16 millimeters."

That evening, over a sumptuous dinner of stone crabs, spiny lobsters, and fresh fish speared on the reef by Vladimir, Jean-Claude reveled in his successful year. "We finish our annual harvest tomorrow," he boasted proudly, "22,000 black pearls. But even a *madly* independent Frenchman like me still has to deal with Japanese technicians, although my pearls all go to New York City to be sold."

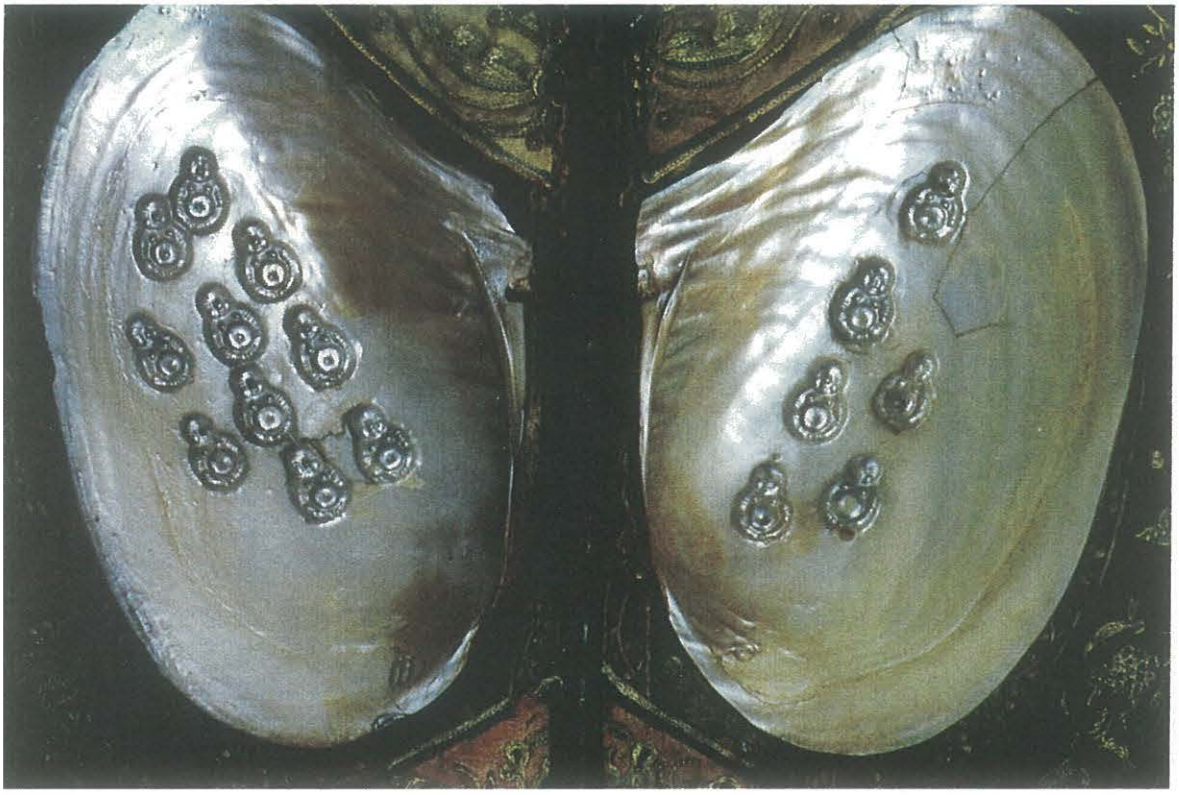
That U. S. connection is unique in the industry. Salvador Assael, president of Assael International, is credited with creating the world market for black pearls. He says, "Jean-Claude has restructured Polynesie Perle, but we'll still import the whole crop. We buy a great many pearls inside and outside the Japanese cartel, but what I'm proudest of is to be the first American to crack their pearl monopoly."

JUST HOW COMPLETE *is* the large-pearl Japanese monopoly? I paid a visit to the dull gray walk-up office of the Japan Export Overseas Pearl Producers' Association near Tokyo's Ginza. Managing Director K. Ishizuka readily admitted the association's 14 members handle nearly all the world's South Sea pearls. He carefully explained: "Cartels are

The land of the Pearl River *revived its tradition of pearl cultivation in the late 1960s, and today China leads the world in production of freshwater pearls—50 to 80 tons this year. The pearls of myriad colors and shapes from its native* sankaku *and* kurasu *mussels have made a splash in the U. S. market, and Japan will buy as many as 12 tons to augment its dwindling freshwater harvest, only about five tons in 1984.*

Criticized for stressing quantity over quality, the government-controlled Chinese industry works to improve culturing methods and has built an artificial lake for research 60 kilometers southwest of Shanghai. Low-tech, labor-intensive operations characterize China's pearl business. When not fish-farming, Han Gen Sheng ***(below)*** *tends his crop of 7,000 mussels—each hanging from its own string—on a pond in a hamlet near Shanghai. After two years the mussels are returned to a government center for pearl harvesting.*

Most of the country's pearls are sorted, drilled, and strung in four Shanghai factories. Teenage workers do some of the drilling with metal bit and bow saw ***(right)****, economical because they are paid 16 cents an hour.*



Early clues to culturing *emerged in 12th-century China when tiny figures of Buddha, cemented onto the inner shell of freshwater mussels, were coated with nacre. Valued as amulets and temple decorations, pearl Buddhas* ***(above)*** *were grown into the 20th century.*

Similarly, half-pearls sometimes grow naturally in response to inhaled irritants or parasites that bore through the shell. Women of ancient Rome used such knobbed shells for carrying perfume. Today half-pearls are cultured mainly in mabe oysters by gluing a plastic or shell hemisphere to the mother-of-pearl. The resulting dome of nacre is later drilled away ***(below left)****. Usually filled with epoxy and backed by mother-of-pearl, a mabe graces an ear* ***(below right)****.*

normally illegal in Japan. We are a legal cartel, formed in 1964 to avoid competition between Japanese akoya pearls and the fewer, but larger, South Sea pearls [*nanyo-dama*] from other countries. And we set prices. Government policy decreed that Japanese dealers bring 100 percent of the pearls back to Japan for marketing and only make pearls over 10 millimeters [to avoid competition with the home pearls]. The policy also stipulated that we could not leak or divulge the Japanese secrets of pearl production to anyone. For our part, we meet and agree to a floor price for South Sea pearls." The only other business receiving government protection for price-fixing in Japan is rice production.

South Sea pearls are intriguing because of their sizes and monopolistic marketing, but they amount to only 5 percent of Japan's pearl exports. Akoya pearls, the ones from two to ten millimeters cultured in Japan's *Pinctada fucata* oysters, are the backbone of the cultured-pearl business, accounting for 60 percent of the exports. Pearls are sold by weight, using the old unit *momme,* which is 3.75 grams. A thousand *momme* is a *kan.* Japan reached its record high production, more than 39,000 kan, in 1966.

Hidenobu Ogawa, managing director of the Japan Pearl Exporters' Association in the Kobe Pearl Center, described what's happened since then. "Basically, when we overproduced to benefit from high prices, we killed our own market. Then the waters here also got more polluted. Production has steadily fallen to near 18,000 kan. That's about 150,000 pounds of pearls, and we export 60 percent of what we make here, grow in the South Seas, and buy from China." Quantities are down, but prices are up, rising 30 percent in 1984, mainly because of demand in the U. S., which buys about half of all Japan's pearls. Pearls are now Japan's largest single marine-product export, worth more than 300 million dollars annually.

I drove from ancient Kyoto to Lake Biwa —the historical home of Japan's freshwater pearls—passing more than a thousand years of history in an hour. A solid phalanx of apartments, restaurants, massage shops, love hotels, and pachinko parlors blocked the lake's southern resort shore from view. Wedged between rice fields, Omi Pearls Limited Company operates on a little over three acres.

Chojiro Hamada, president of the company and director of the Shiga Prefecture Pearl and Fishermen's Union, walked with me to where three women operated on black mussels. Since the shells can only be opened less than an inch without damage, I could see that fine surgical skills were necessary to cut numerous small slits in the thin flesh. Hamada explained: "Unlike saltwater pearls, the usually less expensive freshwater pearls are as close to naturals as you can get. Instead of starting from shell nuclei, freshwater pearls are seeded with pieces of mantle tissue placed directly into the mussel's own fleshy mantle. Each mussel yields between 30 and 50 solid pearls with no nuclei, often enough for a 16-inch strand."

Outside, on the wooden dock, Hamada voiced concern: "Lake Biwa is getting more polluted all the time. Pesticides and fertilizers are our worst enemies. We can't even get our young mussels from the lake any more. And tank-grown mussels are weaker."

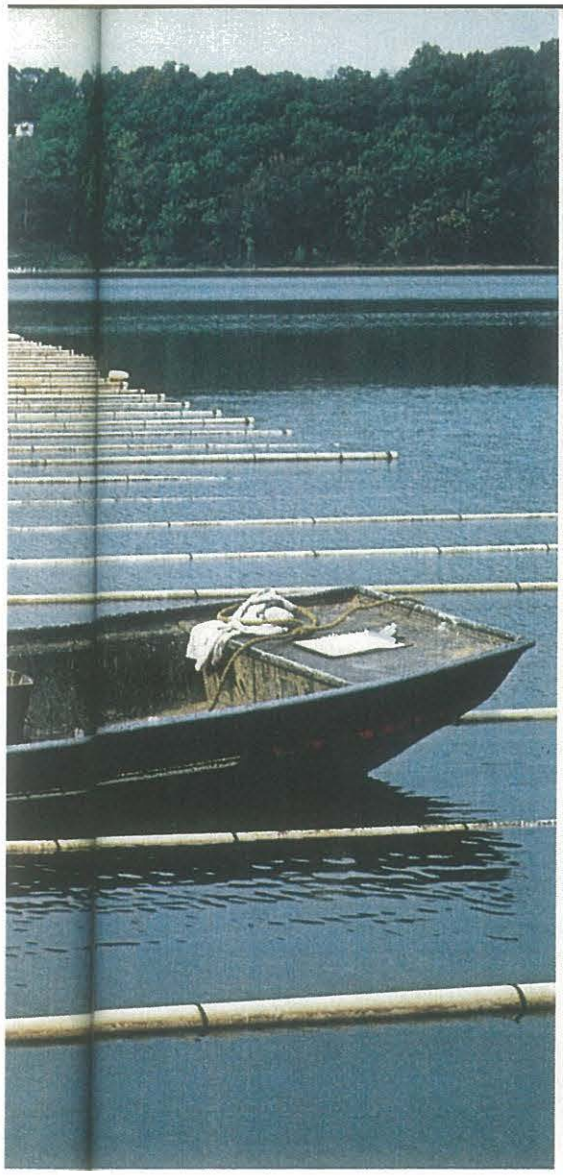
ONE unusually innovative Japanese decided on bold, individual action to save his pearl farms. Standing shoulder-deep in the fast-moving channelized Shintone River two hours north of Tokyo, Syoichi Kitao is the antithesis of committee thinking. Pulling up heavy baskets laden with mussels ready for harvest, the deeply tanned pearl farmer recalled, "I left Lake Biwa for clean water. In 1971 I came to this river and started the Daiko Pearl Company. Here I grow all the young mussels I need. Just look at the size and condition of these," he said, thrusting a net of six toward me. We took them up the levee and across the road, where his wife and two coworkers operated.

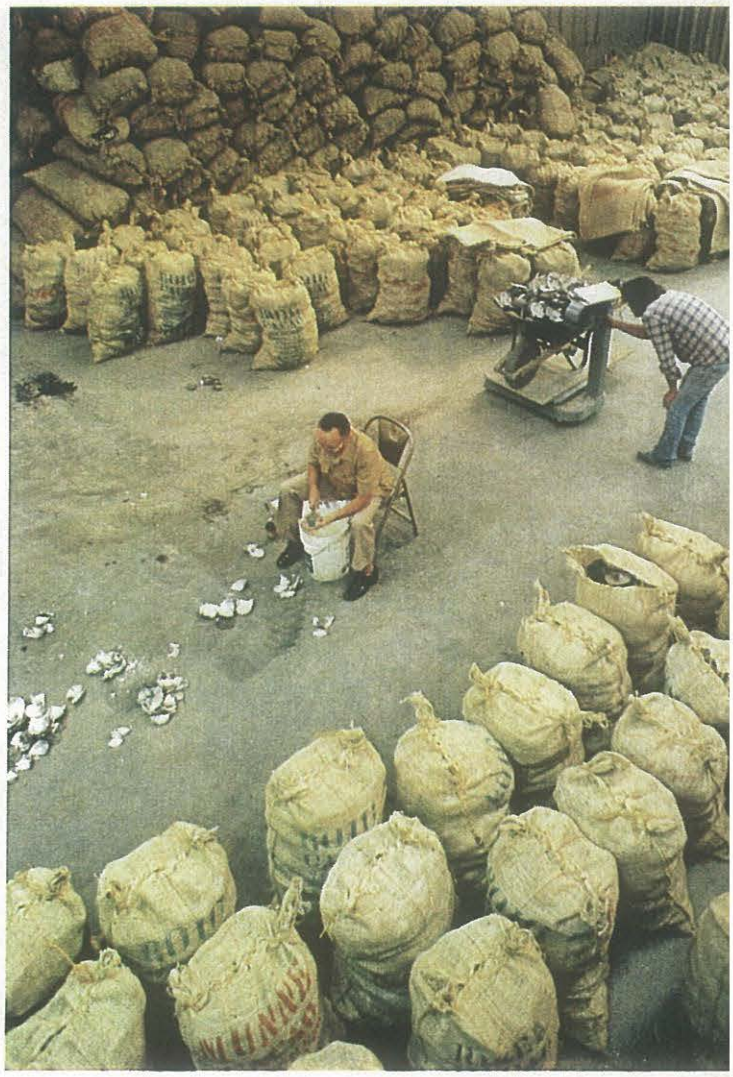
Severing the adductor and retractor muscles that hold the shells together, Kitao spread the mussel flat, saying, "The strong current carries plenty of food. My animals grow far bigger than they would lying in a still lake. See the 30 pearls here in the mantle. Now I'm going to show you something I've never shown anyone from the outside."

With that, my revolutionary friend dug his fingers deep into the mussel's body, and plucked a spectacular round, pink,

In praise of American pearls, *Chessy and John Latendresse of Camden, Tennessee* ***(left)****, design and sell jewelry from their renowned collection of U. S. natural freshwater gems. But they decline offers, as high as $150,000, for this graduated strand of pearls gathered from the Tennessee River over a 25-year period. Few natural freshwater pearls are harvested today. Disturbed by river damming and pollution, mussels are seldom able to produce sizable pearls.*

Nevertheless, the U. S., predicts John, "is the future of cultured freshwater pearls." After decades of research, the Latendresses' American Pearl Farms will in 1987 start marketing large, round





*pearls from up to 24 species of nucleated mussels. Taught by Chessy, who learned culturing in her native Japan, employee Tammy Story, 16, practices nucleation (**right**). Cultivated largely in the Mississippi and Tennessee River Valleys, mussels suspended from plastic pipes are cleaned periodically of algae (**above left**).*

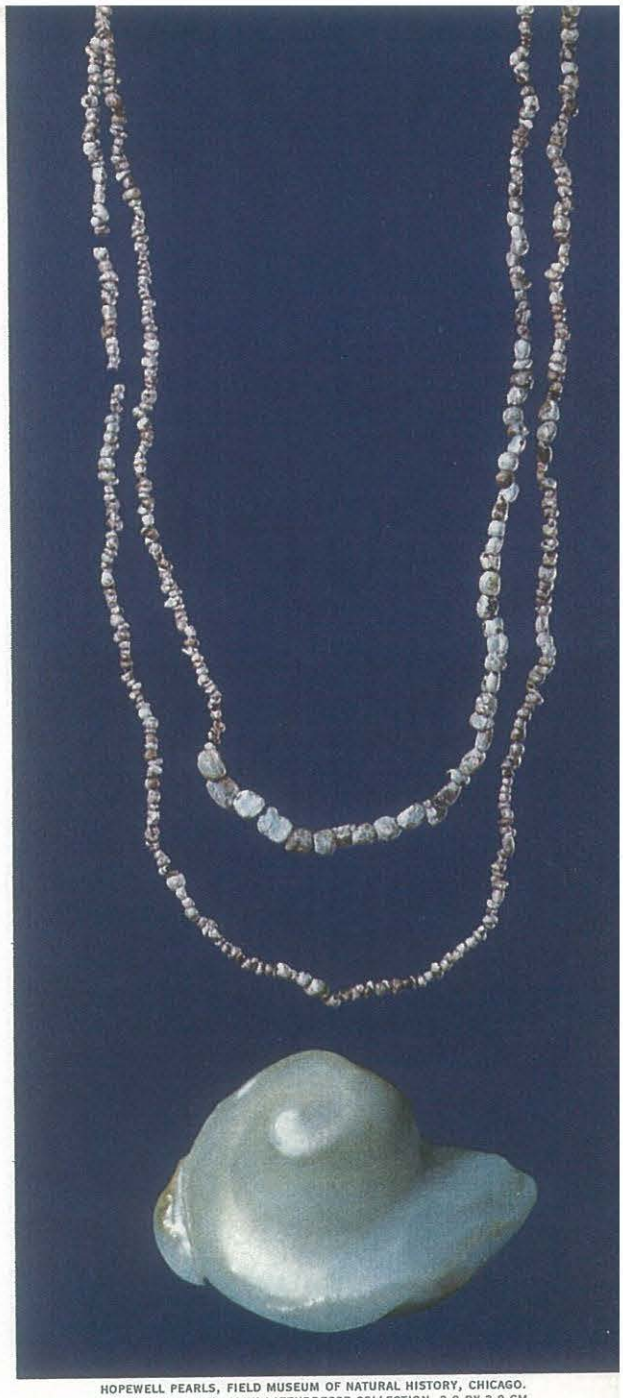
*The heart of saltwater cultured pearls is already an American product. Beads used for nucleation are carved in Japan from the shells of mussels found in the Mississippi River basin. John Latendresse supplies more than 60 percent of the mussel shells and here checks for quality (**above right,** at left).*

14-millimeter beauty from its unalluring origin. "I've married two cultures, freshwater mussel with South Sea oyster techniques. Instead of just traditional mantle-tissue nucleating with mussels, I'm inserting shell-bead nuclei inside their bodies, just as farmers do with saltwater oysters."

As Kitao hunkered amid the shells outside his small operating room, filling a plastic cup with his cache, I marveled at his accomplishment. With characteristic modesty, he admired one of the large beauties, saying, "I never use a nucleus more than nine millimeters, so these pearls have thick nacre, not like the akoyas. Once I made a 17 millimeter. My ambition is to be first to culture a round 20-millimeter freshwater pearl. When I get that, I will present it to the President of the United States, not the emperor. Why? Because the U. S. is my best customer, and I'm going to say 'Thank you.' "

RECENTLY, China has exploded onto the freshwater-pearl market. Isedor Slutsky, through his August Corporation, started buying early and is among the largest U. S. importers of the Chinese goods. From his office in New York, he remembered: "The Japanese were caught totally off guard. The first marketable Chinese crop came in 1970, and this year they will culture 50, maybe even 80, tons of pearls, far outpacing the Japanese, who will make no more than three to five tons themselves. However, the Japanese will still market 15 tons of freshwater pearls, 80 percent of which they will buy from China and sell as theirs."

Isedor's admonition that "things are really chaotic over there right now" didn't fully prepare me for the disarray I found in the People's Republic. As China races toward a new capitalism, pearls, perfect for earning foreign exchange, have gotten the green light for expansion. In a drab hamlet about 30 kilometers west of Shanghai, standing with farmer Han Gen Sheng and surrounded by fishponds and rice fields, I sensed that a pearl farm in China can be different from a pearl farm anywhere else. It is sometimes a nondescript pond or small patch of irrigation-canal shoreline tended by a worker designated by the local commune. Han, in the faded blue uniform of China's peasants,



HOPEWELL PEARLS, FIELD MUSEUM OF NATURAL HISTORY, CHICAGO. LARGEST PEARL, 1.5 CM; SNAIL: JOHN LATENDRESSE COLLECTION, 3.0 BY 3.9 CM

Adorning the dead, *freshwater pearls* ***(top)*** *were buried in the funeral mounds of Hopewell Indians in Ohio during the early centuries A.D. "Pearl rushes" were common in the U. S. into the 20th century, and some of the best finds went into the crown jewels of Europe. X rays of an Indiana pearl more than an inch long* ***(above)*** *reveal a tiny snail. Its shroud may have been 70 years in the making. The varied shapes of Asian cultured freshwater pearls* ***(facing page)*** *reflect the implanter's skill.*

spends half his time fish-farming and half watching over 7,000 mussels, each suspended from its own string in the muddy stream just in front of his home (pages 214-15). Later as we poled past the graceful draped curtain of thousands of lines, Han said through a translator, "I receive mussels implanted by the government and keep them two years. Then I turn them back for harvesting and get a new batch."

On shore, Sheng Yu Lin, manager of Jinpu County's Fish and Agriculture Cooperative office, opened a shell we had collected. "China can make many pearls very cheaply, but they're still not very good," he observed, fingering a few of the 15 small rice-shaped freshwater pearls from each side of the slick mantle tissue. "We need better techniques, instead of just more quantity, which has hurt us in the world market."

Like other peasants, pearl farmers tend to keep any of their harvest above their quota. Since China has virtually no pearl market except for medicine and cosmetics, the assumption was that surpluses would be sold to the government at a fixed price. Instead, Sheng said, "The farmers resorted to smuggling. Local dealers rendezvous with Hong Kong buyers who usually trade TV sets, radios, watches, and other hard-to-get items."

Pearls from dozens of nearby farms are processed in a gray concrete factory I visited in Shanghai. On the top floor, above a sweater-knitting operation, crew-cut manager Yao Yun Xie showed me through two bleak rooms filled with girls who sort, drill, and string about 3,000 kilograms (6,614 pounds) of pearls annually. Watching a teenager saw away with a primitive bow and twine, hand-spinning a sharpened bit that serves as a drill, I wondered how such a labor-intensive operation could possibly compete in world gem markets. Yao then described their salaries: 60 yuan a month for a six-day week, 183 hours a month, or 16 U. S. cents an hour.

John Latendresse also played a role in China's current success. Back in Tennessee, he recalled, "I went to China first in 1967 to advise them on how to culture, and in return I got a worldwide exclusive to sell their pearls. The fourth year they harvested 11 tons. I couldn't handle that much, so they went to other people."

Like an Oriental potentate, John poured a tableful of huge natural baroques before me: "The U. S. is the future of cultured freshwater pearls. Look at these colors and shapes, all from American rivers and lakes. China has only two mussels that produce pearls, and outdated technology. The Chinese are too much in a hurry for cash to make a good product. The Japanese, also with two pearl-producing mussels, have ruined their fresh water. We have at least 24 acceptable mussels, great color variety, and vast clean-water resources." Gazing into his treasured "Pearl of Many Colors," John predicted, "We will be the center of this business soon."

PERHAPS. But the Japanese have decades of labor experience and public acceptance of their products. Pearls have never been more popular, because they are affordable jewels, and 1980s free-form fashions encourage wearing them at any hour with any clothes. Recent changes in Japanese pearls do indicate this is a time to be cautious. As Richard Reuter says, "Good pearls are still plentiful. Buy from a trusted jeweler, ask about nacre thickness, and stay away from those obviously dyed. Keep them clean, and restring regularly for years of enjoyment."

A woman who wears and loves pearls is in good company. I was thinking about history's queens who coveted them as I sat with one of today's film royalty, Elizabeth Taylor. Surrounded by her Impressionists and looking out over Hollywood, she fondled La Peregrina, her fabulous inch-long natural pearl, and summed up the eternal appeal of pearls in her surprisingly small voice. "I love to hold them, feel them, touch them. For women, pearls are feminine and warm, and very romantic." And so they are. □

Passport to freedom *for the slave who found it off Panama in the mid-16th century, the storied inch-long pearl called La Peregrina, "the wanderer," passed through the hands of European rulers such as Mary Tudor until purchased by Richard Burton for Elizabeth Taylor in 1969 for $37,000. Cartier designed for her the necklace and matching earrings.*