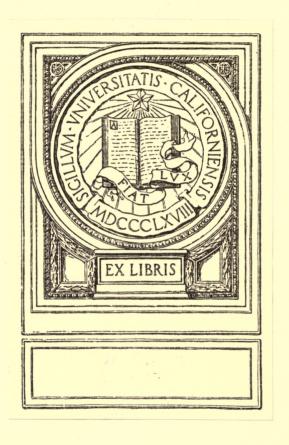
W.R. CATTELLE



January 1910









H. M. QUEEN ALEXANDRA AND HER PEARLS

ITS STORY, ITS CHARM, AND ITS VALUE

BY

W. R. CATTELLE

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WITH SIXTEEN ILLUSTRATIONS



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NOTE

In these pages the story of the pearl is told from its birth and growth under tropic seas, through the search for it by dark skinned divers of the Orient and its journeyings by the hands of men who traffic in precious things, until it becomes finally the cherished familiar of the great. Historical and traditional allusions, the sentiment and superstitions, the romance of ancient and noble associations. drawn to it through the ages, are garnered here and to them added the more prosaic facts which a merchant's experience suggests, to enable lovers of the dainty sea-gem to discriminate. The qualities which make some pearls of great value and the imperfections which render others less valuable are described in detail, that owners and buyers may appreciate at their true value the gems they have or would purchase and the market price of all kinds is given. Means for the detection of imitations are included.

Long time has been given to microscopic research and though much remains to be learned of the genesis of the pearl, it is hoped that

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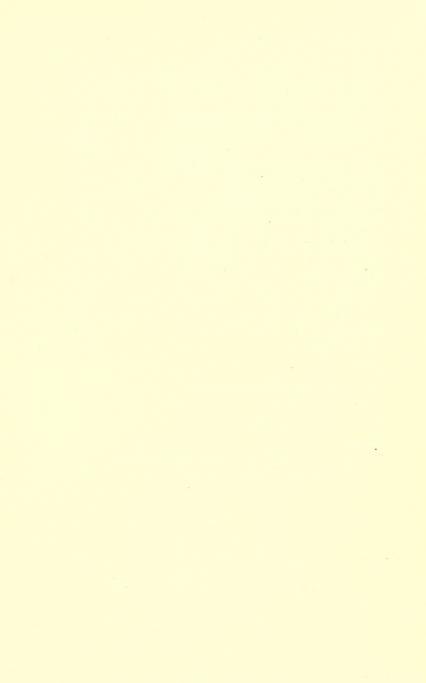
something of value has been added to the knowledge of Nature's wonderful and curious processes whereby through the humblest she makes a jewel fit to adorn the most beautiful of her creatures—woman.

My thanks are due Messrs. Combes & Van Roden of Philadelphia for the loan of the original photographs from which were made the reproductions of the portraits of Queen Alexandra, The Marchioness of Londonderry, Countess Torby and Princess Lazareff, which will, I trust, be of great interest to lovers of pearls: also to Mr. Ludwig Stross for much valuable information about Oriental pearl fisheries.

W. R. C.

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AT THE BOTTOM OF THE DEEP BLUE SEA



AT THE BOTTOM OF THE DEEP BLUE SEA

HE sea in all her moods has a strange fascination for the children of the dry land. The rumble and thunder of her never ending procession of rolling breakers, rising and falling, tumbling over the sands, to race hissing back to shelter under the curling crest of an eternal successor; the mad recurring dash which cannot be discouraged, of great waters upon unvielding rocks whose grim faces smile at the spume fountains falling back upon them; the wash and mutter of rocky shoals; the suck and bellow of her caverns and the monotone she chants, heedless of hearers to the ages; all these charm the hearts of men and bring them into the fellowship of spirits they feel, but cannot understand. For the moods of the sea and the ways of the wind are akin to the heart of a man. His eyes dance with the flicker of light in the path of the sun over watery wastes; his breast heaves in unison with the multi-

tudinous swellings of the sea; he finds peace in the slumber of her calms and exults in her mad race before the drive of the tempest, but he seldom thinks below the surface and knows little of the things she hides in her deeps. Yet a world lives there, very strange and full of enchantments. Sheltered under the breasts of the sea and undisturbed by the furies of the upper world, myriads of living creatures, graceful, beautiful, wonderful, traverse the peaceful depths. In the vast and fathomless solitudes, things grow and take on form, meet for the eyes of the gods. In everlasting touch with soft currents, trees of coral grow from rocky beds and finny tribes of every shape and hue glide in and out among their fantastic branches. Water covering all, on hills, plateaus, shelving stretches, sandy bars and rocky shoals; in valleys, chasms and even in the dread abysses, are things as strange to man as Jupiter or Saturn holds; weird as the creatures of our dreams; uncanny as the pictures a riotous imagination paints and some as beautiful.

Near the shore and a few miles out, where the

AT THE BOTTOM OF THE SEA

bottom of the sea is but a few fathoms deep and where man can go and come and live, there are among other marvellous creations, shells of wonderful structure and beautiful to look upon. One by one these have been discovered during past ages by the adventurous and for their usefulness or beauty have awakened the desire of those who dwell upon the earth. The chank, the sacred shell of the Hindus, has been used by the priests of Buddha for centuries as a horn to call the faithful. Shankar the Destroyer, of Hindu mythology, and Vishnu, each hold a chank shell in one of their hands.

The shell whorl usually runs from left to right, sometimes it is found with the whorl reversed and these were so highly regarded by Hindus, Cingalese and Chinese that in old times they were sold for their weight in gold. Even now they bring a good price in the eastern markets. They are kept in the pagodas of China to hold the sacred oil: the priests of Ceylon administer medicine by them. In Dacca the chank is cut into armlets and anklets for Hindu women upon whose persons they are left after death. The delicate pink cameos

carved from the Queen Conch have delighted feminine eyes of almost every race. The Pearly Nautilus decks many a dainty lady's table and is wrought into a thousand quaint conceits. The silky byssus of the Pinna has been woven into fabrics of such fineness as to be thought worthy of acceptance by Popes and princes.

Before Europe knew of their existence, the people of China and Japan, the Maoris of New Zealand, the Indians of our Pacific coast and the brown skinned natives of far-off islands of the Southern Seas, were delighting themselves with the magnificent coloring and iridescence of the Haliotis even as ancient Greece and Rome made ornaments from the "Venus Ear-shell," as they called it, brought from the ruder coasts and islands further west. In these later days the costly outer garments of proud dames are ornamented with buttons cut from the same resplendent shell. But of all the beautiful things old ocean pays as tribute to the adventurous spirit of man, the pearl-oyster and the gem found sometimes in it are most precious.

From unknown times when man discovered them until now, mother-of-pearl shells and

AT THE BOTTOM OF THE SEA

their pearly treasures have held desire constant and the eyes of modern queens brighten when the opening of the gift casket reveals a string of these spheres of beauty just as eyes did in the far-off Indies thousands of years ago. When Europe was a land of barbarians and America an unknown country of savages, dusky fingers that held the life and destiny of millions, toyed lovingly with pearls, even as now the favored few who enter the sanctum sanctorum of fortune, pride themselves in the possession of them and find pleasure for cloyed desire, in every addition to their store.

In all ages, pearls have been the social insignia of rank among the highly civilized. No other gem was so abundantly used for adornment by the princes of the east. Above great diamonds from the mines of India or glowing rubies from Burmah, the ocean gem became peerless among the ancient nations of Asia and as their power began to wane and the tide of empire swept westward, there went with it the love of pearls. The rulers of Rome when she was Empress of the world sought pearls, so also have the rich and powerful of every nation as it rose to afflu-

ence, and now in this new western star of Empire the men who hold the vast wealth of these United States in their hands, when they place their consorts on the last plane of social eminence, buy pearls.

Before the machine-like system of modern industry had combined ownership and seized the vast natural reservoirs which hold the diamonds of Africa, and brought the output to a known average yield of so many carats to so many loads, and established the cost of mining, washing, shipping and marketing, separately or together, to the fraction of a penny, there was a fascination in the hunt for diamonds there, the charm of which drew thousands to the fields.

From the discovery of them as baubles in the hands of children and the Hottentots, or plastered in the mud walls of Boer farmhouses, through the search for them along the Vaal River, to the time where findings led men to the kopjes, which capped the great chimneys of diamond bearing clay, where they staked and worked their individual claims, the ever present hope of finding a royal gem among

AT THE BOTTOM OF THE SEA

the small stones which formed the every-day yield, gave edge to appetite and the spur to toil, and the stories of fortunes diverted from one man to another by the lapse of a few minutes at the beginning or expiration of a lease, or by the line separating the mining rights of one from another, read like fairy tales.

More exciting yet is the search for them when, as in Brazil, they lie scattered over the river beds where one man hunts in vain and another by chance stumbles upon a pocket full, or as in India, where one must dig for them blindly into detrital matter ten or twelve feet under a later covering of earth. Who has not felt the stir of it while reading of miners in Brazil using diamonds worth a king's ransom as counters in their games of chance, or of a naked Hindu, emaciated and diseased carrying about his person, wrapped in a bit of soiled cloth, a gem found by chance which the richest prince of India would covet. So also do the tales of rubies brought from Death's Valley of Burmah renew within us the glow which fired the heart of youth when we read of Aladdin and his lamp.

But none of these are so redolent of romance as the story of the pearl. Beneath the rolling of the sea, where the waves pace softly and restlessly like caged lions, or lift themselves roaring to answer the voice of the storm; where at times the water lies green and placid under burning skies; at times, lashed by tornado and monsoon, becoming a seething caldron of black perdition; where spice-laden vessels sail, and where in the old days, privateers and pirates lay in wait for prey, there, at the bottom of the sea, unruffled by storm or pirate, unmindful of sun and calm, myriads of delicate creatures toil ceaselessly to strew old ocean's bed with gems. The chaste spheres with which you toy, while counting up the cost of hanging them round some fair neck, at one time lay fathoms deep, the ocean rolling over them. Dusky fishermen, at risk of life, brought them up and turbanned merchants gave great sums of money to own them; ships carried them, and dealers in precious things handled, sorted, examined and matched them, ere they came to rest in festooned rows within the velvet covers your jeweller opens to you.



THE RAJAH OF DHOLPUR
Whose pearls were valued at \$7,500,000

AT THE BOTTOM OF THE SEA

On almost every tropical sea that washes a shore near the equator, when the time of storm is over, boats ride over the shallows, and men dive from them for the pearl oyster as they have done for ages. Black slaves for Arab masters in the Red Sea and the Persian Gulf: Tamil and Singhalese in the Indian waters: Polynesians about the islands of the South Seas: Indians and other natives along the Atlantic and Pacific coasts of tropical America, and not a few white men in "dress" off the coasts of Australia. Your pearls have seen the dusky man-fish come silently and swiftly from the world of air to wrench the gaping shells that held them, from their anchorage. It may be your pearl lay twenty fathoms deep in the clear water of some lonely atoll in the great Pacific, among branching coral, and, found its way from water's solitudes to the light of the Sun and admiring eyes by the hand of a bright-eved Polynesian. It may have come from Egypt or the Indies, from Australia or Mexico: but from whatever quarter of the globe it came and by whom, it was born and grew somewhere at the bottom of the sea.



A PEARL OF LEGEND



A PEARL OF LEGEND

Long ago, ere the great Nations of Europe came into existence; before Rome was, or Greece had made history: when the power of the Earth dwelt in the lands of the Sun and was for good or evil in the hands of princes, there lived in Travancore a ruler of renown. Of those who came from the north, he with his followers had subjugated the fierce native tribes inhabiting the country for many miles along the seacoast and back to the mountainous interior. Over all, to the utmost bounds of his territory, the land was fertile and very beautiful. Along the shores, but a short distance from the ocean, were numerous shallow stretches of water, formed by the meeting of the inland streams with the swift current of the sea which there sweeps the coast. In them fish abounded, yet were they free from the dangers of the outer waters, so that young and old could there disport themselves without fear. Though the tropic heat was often great there were no

parched and barren wastes in the land, for the rains were many and the streams which ran to the sea from the mountains were numerous. Everywhere luxuriant verdure swayed to breezes that played to and fro over the rolling lowlands and about the hillsides, now coming from the water and now from the mountains. Coffee, rice, the palm, cocoa-nut, the areca-nut, the pepper, tamarind, and other tropical fruits and trees grew in rank abundance, and huge forest timbers sheltered many noble creatures of the wild.

At the first coming of this prince, fighting was constant and bloody. The hill tribes, more war-like than those of many lands, made frequent descents from their fastnesses, seeking by every ruse of barbarous warfare to exterminate the intruder. But this man was wary and alert. Possessing the confidence of his followers, they obeyed him with unquestioning obedience. Quick to move, merciless in his reprisals, he was soon feared by all the surrounding country and as it became known that he was also just and generous, peace presently followed.

Then did he seek to establish his kingdom

A PEARL OF LEGEND

wisely and well. He encouraged his subjects to cultivate the land, to fish the waters, and to trade with those who came by ship and overland bringing all manner of things for barter.

Though he and his people were devout believers in the Veda, yet did he tolerate the faith of others, and considered the low-born, for Brahmanism had not yet established the extremes of caste which came later. He himself was a Kshattriya but he ruled the Brahmans and would not permit injustice to the Sudras, therefore was he as a god among his people.

And this prince was good to look upon. Tall and straight as a tree of the forest, the fine lines of his grave impassive face were made alive by the light of eyes keen as an eagle's, inscrutable as those of a lion when he looks beyond.

One son only had he, for the others had all fallen in battle. The son was like the sire, and the father's heart was knit to him as steel when it is welded.

Now the time came when it was good that the young prince should marry, for he was man-grown and had been invested with the

sacrificial cord. So the prince his father said to him, "My son, thou standest alone to guard the manes of thy fathers. It is meet that the sons of my son be alive upon the earth, that when the time is come I die in peace and return to the place from whence I came, in confidence. I will find for thee a wife." And the young prince answered, "Let it be as my lord wills."

Now there was in the country beyond the hills, on the eastern coast of India, a prince whose daughter was famed for her beauty and he also was Kshattriya. To him the ruler of Travancore sent certain of those who were near him, and a wise priest in whom he had great confidence, to treat with the father of the maid. And these when they had arrived, made haste to do their lord's bidding, nor was it difficult to obtain his desire, for the prince of Travancore was in great repute. So as soon as could be, the maid became the wife of the heir of Travancore.

Report had not lied concerning the beauty of the girl, and such other qualities had she that the heart of her husband melted to her and

A PEARL OF LEGEND

became as the gold of a jewel when it holds a ruby most precious.

In due time a son was born to them, and the father and his sire and all the people with them were exceeding glad, for said they, "Now is wisdom and power established on the throne of Travancore and a son's son will guard the name of our lord."

Now when the princess was a maid in the land of her father, a Rover from the coast of Kandy had greatly desired her, and when she was carried away to Travancore he was very wroth. It was told that he would seek vengeance, but another year passed and another son came and both the children and the mother thrived.

But one day, when many sea-boats lay within the harbor of a city of Travancore where much trading was done with men who came from far-off countries and when multitudes were gathered there, it chanced that the princess passed by the market-place. Suddenly, a great number of them that were there from foreign shores, gathered together, and drawing swords, rushed upon the guards which accompanied

her. These, with the bearers they overpowered, and ere the bewildered populace knew the meaning of the tumult, the princess was dragged from her attendants and hurried to a boat waiting and ready to sail. Immediately this glided swiftly toward the sea followed by many others manned by ruffians who had lately mingled with the men on shore as peaceful traders. They were followers of the Kandy Royer.

In a very little while, the King, with the trusted priest of his household, the prince and many picked men of the King's body-guard rode furiously to the water-side. The face of the King was very stern, but only in the flashings of his eyes could be seen the unrelenting vengeance which moved him. Quietly he gave orders to man his ships of war. Then it was found that every one of them had been damaged. Not until the sailors made ready to sail were the hindrances observable, and in no case was the evil great, or so that it could not be presently repaired, for fearing discovery the doers of it sought only to delay the sailing of the King's ships, as the ships of the Rover were

A PEARL OF LEGEND

swift, and after they were out of the harbor, Travancore had none which could overtake them. Then was the wrath of the King terrible to look upon.

Now while the prince and his followers chafed, and the dismayed populace watched the work of the men who sought to make the boats ready to sail, the King filled them with the fiercest of his soldiers, being resolved that if the pirate escaped him on the sea he would follow him to his lair with swift and overwhelming vengeance. While these things were being done, the Rover passed out to the open sea and in sight of all the people turned his prows to the south.

Then the Brahman, standing where the lapping waters encircled his feet, stretched forth his hands toward the white sails as they spread to the west wind and called upon Shankar to destroy the despoiler. Immediately the wind died out and the ships were becalmed. Then the heart of the King swelled with fierce joy.

At his orders all the lighter boats were filled with men and oars were provided that they might row to the attack, and the young prince stood in the front of the fastest one. But while

the people whetted themselves for battle, the Brahman still stood and prayed. And presently the air became thick. Though no clouds appeared the sky faded rapidly from sight, and the sun could no more be seen and the light of it was as the color of fire in thick smoke only.

Darkness as of chaos and a silence like that of a dead world encompassed the people, and a great dread gripped them. Suddenly there came from the sea a breath of sighing broken by sobs very heartrending, and this was followed by the sound of churning and lashing water. Soon a furious wind swept the coast in gusts which rested only that they might gather strength to rage, as the rush of rioters is momentarily stayed between whiles. And the black air, writhing like smoke, was driven hither and thither, and shaken by the din of thunder. Fierce lightnings pierced the darkness and in passing gave lurid glimpses of the sea's frenzy and the wind-swept earth. But though the storm raged so that the roaring sickened the hearts of the people, the Brahman remained unmoved, his hands stretched toward the sea where the Rover and his fleet were when it began.

A PEARL OF LEGEND

Presently the wind passed, and the people looking seaward saw that there were no ships there, but the foam of the surf was black with wreckage, and tossing in it were the forms of dead men. The Rover and his followers had all perished. But the joy of the King and his people was savage, and their thoughts were black, for the princess was with them that were destroyed. Then the people made haste to spread themselves along the coast to watch if perchance the gods might cast her ashore alive, but no living thing appeared, neither was her body seen.

Now while these things were being done, great clouds, very thick and black, gathered, and rolling together, poured themselves in torrents into the sea. So thickly did the rain fall that the waves were beaten down and the sea became as a threshing-floor on which the rain fell white and hissing. The Brahman watching, said "Behold! the Heavens weep," and turning, he went straightway to the temple.

For many hours thereafter did the torrents fall and all Travancore mourned, the lamentations of the people being very loud, for the King and his

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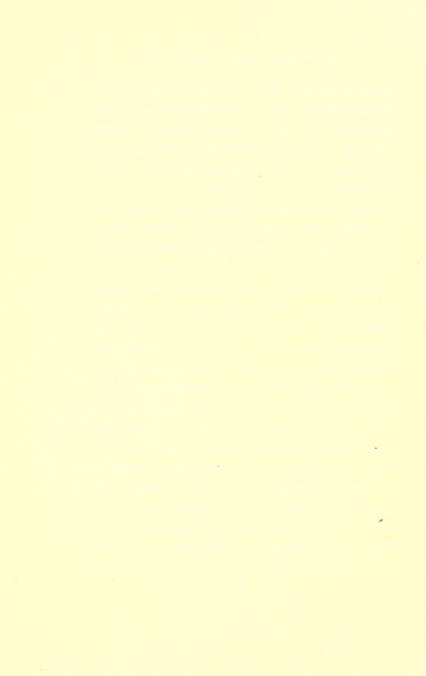
son were much beloved and it was known that the prince was sorely distressed, and the more so that his sword must needs be idle for there were none left upon whom he could take vengeance.

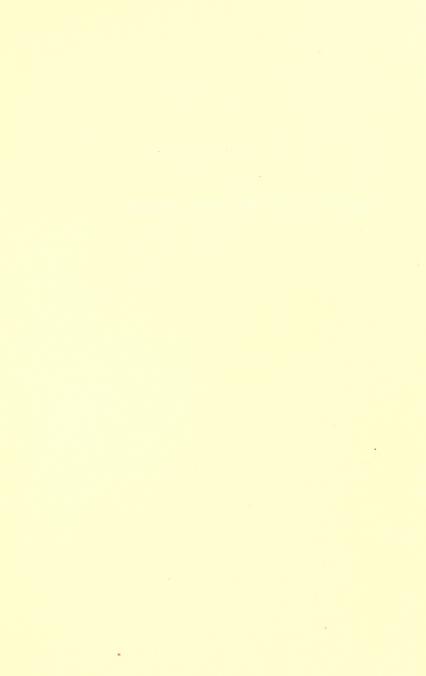
Now when the elements were at peace again, the King gave orders that certain fishermen of his people who were expert divers, should explore the bottom of the sea where the ships of the Rover were destroyed. One of these discovered the body of the princess and brought it to shore. And when they prepared it for burial, the women found fastened upon one of the hands a shell-fish, the two shells of which had closed upon a finger when it fell between them as they gaped. And when the shells were pried apart, there rolled from between them a round bone, white and shining, yet of a luster so soft and beautiful that no man had seen the like. And the Brahman when he saw it said, "Herein are the tears of Heaven which fell into the sea congealed and have become a gem which is beyond price." And he named it "Pearl," and carried it to the King. Then the King after he had heard the story of it, sent for the chief man of them that worked in gold and

A PEARL OF LEGEND

commanded him that he make for the pearl a setting most precious, and when it was done he gave it to the prince his son saying, "Above all things let this be first among the jewels of Travancore for-ever." And the prince when he looked upon it said, "The beauty of it is like the brightness of her eyes when they veiled themselves before my passion," and he prized it more than all the diamonds and rubies in his treasure-house.

From that day, when the fishermen dived for the chank, they sought also for shells like unto that in which the King's pearl was found, and after great rains many more pearls were brought from the depths of the sea, and fishermen following the coast, found them on the shoals between India and Kandy in great plenty. These were carried to the King, for no man dared to sell them, yet did the King reward the finders very liberally. So the store of them in the King's treasury grew, and for that there were no gems like them in all the earth, the fame of them spread, and travellers came from many and far-off lands to look upon the pearls of Travancore.





How long the pearl has been used as a jewel is unknown. It is seen all through the pages of history, from the long ago days when records were inscribed on the leaves of plants, to the rapid-fire prints of to-day, which unceasingly scatter to myriads the knowledge of things as they occur.

Back of history, pearls loom everywhere in the mists of tradition like delicate but imperishable orbs of beauty set in the smoulder of burned out days and passions. And wherever their tranquil light attracts the eye of imagination, the ghosts of the great are seen, for pearls lie in the hair of royalty and clasp the fair necks of Queens. Upon them shine the eyes of turbanned princes who valued them above the blood and life of thousands of subjects. Shades of imperious fingers, long since fallen to the elements, toy with them: they deck the spectral gatherings of the mighty in all lands and ages, and there is no dream of song or story

which does not hold them among the chief enchantments. As the fair moon hangs from the brow of night when she broods over lonely waters, so does the pearl shine in the shades of the ages.

In this country abundant evidence exists that before the advent of the white man, or of the red-skins as we know them, the aborigines, from the cold rise of the Mississippi to the glades of Florida, used them for their adornment. In savage wilds, and on coasts that knew not the sight of ships or other shores, copper-skinned natives treasured the glistening things they found in the mollusks of the sea-shoals and inland streams. Quantities of pearls have been found in the Indian mounds, many of them loose, others strung for necklaces and wristlets, some mounted in quaint and primitive fashion, all showing that in the days of unbroken forests and swarming game and roving tribes of untrammeled savages, in the tepees of the braves, their queens wore pearls even as they are worn now by fairer successors in the palaces reared where once were forests and campinggrounds. In those days the savage lords of the

undivided earth knew nothing of whirring lathes and drills; of hardened points of steel turning with lightning rapidity and unerring precision. Slowly they burned a way through the gem with hot copper wire, destroying thereby with ruthless ignorance the delicate beauty of jewels fit for royalty. To them the slender prongs of gold with which the modern jeweller holds the lustrous balls, uncovered and in safety, were unknown. Instead, the savage set them in holes bored in the teeth of animals. possibly to enhance the relics of a great fight with some fierce beast that succumbed finally to his prowess: possibly to add beauty to the grim reminders of her lord's valor when he hung them round the neck of a favored mate. The Indian of this continent was much more primitive in the art of the jeweller than in the manufacture of implements for war and the chase. Gaudy colors extracted from plants and minerals appealed more to his unthinking eye than a chaste form of beauty. With these he could stain his blankets, record on skins of slaughtered animals his deeds, or paint in hideous signs upon his face the malignancy of

His time and thought and ingenuity were given to things which would contribute to his master passion and glorify its deeds. The scalps of his enemies, the skins of animals he slaughtered, the feathers of birds that fell to his unerring arrow, the teeth of bears and mountain lions slain in desperate encounters, these were his jewels. Nor was his sexual instinct sufficiently refined to enthrone his mate. She was his slave, and her reward for toil was pride in his deeds and glory. He knew little of the tender homage which brings gifts and lays them at the feet of woman. Instinctively he made a setting for his pearls of bears teeth, that they might carry the scent of blood and tell the story of his conquest. Nevertheless, among these rude tribes of wolfish savages, sequestered from the touch of other people more refined, the modest pearl found favor, and in it they unconsciously paid tribute to one of the purest forms of beauty. But even this recognition must have been the growth of years, possibly of ages, for not until the understanding of worth has become general among a people is value established, and only things valuable are

stored. As desire for a thing for its inherent qualities spreads, there is added a larger number of those who seek to possess it for the profit they can make in supplying that desire. Not many years ago, fishermen along the streams of remote parts of Kentucky had no eye for the beauty of a pearl, and no knowledge that men and women lived who prized them. If while fishing, the fisherman's hook fell between the gaping valves of a mollusk it was immediately seized. The disgusted angler thereupon angrily pulled the nuisance out, and if upon disengaging the hook from the bivalve, he found within the shells a pearl, it was immediately tossed back into the stream for luck; for the beginning of a day's sport with a catch of that kind was illluck and the fates could only be appeared by the finding of a pearl, or a "mussel egg" as he would call it, in the mollusk, and its return to the water. There lives yet on the banks of the Clinch River, an old pearler, the distress of many a speculator for his knowledge of pearls and their value, who sometimes sorrowfully relates how he thus in bygone years angrily threw away many good pearls, one of them the

finest "ball" pearl he has ever seen. If these gems were so regarded by the ignorant white settlers of the west until the advent of men who had learned to appreciate them either for their beauty or the price they would bring from the outside world, it may be surmised that the awakening of the ancient Indian to their beauty, must have been a much slower process, unassisted as it was by men from beyond their limits who had long regarded them as precious. At first, probably, pearls were thrown to the children as playthings, as diamonds were in the Cape: then the young squaws gradually opened their eyes to the fact that the white shining things enhanced the charms of their smooth copper skins by contrast: the brave sought them to please the maid he would bring to his tepee: perhaps rovers brought news that in the far south, in lands of houses and teocalli and much magnificence, or farther off among the Incas, these baubles were prized by the chiefs. So gradually it dawned upon some that the "eggs" of the mollusk were beautiful, and upon others that they could be bartered for skins. blankets, or arrows, possibly for a pony, and

so they came to be gathered and stored and displayed as things which enriched the owner.

How far back in the ages the use of pearls on this continent extends cannot be estimated. The discovery of them in the mounds east of the Mississippi, which are credited to an ancient race that finally succumbed to the similar but more warlike red men found here when the country was discovered by Europeans, suggests many centuries. And the use of pearls to the extent manifest by the discoveries, favors the theory that the mound-builders had reached a degree of refinement never attained by the North American Indians of record. When white men invaded the North American continent, they found tribes of red men as rugged as the coasts of New England. Inured to hardships, despising pain, contemptuous of death, they lived by hunting and found their chief pleasure in the slaughter of their enemies. Camping at will, their lodges were here to-day and there to-morrow, and brutal if heroic, they roamed over fields once inhabited by a race which had passed, but left evidence that they were sufficiently civilized to appreciate the pearl.

In Florida and South America, the conditions, when the country was discovered by the Spaniards, were different. The ancient races, corresponding with the mound-builders of the north, undisturbed by the incursions of stronger tribes, had continued to progress and had reached a high degree of barbarous luxury.

In Mexico, when Montezuma gave audience to Cortez, he was ablaze with gold and silver and precious stones. His cloak and sandals were adorned with pearls. Pearls were used to decorate temples, canoes and even the paddles. Indian women had great strings of them coiled around their necks and arms, and the chiefs used them freely on all occasions of state. It was the same on the Colombian coasts.

At the island of Cubagua and on the main coast, Columbus found great quantities of pearls, as did De Soto and his followers when they landed at Tampa Bay, known by the Spaniards as "Spiritu Santo," in Florida in 1539. The Incas of Peru also owned many fine pearls. Though the natives of all these countries ignorantly injured the gems by cooking the oyster to extract them, or by their crude methods of

boring, and reckoned them of little value as compared with the European idea, they nevertheless esteemed them as jewels and must have done so for ages, for the invaders found them in the sepulchres of the dead, so altered by the processes of time that they retained nothing of their original beauty.

From these premises therefore it can be said of the antiquity of the pearl in this hemisphere, that it had been used as a jewel for some centuries before the early part of the sixteenth century.

The European regard for the pearl at this time may be estimated by the eagerness with which pearls were sought on the American continent by the adventurers of Spain, and by the pains they took on the arrival here of a new expedition, to convey assurances to the King of Spain that pearls were to be had in the new conquest. In the commission appointing De Soto to the governorship of Cuba, and as adelantado of Florida, Charles V. stipulated that of the gold, silver, stones and pearls, obtained by barter or in battle or otherwise, a certain portion should be reserved for the Crown.

In all the courts of Europe during the fifteenth and sixteenth centuries the pearl was, if not the chief, one of the most prominent jewels. Mary, Queen of Scots, possessed a rosary of pearls which excited the envy of Catherine de Médicis and Elizabeth of England, both of whom sought diligently to acquire them when the Scotch Queen became mired by misfortune.

The virgin queen of England when she went in state to chapel, wore pendent pearls in her ears after the fashion of Rome, and borders of large pearls fastened on her dress. When in her time Sir Thomas Gresham of London, a wealthy subject, wished to show the Spanish Ambassador, who had boasted of the magnificence of his Sovereign's court, how prodigal her liege subjects could be in her honor, nothing occurred to him more striking than to grind to powder a large pearl and mix it with the wine he drank to her health. This act of the English merchant shows that the pearl was then regarded by the great as the acme of costliness and beauty.

From the reign of Francis I. of France to that

of Louis XIII. the pearl was prominent in all jewels of note, and from that time to the death of Maria Theresa of Austria toward the close of the eighteenth century, it was worn in preference to all other gems. It was during the reign of Louis XIII. that Tavernier, the celebrated French Jeweller and traveller, assisted by that monarch, made his journeys into Asia. The account of his travels, published later, are highly esteemed for their truthfulness, and are regarded as exact, if prosaic statements of fact.

The desire for the gem in Europe at this time was so great that Tavernier purchased over half a million dollars' worth from the Arabian Sea. Probably the immense quantities of pearls sent to Spain from the Indies by her rovers in the early part of the sixteenth century, caused the vogue of that gem during the three centuries following, for not much mention is made of them in western Europe prior to that time. Nevertheless pearls were esteemed in the British Isles as early as the eleventh century, for it is recorded that Gilbert, Bishop of Limerick, sent a present of Irish pearls from the fishery at Omagh, to Anselm, Archbishop of

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Canterbury, about 1094, and Scotch pearls were not only in demand in Britain but on the continent also as early as the twelfth century. In 1355, the Parisian goldsmiths forbade by statute, workers in gold and silver to set Scotch pearls with the Oriental.

The Oriental pearl probably came into Europe first from Egypt through the incursions of the Macedonians into that country. Later, when Alexander overran Persia his followers doubtless became yet more familiar with the gem, for they spread through Arabia and the Persian Gulf where ancient fisheries also existed.

Pearls were not well known west and north of Asia and Africa at this time, for a writer of Mytilene in the island of Lesbos, about 350 B. C., which was but a few years before Alexander's conquest of Persia, says: "In the Indian Sea, off the coasts of Armenia, Persia, Susiana and Babylonia, a fish like an oyster is caught, from the flesh of which men pick out white bones called by them 'pearls'." This would indicate that knowledge of them was being carried at that time by returning soldiers, camp-followers and travellers, and these men probably brought

home also many of the "white bones" obtained by trade or looting. Whatever the method by which they were introduced, pearls came into favor, and the favor increased as they were brought with other jewels from the looted treasuries of eastern potentates. The Macedonians established fisheries in the Red Sea, where the Egyptians obtained their chief supply, and the Romans later brought them also from the Arabian Sea.

Three centuries B. C., the power of the Macedonians commenced to wane; Rome began to rise and overrun the countries which had been subject to the Macedonians; and pearls were thereby carried further west. The Romans adopted the pearl as a jewel of the first importance if not the chief of all, probably because they had found them so regarded by the older royalties they plundered. As the riches of surrounding and far-off countries which she raided, poured into the coffers of Rome, and the city grew to be the centre of power and wealth, the excesses of the rich became ludicrous to the verge of insanity. In their wild extravagances the pearl was prominent.

Affected doubtless by the splendor of Asiatic courts, the rude soldiers of Rome learned to regard the pearl as a royal luxury, and therefore adopted it as a sign of great wealth and power. Enormous sums were paid for pearls of rare size and beauty. Great leaders of men vied with each other in the effort to add to their collections. It is said that Julius Cæsar's chief incentive for pushing his conquests into the west so far, was his desire to obtain the pearls to be found in the streams of the British Isles. The Emperor Caligula decked his favorite horse with a necklace of pearls. Pliny says of Lollia Paulina, Caligula's wife, that he had seen her so bedecked with pearls and precious stones that "she glittered and shone like the sun as she went." Clodius, the glutton, claiming for them a very delicate flavor, placed one by the plate of each guest at a great banquet to be mixed with the wine. This same profligate, either setting the example or emulating Cleopatra, swallowed in a cup of wine one worth eight thousand pounds that he might have the pleasure of consuming so much value at once.

If in the intrigues so common then, a woman's

influence was required, pearls were given her. To convey an indirect bribe to a man of high station a pearl of great price was presented to a member of his family. Women wore them while they slept that they might possess them in their dreams; they hung them in loose clusters suspended from the ears, that the tinkling might remind them of the beauty they could not see, and to attract the admiration and envy of others. These were called "crotalia," meaning "rattles." Young men of fortune in Athens and Rome followed the Persian fashion of wearing one in the right ear, hung as a clapper in a small bell of metal. So strong and general did the desire to own them become that Cæsar forbade unmarried women. and women under a certain rank, to wear them.

Perhaps never in the history of jewels has the vogue of one so nearly approached a frenzy as that of the pearl in Rome during her days of extreme power and grandeur. The high esteem in which it was held there is reflected in the Scriptures. The Saviour used it in His parables as a symbol. The gates of the Holy City, as the prophet John saw it in his vision, were

pearls. From that time until now, writers have used pearls to symbolize purity, innocence and the highest type of feminine beauty. To say that a woman's teeth were like pearls has been the poets' favorite adulation, and the discovery and sale of great pearls has been deemed of sufficient importance by travellers and historians to record them.

Much of the literature of pearls is founded on the statements of Pliny regarding them: many, if not most, of the absurd beliefs as to their origin and superstitions concerning them, may be traced to the same source; and though these ancient errors have been repeatedly exposed by later scientists and naturalists the poetic absurdities of the industrious Roman compiler, gathered from contemporaneous writers and tradition are current to-day, for they appeal more to the child-like human love of the indefinite wonderful than the exact statements of research, though the latter are really more marvellous.

Though jewels are regarded by many as baubles and of little account among the great commercial interests of the world, they have

been an important factor in shaping the destiny of nations, changing the borders of great countries and thereby aiding the progress of civilization. As pearls helped materially to bring Rome to the British Isles and the colonists of Spain to South America, so it is quite probable that the pearls of Egypt had their influence in drawing the Macedonians to that country, to be followed by the Romans when the latter sought to overturn the Macedonian empire. Beyond this, their influence among those who held the reins in the government of empires, or those having power with them that did, cannot be estimated.

Passing beyond the days of Greece and Rome to more remote times and countries, we come to the realms of conjecture. We know that pearls were known and used as jewels in Egypt under the Ptolemies. Chares of Mytilene mentioned that they were worn by women of the East about the neck and arms and even upon the feet. It is said there is a word for them in a Chinese dictionary four thousand years old.

There is evidence that they had been used in India and the far East long before the West had

knowledge of those countries, but we have nothing recorded which penetrates the past beyond three to four hundred years B. C., for there is not as much mention made of them in ancient writings familiar to the West as of other precious stones. Nevertheless the pearl is among the most ancient in the nomenclature of jewels because when it did come to be written of only the one thing could be meant. Nature produces nothing similar with which it could be confounded, whereas it is not certain that the diamond, ruby, and other stones as we know them, were intended when the names by which we designate them were used. Such indiscriminate use of names has been made by translators that it is difficult to determine what the stones really were about which ancient authors wrote. The names of those in the Jewish High Priest's breastplate, given in our English version of the Old Testament, undoubtedly misrepresent the stones actually used, and the only thing authorities agree upon regarding the names is that they are incorrect.

As there was no definite knowledge of the crystallography and chemistry of stones in

the old days, writers referred to them often in general terms rather than by specific names, and these were translated into the names of later times according to the understanding of the translator, who had neither expert knowledge of his own nor reliable literature from which to gather information or guidance. An illustration of this general confusion occurs in the book of Job XXVIII. 18. It is written there, "No mention shall be made of coral, or of pearls; for the price of wisdom is above rubies." Scholars tell us that the words translated here "coral" and "pearls," signify "found in high places," and are thought to be precious stones though the variety is unknown. The Targum renders the first "Sandalchin," probably our sardonyx. Junius and Tremellius translated it "Sandaztros" in their Latin version of the Old Testament, whereas Pliny described it as a sort of carbuncle having shining golden drops in the body of it.

After the same manner the last sentence, "For the price of wisdom is above rubies" is rendered by the great oriental scholar Bochart, "The extraction of wisdom is greater than the extrac-

tion of pearls," and other authorities agree with him.

Although there is evidence that many if not all the precious stones of to-day were known and used by the ancients, it is equally evident that they were much confounded and very roughly classified by general appearance only, and as various peoples gave them different names, all records of them are as misleading as the recorders were ignorant of their differential qualities. Even with the rapid increase of knowledge in the last few centuries, not until quite lately has science drawn the lines clearly between stones similar in appearance though essentially different and furnished means for the detection of those inherent differences. It is impossible therefore to learn by ancient writings how long any of the precious stones have been known and used as jewels, for we do not know positively what the stone was by the name given in old writings or by the translator of them. The pearl only has not been thus generally confounded with other gems.

Once only are pearls mentioned in the Old Testament—the instance quoted from the book

of Job. It would seem therefore, that although used as jewels, they were not regarded as of great value in the East prior to about 400 years B. C., at which time the last of the sacred Jewish books is supposed to have been written. True, royalty wore them in Egypt and the people of Persia and Arabia used them very generally for personal adornment; but they were abundant in those countries and there had been no demand for them beyond their borders, therefore, though beautiful, they were common and not appreciated fully. Upon the influx of foreign invaders from shores that yielded no such gems their status changed rapidly. The greedy avidity with which Greeks and Romans seized them, and the demand for them from the West which came later, gave these natives of pearl-producing shores a new idea of the value of their pearls and the trinkets became gems.

It was a condition similar to that which arose nineteen hundred years later when the Spaniards invaded America. At their first coming the natives gave them freely large quantities of pearls and gleefully traded magnificent gems

for broken pieces of gaudily painted and varnished porcelain. As one to-day might take a new acquaintance for a day's fishing to a well-stocked stream, so the Indians took the Spaniards to the pearl banks to show them how they obtained their pearls. With pleasure and probably some amusement, they watched the eagerness with which the strangers sought the pearls, and doubtless wondered at the gratification displayed when they found any.

The Egyptians and Asiatics being more highly civilized undoubtedly valued their pearls more than the South American Indians did, but naturally they would not appreciate them so highly as they did after foreign desire had depleted their hoards and established a constant demand for them, greater than the yield of their fisheries.

That this condition prevailed in Egypt and Asia prior to the advent of Europeans, is indicated by the apparent ignorance of the writer of the book of Job concerning pearls. The word used in Chapter XXVIII. 18 is simply the translator's sign for an unknown quantity, and as the pearl is an apt symbol and illustration of

many ideas connected with or embodied in the cult of the Jewish Church, the fact that the Jewish writers did not so use it, though the precious metals and other precious stones were so used, and though their books were written in various countries, suggests that the pearl in those days was not reckoned of equal importance with gold and silver and stones like those set in the Jewish High Priest's breastplate for instance.

That a very considerable change in the world's estimate of the pearl took place during the four centuries B. C. is illustrated by the references made to pearls in the New Testament. Rome had made of the "white bones from a shell-fish" of the fourth century B. C., a gem for the rich and powerful and so generally established it in the public estimation that the sacred writers used it to illustrate their greatest conceptions of beauty and spiritual worth.

The Saviour likened the Kingdom of Heaven to "a pearl of great price:" under the similitude of pearls He counseled the reservation of holy things from men incapable of appreciating them. Paul and John numbered them among

the costly adornments in the pride of life and with the most precious articles of merchandise. From that day, with the extension of commerce, and the growth of Western nations in affluence and refinement, the demand for pearls grew and spread until even the rude island of Britain learned to appreciate them.

The quantities of large and beautiful pearls stored in the treasure-houses of Hindu princes suggest that they have existed as jewels in India for a very long period, but for how many centuries cannot be definitely stated. probability is that in very remote ages, rude fishermen of tropic seas all over the world, while fishing for food were attracted by the lustrous objects found occasionally in the oysters which they gathered and that they saved them as things likely to please some maid or matron of their affections. A favor for them once established, they would be sought, and with the growth of intelligence and refinement would come increased appreciation. There is a close analogy in all things between the development of the individual and nations, and even of the world. Each progresses on the same lines,

the difference consists in the magnitude and duration of the processes only.

To the child, pearls are playthings; to youth, pretty baubles; to mature years, important gems; to age, most beautiful and wonderful creations, and the more intelligent and refined the individual, the more quickly are these stages of regard reached.

So probably, in countries where they were found, pearls have risen with the evolution of a great nation out of a primitive race, from the rude favor of toilers of the sea, to a high place in the esteem of the princes of a cultivated people. It is quite probable that when the Aryans from the north spread over India, they found pearls among the possessions of the natives of the Madras and Malabar coasts, if not of the interior and north, as Spain found them among the natives of South America. Having a higher order of intelligence, they would naturally estimate the gem as of greater value than the aborigines would.

As the invaders in the course of centuries gradually divided themselves into castes, the gem would come largely into the hands of the

highest and its value would increase with the affluence of the ruling class, according to the ratio existing between their wealth and that of the average community; for the centralization of wealth establishes a price for its imperishable forms which debars the masses from ownership. So, probably, the Aryans from the north acquired the pearls they found in the possession of the Dasyus. When the shepherd invaders were settled in the territory they had conquered and became divided into castes of Vaisyas, Kshattriya and Brahman, pearls gravitated to the upper classes, to be garnered later by their princes as the government assumed a tyrannical form; and so it is that the great pearls of India found in ancient times are among the jewels of the princes of India, or of the Shah of Persia and the Afghan Ameers, who in turn looted some of the richest treasuries of India

In countries east of India one can only imagine the history of pearls for there are no records of them. Year after year, for centuries and cycles, in undiscovered deeps, the beds of the sea were strewn with noble gems that

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through all their years of beauty lay neglected: the soft luster of succeeding charms appealed in vain for eyes which never came, and when the slow processes of time had brought decay they passed unseen to the catacombs of Nature.

So it was in many a tropic sea, on unknown shores and about islands holding strange creatures and stranger men. In the still, clear waters of far-away lagoons, treasures of pearls, released by the death of their creators, have rolled to a resting-place on coral reefs, to lie there until the sea, atom by atom, devoured them. Could all the pearls hoarded by every nation on earth be gathered together, the mighty sum would be small compared with the number of those which lie buried beneath the ocean.

But, one by one, slant-eyed Celestials, Maoris, Malays, Papuans, Polynesians and others, discovering, learned to prize and hoard the pearl. Then came men from far-off wonderlands, whose great ships spread their sails to the winds of the deep waters and who could endure for many days the solitudes of the great seas. These in the early days made war to plunder,

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but were replaced as the centuries passed, by others who gave gaudy beads and cloths of many colors and water that fired the soul and other wonderful things, in exchange for the white beads of the sea, and so the pearls of the unenlightened children of the South Seas passed to the princes of the West, even as the same restless spirits, spreading their sails to the winds of the great seas in the opposite direction, brought them east from more barbarous shores far away to the westward.

Our knowledge of pearls reaches back about twenty-three hundred years, through the writings of Pliny, who nearly nineteen hundred years ago gathered the facts of his day and the rumors of traditions concerning them. Beyond that we can only surmise that in prehistoric ages, with the dawn of intelligence in the infantile period of the race, men dwelling near tropic seas were attracted by them as children are by bright and pretty baubles; and that as humanity by families, tribes and nations, grew out of savagery to the mental stature of a man, so pearls grew to be jewels very precious.



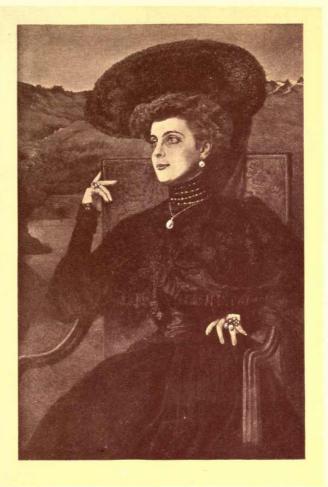
Although the pearl like all other jewels, has had its periods of extreme and general public favor, unlike other gems if it is once appreciated by an individual or a nation it is never utterly discarded by either. If not the fashion, pearls are always in fashion. Far as we can look back among the dim, uncertain figures of the mystic past whose shades stand where the unknown multitudes have fallen, we find pearls.

The princes of India through all their generations, the dynasties of Egypt, the royalties of Persia, the wild chiefs of Arab tribes, the potentates of Greece, Rome and Venice, the houris of Turkey, the Queens of every European court, from the time they found a place in history until now, all wear pearls. At first thought this seems strange, for of all gems the origin of the pearl is most humble. No titanic forces, groaning in the travail of subterranean convulsions, crushed and ground and fired its particles to shape and beauty. It grew, a few

fathoms deep, where the waters are at peace, in the embrace of a mollusk and out of its exudations.

From this lowly parentage it rises at once to a place among the noblest, for it is the aristocrat of gems and finds its warmest admirers among the aristocrats of all nations. The favorites of fortune the world over in all ages have succumbed to the modest beauty of the pearl. Its ascendancy marks not alone the refinement of the individuals with whom it finds favor, but the high status of the nation where it is widely appreciated. The pearl is the favorite of those who are surfeited with jewels. One may become tired of the diamond's splendor, but those who learn to appreciate the unobtrusive loveliness of the pearl, seldom lose that fondness for them which it develops. It is the one gem which does not satiate. .The love of pearls usually marks a connoisseur of gems and one accustomed to the possession of iewels. Diamonds emblazon the gates of luxury but pearls are the familiars of the luxurious. Glittering gems are admired by all classes but usually the pearl is fully appreciated

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PRINCESS ABAMALEK LAZAREFF (From the painting by Vitelleschi)

only by old countries and persons "to the manor born." It is in the treasure-houses of the princes of the Orient and among the jewels of great and noble families that one must look for the pearls gathered during the centuries. Except in Italy and Arabia, where all classes prize them, the pearl is not a jewel of the people, but of the gentry and the very rich who come in contact with them.

It is essentially a jewel for the wealthy. Unostentatious, exquisite, it is insufficient for those who have no other jewels and unfit for common wear. Of a nature too delicate for rough usage, it must be well cared for and properly housed. Even then the hand of time bears heavily upon it for it is susceptible to many influences which do not affect other gems. Comparatively soft, the lustrous skin is injured by rough and careless contact with other jewels. The gold of the setting, in time, cuts into the surface where it binds, or if it is pierced and strung, the rings of nacre about the orifices gradually peel away. Hot water injures it; gases discolor it. As the cheek of beauty grows dim with age, so gradually the brilliancy of

youth fades from the pearl and the complexion of it is changed. And yet it retains a certain loveliness which may well be compared to the exquisite serenity with which the maturer years of some women are adorned.

The pearl, therefore, being essentially a jewel of the rich, is not affected as others by the whims of fashion. In Oriental countries, where the lives of the masses and what little property they hold are practically at the mercy of their rulers, the centuries make little change in conditions and less in fashions. The nobles have always possessed the jewels of the various eastern countries and the fashion continues through generations and dynasties, to accumulate and hold them until some stronger power takes them away by force. As the people hammered heavy bracelets and anklets out of the precious metals, not alone for display, but also to hoard them, so their princes hoarded iewels.

In the old times these hoards of the precious metals were periodically gathered by the requisitions of the princes on the people, and of jewels by the demands of a successful invader

upon the princes; but while the possessors changed, the fashion remained always the same, and whether the Shah of Persia, the Ameer of Afghanistan, or the Mogul, there has been no variation in the constant desire to obtain more jewels, pearls among them, and to display them after the same fashion through all the generations.

To some extent this is true of pearls in the Occident also. Since Rome set the fashion there has not been a time in the history of any European nation, once it had risen to the pearlwearing eminence, when the upper classes did not wear pearls. There is this difference between the East and the West however; whereas the men of the East wear them, in the West, pearls are worn almost entirely by women alone. The more rugged life of European men, the coarser fabrics of their garments to suit climatic needs, and their virile distaste for effeminate display, all combine to bar them from a jewel suited only to soft silks and linens or the touch of softer flesh.

In ancient times, among Asiatics, fashion probably did not culminate in any direction,

as to-day, in a vogue. The inability of the masses to follow a fashion of the upper classes, both for lack of means and permission to do so; the absence of all rapid methods of communication between sections of country within and without national borders, with the consequent limitations of a knowledge of men and things to community affairs, and the paucity of manufacturing possibilities, all combined to make fashions permanent. With the awakening of the vigorous barbarian tribes of Europe to a knowledge of their power, and their rapid civilization, came the frenzied desire of men new to the situation, to crowd as much as possible into the span of life.

Rome rioted in the accumulations of ages. With an appetite whetted by an heredity of unsatisfied desire, she drank the finest vintages and gourmandized the choicest morsels of the world, immune from present punishment for excess by a long ancestry of hard and simple life. Every land that she could reach, sent to her the best of all their products, and from the incoming tide of things new to her experience, she adopted many fashions, among them that

of wearing pearls. For several centuries they were in vogue, so much so that edicts were issued restricting them to certain classes. Since that time, the very general use of them by persons of high station in Europe, beyond all other gems, seems to have been confined to the seventeenth and eighteenth centuries and is now being revived at the opening of the twentieth.

There is one fashion of wearing pearls which is common to all ages and races, viz. strung as beads in chains to hang about the neck. The mound-builders of North America, the Indians of the Mississippi Valley, of Virginia, of the coasts of Florida, of the lands around the Gulf of Mexico and everywhere in New Spain, all wore them so. Egyptians, Persians, Arabians, Hindus, Singhalese and South Sea islanders, many of them without knowledge of countries or peoples beyond their own or very near territory, alike adopted this fashion. And it has been followed by every newer people, as they acquired by trade or the sword, the pearls with which to so adorn themselves.

In lands of tropic heat the women wound these strings of pearls about their arms, wrists

and ankles also. Nor was the fashion confined to women. When the Spaniards first reached these shores, the caciques of Florida and the incas of Peru, on occasions of State, wore ropes of pearls around their necks, and so to this day do the rajahs and princes of India and the eastern islands. The more civilized peoples used round pearls, and became more critical about the quality and perfection of the gems as they grew in wealth and refinement.

The necklaces found in the Indian mounds are made principally of baroques, some of them rounded, but many of them long, slender pieces, bored a short distance from the thinner end, so that they hung in pendant festoons. As with all primitive races, the magnificence of size appealed to the Indians of this hemisphere, as it did also to the Spanish adventurers who first landed on the coasts of America. A chronicler of events during the time when De Soto was governor of the province which now forms several of the Southern States, mentions that a cacique brought as a present to the governor at the town of Ichiaha, a string of pearls as large as filberts, five feet long.

It is noticeable, that in all the accounts given of the wealth of pearls discovered in the possession of the natives, the Spaniards rarely say anything about the shape or quality of the pearls seen or taken, but always mention the size when large. They do, however, constantly deplore the discoloration caused by the use of fire in the process of boring them. One may imagine the chagrin of these freebooters on finding heaps of royal gems wrecked by the ignorance of the plundered; the value burned out of them, like bank notes for millions mutilated beyond redemption. The pearls composing this five-foot string were all discolored, good enough for Indians, but of little value in Spain and Europe.

Round baroques are strung for necklaces to this day, especially in Italy, where the peasantry save from their small earnings the equivalent of two to three hundred dollars, to them an enormous sum, to buy the coveted necklace of pearls. These necklaces are composed usually of several strands of small rounded baroques weighing about one to two grains each and connected by bars. Usually there are three to five

strands, but some are made with as many as eleven or twelve. Necklaces are made also in the same way, of small round pearls, and the bars, of which there are generally four, including that containing the clasp, are studded with diamonds.

The Asiatics prefer strings of large pearls, graduating in size on either side from a large central one. A number of these of increasing length and fastened together at the clasp are worn by Oriental royalties, so that each string festoons below the preceding one, the lowest and longest string sometimes hanging to the waist. There are few however even among the Hindu princes whose store of large pearls is equal to such prodigality.

When pearl necklaces were adopted by the Romans after their conquests in Egypt, Persia and India, they vied with the monarchs they had conquered, some of their rulers acquiring pearls of enormous value. The wife of Caligula owned pearls worth two million dollars, but Oriental treasure-houses held greater accumulations. The pearls of the late Rana of Dholpur in Upper India, were valued at seven and a half

million dollars. From Rome the fashion spread with the advance of civilization through all the nations of Europe and followed their colonizations westward. Only in the last decade has the use of pearls in the United States become sufficiently general to place them in the list of things that are a fashion.

Many large pearls of pear, egg, or drop shape, and some round, are used as pendants, to be hung on slender gold neck chains, or suspended from brooches of diamonds. They are bored at the smaller end to a depth of about oneeighth of an inch, the hole is filled with a composition which hardens rapidly, and in this a gold wire, looped at one end for connecting, is inserted. Formerly the pearl was drilled quite through and the suspending wire riveted, but this is rarely done now as it lessens the value of the pearl and destroys the perfect pendant This is a European fashion. effect. Chinese mount pearls by boring into the body of the pearl at two, three or four points and inserting the bent ends of spreading wires so that the gem is clasped as by spreading finger tips.

Pear-shaped pearls were used in Rome for pendant purposes as now and were known as "elenchi." After the Roman fashion of "crotalia" or "castanet" eardrops had passed, drop pearls continued in more or less favor throughout succeeding centuries as eardrops, the matching of one nearly doubling the value of both. Of late, egg and pear-shaped pearls have been used largely as heads for scarf pins. They are drilled and set on a gold wire or "pegged" as it is called, in the manner described for pendants but with the smaller end resting upon a light gold ring soldered to the scarf pin, or in a small cup, so that the pressure, while inserting the pin, is distributed over the body of the pearl and upon the end, instead of upon the inner wall in contact with the end of the pin.

The Persians used pearls largely in the jewelling of royal headgear, for Pompey is said to have brought home twenty crowns of pearls with the loot from his eastern raid. Hindu princes strung them on straight wires of equal length and bound a number of them together, to be fastened as pompons or aigrettes, to their turbans. They encrusted and edged their robes

with them as also did the royalties and nobles of Europe during the middle ages. Seed pearls were strung in lengths of four to six feet and the strands twisted together like a rope. This fashion continues to this day, such ropes of pearls sometimes measuring five feet in length.

The semi-barbarous Indian tribes of America did not confine the use of pearls altogether to personal adornment. They decorated their idols, state canoes, the handles of the paddles, and the figures in their temples with them, and they buried enormous quantities in the sepulchres with their dead. There is no evidence that this latter form of extravagance was at any time general in Asia or Europe, but Julius Cæsar made a buckler of British pearls which he hung up in the temple of Venus Genetrix after dedicating it to her.

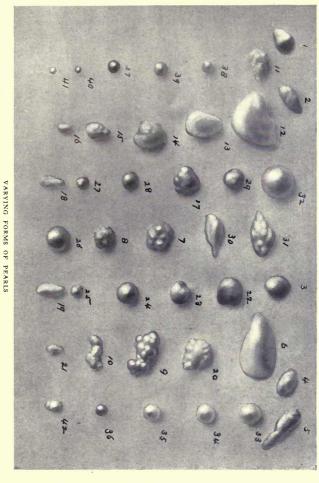
Among the ancients it does not appear that pearls were used in connection with the precious metals to a great extent. Collars of gold and silver with large pearls as pendants were sometimes seen upon the necks of Indians by the Spaniards when they landed on this continent, but in Asia, Africa, and upon their first intro-

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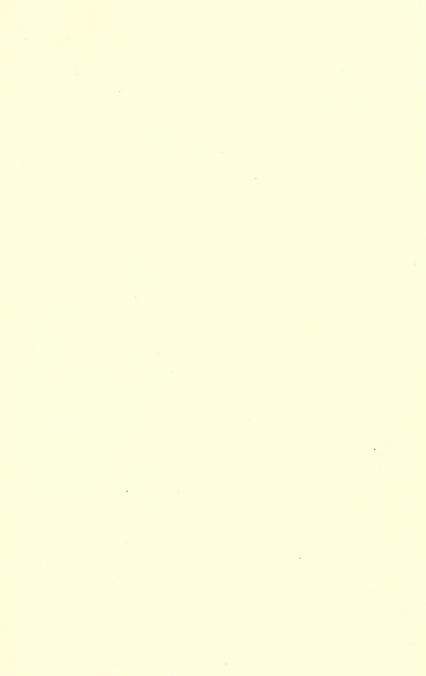
duction into Europe, pearls were not used with the metals as freely as other gems. As the art of the jeweller developed however, they came into more general use and are now utilized with gold in every form of jewelry. Round and button pearls with diamonds or other stones, or alone, are set in gold as brooches, ear-rings, finger-rings, bracelets, hair-ornaments, scarfpins, dress-pins, studs, cuff and dress buttons, etc., and baroques are also used for the same purposes. Brooches, lockets and pendants are paved with solid masses of half pearls.

Some ancient swords of Hindu warriors betray a curious custom. A groove with overlapping edges was sunk in the blade and into this pearls were introduced from the hilt end to represent the tears of enemies. There are blades so constructed in the collection of Indian swords presented to King Edward of England when, as the Prince of Wales, he visited India.

Jewellers frequently avail themselves of the odd shapes in which baroques occur to construct unique jewels. Nature frequently gives them a resemblance to animals, and sometimes to the human figure and face, which may be accentu-



1-5 Abalone Baroques. 6-Blister. 7-10 Twinned Pearls. 11-21 Baroques. 22-29 Round Baroques. 30-31 Wing Pearls. 32-35 Button Pearls. 36-37 Colored Round Pearls. 38-41 White Round Pearls. 42 Jockey Cap.



ated by the jeweller's art so as to make the resemblance striking. In one notable instance lately, a baroque was so mounted that it might easily pass as a modelled portrait of Queen Victoria. Baroques resembling bird's wings are common and are often made effective by mounting them on a bird of gold. Others remind one of fish, birds, insects, and beasts of various Clustered pearls enveloped together kinds. sometimes look like dog's heads, in which two of the enveloped pearls near the surface pass for eyes. Long, slender baroques are set to resemble the petals of a chrysanthemum, and others, mounted singly in sepals of gold, are suggestive of the buds of various flowers, roses, lilies, etc.

Round and button pearls are used extensively now, and have been at various periods formerly, as centres for circles, or "clusters" of diamonds mounted as scarf-pins, finger-rings and formerly, when they were worn, as ear-rings. The pearls are sometimes drilled and set on a peg; sometimes they are held by claws or prongs as the diamonds surrounding them are.

Pearls are very generally used now as studs

by men for evening dress, usually mounted on pegs so as to avoid the display of any gold.

But all fashions of wearing pearls except as necklaces, are ephemeral. The fashion of pearl necklaces has been constant for thousands of years, though it is only brought to general public notice when some new country with its great and rapid accretions of wealth, adopts it. The markets of the world are then affected, the price of the gem rises, and this in turn tempts ancient and impoverished families to unlock their jewel cases to the bidding of the nouveau riche. That this condition has existed from the beginning of this century is shown by the sales which are being made constantly in Europe at the great public auctions of jewels. In 1901 the Comtesse de Castiglione necklace was sold for \$84,000. At the sale of the Princess Mathilde jewels in Paris, a three strand necklace of 133 pearls weighing 3320 grains, once the property of Queen Sophie of Holland, brought 885,000 francs, which with the taxes to the purchaser made the cost \$188,000. At the same sale, a seven strand collar given by Napoleon I. to the Queen of Westphalia, weighing 4,200 grs.,

brought \$80,000, and another collar once owned by the same Queen containing thirty-three black pearls, weighing 1040 grs. was sold for \$20,240. Several fine strings were sold in London in 1903. Among them a three-row necklace from the Aquila Jewels for \$22,400. A string of 198 finely matched gem pearls, round and graduated, was sold at Christie's for 6,500 pounds. A triple row of 153 of the same kind brought 6,500 pounds. Many important sales have been made in the States, during the last ten years especially, but as they were made privately, and as buyers here are averse to any publicity they are not chronicled. It is a fact well known to jewellers, that Americans in their home market are extremely difficult. They demand a degree of perfection, not only in the gems themselves, but also in the matching of them, rarely exacted in other countries. There are strings of pearls in this country which if less magnificent, for extreme perfection and beauty are seldom equalled by the more notorious jewels of Europe, and princely sums have been paid for single pieces of great size and purity. Greater quantities of the coveted treas-

ures of the earth are pouring into the lap of the United States of America through the channels of peaceful industry, than were ever gathered to a nation in the olden times by the marauders of the sword, and the jewel cases of our princes of commerce will soon eclipse those held by the scions of ancient freebooters.

VARIETIES



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True pearls are divided primarily into two classes, "oriental," and "freshwater." By true pearls those creations are meant which consist of concentric layers of nacre or mother-of-pearl, as distinguished from similar formations by mollusks out of material that is not pearly.

In the early days pearls brought from the Orient were therefore called "Oriental" pearls. For the same reason the fine mellow luster which characterized and made them superior to others came to be known as the "orient" of the pearl. These pearls were taken from oysters found on the coasts of Ceylon, Arabia, and the Red Sea. Later, when the same kind of oysters containing similar pearls were found in other seas, they were also classified with them, until the term "oriental" is now applied usually to all true pearls taken from salt water mollusks, to distinguish them from those found in the fresh water mussels and other products of ocean shell-fish which, though similar in construction and

composition, are not nacreous. Occasionally, however, the term is still applied specifically to pearls from the Indian Seas, though their "orient" or luster is not always finer than that of like pearls found in many other localities.

Pearl oysters are varieties of the Avicula Margaritifera, of which the Meleagrina Margaritifera is the most prolific of mother-of-pearl and pearls combined, and, the Indian excepted, yields the finest pearls. All pearl oysters do not produce sufficient mother-of-pearl to make their shells valuable, nor do they all contain pearls. The name therefore applies to all oysters whose secretions are productive, in some degree, of mother-of-pearl and therefore under favorable conditions of pearls also.

"Fresh-water" or "sweet-water" pearls are, as the name signifies, those found in the mollusks of inland waters. This mollusk is a mussel. The name "mussel" in Anglo-Saxon signifies something which retires on being touched. It is known as "Unio" of which there are many pearl-bearing varieties.

In both the sea oyster and the fresh-water mussel, other nacreous formations occur of

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irregular shape called "baroque" pearls. The orientals approach more nearly to the globular and hemispherical form of true pearls, having frequently the lumpy rotundity of a snowball and sometimes sections which are smooth and round. The fresh-water baroques are usually very irregular, often fantastically so. Many resemble the incisor teeth of man or distorted grains of corn. Slender pieces similar to the wing of a bird and therefore called "wing" pearls, or "hinge" pearls because they are found near the hinge of the shell, are common. Some are shaped like a flat spike nail. Unlike oriental baroques, the surface of a large proportion of the fresh-waters is grooved or indented and some show a beautiful iridescence. Large button baroques of fine luster and iridescent, especially when they have a decided tinge of pink, have come to be known of late as "rose" pearls. Another variety of pink baroques having a fairly regular shape with a lustrous and finely irregular pimply surface are known as "strawberry" pearls. These terms are applied indiscriminately to the two varieties however.

Another nacreous formation found in the

mother-of-pearl oyster shells is the "blister." It is produced by the raising of the nacreous deposits above the level of the shell to cover some intruder of considerable size. This results in a growth similar in shape to a blister on the flesh, hence the name. It is cut out of the shell and used in various ways as a set for jewelry, or to imitate the bodies of insects or small animals. Others with a slightly higher dome and rounded oval shape, regular in form, are called "turtlebacks."

Some of these hollow shells of pearl have been found to cover small fish, lizards, etc. The writer saw one which appeared to be a large button-pearl. On lifting, it proved to be a shell of several thicknesses of nacre covering a small shell-fish about a half-inch in diameter. The imprisoned mollusk was shrunken and crumbling so that the nacreous covering could be lifted from over it, a hollow dome of pearl. Mud blisters are common in some waters and depreciate the quality of the shell and are otherwise useless. A typical mud blister appears in the shell illustrated herewith.

The Abalone pearl occurs usually as a baroque



PANAMA PEARL-SHELL, SHOWING MUD-BLISTERS, BORERS, AND PEARL

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or blister but occasionally it is found solid and spherical. Although it is not classed among true pearls, a few globular pieces found are entitled to a place among them because they are sometimes identical in construction and have a similar pearly luster, it is however very liable to crack and break and can seldom be pierced with safety.

The shell-fish from which it takes the name is the Haliotis, called here the Abalone. It is known under many names—earshell, Venus's ear, etc. In the English Channel Islands it is the ormer, and on the adjacent coast of France where it is very abundant the name for it is similar—"ormier." The Aelonians called it the "Ear of Venus." The shell is ear-shaped, flattened, slightly spiral and has a series of round holes near the edge curving with the last whorl toward the boss. As it grows, the oldest of these are successively filled up and the last remaining open, serves as the anal channel. The exterior is very rough and unsightly, but the mother-of-pearl interior is one of the most exquisite pieces of color work painted by the hand of nature and to this is added an enliven-

ing iridescence most fascinating. Like it, the pearl formations are deeply tinted. Brownish reds, peacock greens, and dark grays are the prevailing colors. They are seldom of even color or luster, many of them having but one lustrous point where a pearly glaze seems to have been incorporated with the earthenware like surface.

Usually the pearls when round and lustrous are not constructed as compactly as those of the bivalves. The texture of the skins vary in quality and the frequent presence of intermediary strata of black conchiolin which shrink, makes them liable to crack and break. The blisters run very even in these two qualities of color and luster and though seldom quite as brilliant as the nacre of the shell, are very beautiful and often curiously formed. These blister-baroques are like two blisters joined at the edges, and are liable to separate there. The interior consists chiefly of black conchiolin, rough and somewhat shiny.

The "Conch" pearl, found in the Conch (Strombus gigas) of the West Indies, also is not a true pearl. The shell is used largely for

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ornamental purposes, especially for the cutting of cameos, and also in porcelain works. It is a large shell, sometimes weighing four or five pounds. Formerly great quantities were exported to England from the Bahamas; in one year as many as three hundred thousand. Conch pearls are devoid of nacreous luster, the surface having an appearance like china. They are slightly transparent and show under the surface a series of delicate wavy markings.

The silky sheen of these lines causes them to appear lighter than the body color of the pearl, and they seem to branch toward the surface, changing kaleidoscopically as the pearl is turned. Almost without exception the shape is ovoid, or a flattened ovoid, though some are distorted. In color they range from very pale to deep pink and coral red, the ends being usually much lighter than the body and often white. In the deeper tints they are more uniform in color, and as they are apt to be less lustrous and transparent as the shade deepens to red they show less plainly the distinguishing wavy lines, and may be easily mistaken for pieces of coral cut to the shape and polished. They are very

delicate and therefore easily fractured or cracked. As the natives usually obtain the pearls by cooking the fish, for which they have a great liking, a large proportion of the few which come into the market are cracked. It is claimed also that the color fades with time. They are sometimes called "Nassau" pearls.

Pearls similar in appearance to the Conch, except that the wavy lines are absent and the skin rarely as brilliant, are taken with true pearls from the small varieties of the Avicula, especially about the coast of Venezuela. Some are white as chalk, many are tinted in various shades of gray, yellow and brownish reds. They have the shining appearance of china in different degrees, but no nacreous luster. The skins of many of these are peculiarly constructed, they show modified characteristics of various parts of the shell. The surface wave lines are present to some extent, together with curious malformations of prisms and conchiolin.

The hexagonal faces look as though they had been doubled up upon themselves together with a layer of conchiolin, the latter appearing as thick black V or U shaped marks in the faces

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of the distorted hexagons. Heretofore these have been considered valueless, but it is possible that with the increasing vogue of pearls and the growing desire for oddities, they will be utilized in the cheaper forms of jewelry.

Creations similar in construction to pearls are found occasionally in the common oyster and clam. Though entirely devoid of the pearly texture and luster, some of them are very perfect in shape and smoothness of skin. Whether taken from the oyster or clam they are usually called "clam pearls." The color of the oyster pearl is generally a light drab. The clam pearls are mostly purplish red or blue. often dark enough to appear black. Those taken from the oyster are generally round; those from the clam are more frequently ovoid. Occasionally one or both ends of the oval are lighter in color, as the Conch pearl is, changing there to a dark red or purple. When the color is very dark and the skin uncommonly good, they have been sold for black pearls by unscrupulous dealers. They are accounted of little value, though exceptionally large pieces will sometimes sell for as much as one hundred to a

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hundred and fifty dollars. Similar to these, pearly formations characterized by a glazed, or glassy, or shiny surface, are found in many molluscan varieties, bivalves and univalves, but none of these are true pearls.

Pearls similar to the pink Conch are found in the shank or chank of Ceylon (Turbinella scolymus). This is the sacred shell of the Hindus and the national emblem of Travancore in the Madras presidency, India. Vishnu carries a chank called "Devadatta" in his hand. It is said his first incarnation was for the purpose of destroying Shankhasura (the giant chank shell), and thereby regaining the Vedas, which had been stolen and taken to ocean deeps.

COLOR



COLOR

The ideal color for a pearl is white. Although all fine white pearls show by comparison a tint of some color, a fine white must be free from an appearance which can only be described as "dark." It is not color always but a certain density which makes the gem appear dead by comparison with the soft, warm, life-like white of the perfect pearl. The layers or skins of some pearls are more transparent than others and this imparts a liveliness which is absent in the more dense.

Upon looking at a string of pearls held between the eye and the light, some will appear much lighter than others and show a translucent band about one-fifth the diameter of the pearl, extending from the edge of the circumference inward. Such pearls upon examination will be found much finer in color and texture than those which have the appearance beside them of dark opaque spots when held against the light.

There is also a white which is not dark and is yet dead. To some extent it is characteristic of all fresh-water pearls. It is a chalky, milky white that even when lustrous, carries a reminder of chalk in the texture and lacks the essential life of the ideal pearl. Color in the highest perfection is found in the pearls of the Ceylon and Australian waters, the former being also very lustrous, and such are sometimes termed by the trade "Madras," after the city where the Indian pearls have been marketed for ages. It must not be inferred however that pearls equally good are not found in other localities, but that the color averages better, and the number of gems of ideal color and luster is greater from the Ceylon fisheries than elsewhere. The color and texture, and therefore luster, of fine Indian pearls is seldom equalled, never surpassed.

To those who are without experience, and see for the first time a large quantity of pearls apparently alike in color, it would seem an easy matter to match any required number; but in attempting to gather sufficient for a single strand necklace, one would learn that a parcel

COLOR

or series of pearls, seemingly all white, contains a surprisingly great variety of shades or tones of color; that which appears at first sight quite easy becomes in the attempt extremely difficult. Probably nothing requires a sharper eye, a more delicate sense of color and greater patience, than the assembling of a finely matched string of pearls. Bearing in mind that size, shape, color, and perfection, must all correspond, it is not surprising that few strings exist which are above criticism.

Those who buy them seldom realize what enormous quantities of pearls, and skilful and painstaking effort is necessary, to match perfectly, thirty or more, especially of large size. Pearls which, separated by a few inches seem alike, when brought close together reveal differences of texture and tone of color sufficiently pronounced to arrest the eye and destroy that ideal perfection of purity which permits no spot to mar the symmetry of an assemblage of these emblematic gems. It was said in old times that to match a pearl perfectly was to double the value of both; one may imagine therefore the difficulty which confronts

the modern jeweller when he undertakes in this critical age to match thirty or forty.

The color most common in pearls of all seas is yellow, but it is not so with fresh-water ones. Other colors are seldom found except as tints in white pearls, but distinctly yellow oriental pearls are abundant. The tones of color in the white are, yellow, blue, pink and green. They are so slight that it is difficult to recognize them except by comparison. The blue and pink are considered best, the champions of each being about equal. The green come next in favor and the yellow last. This order applies fully however to the Occident only. Some Oriental peoples do not draw such fine distinctions, and the Chinese prefer the creamy yellow to any other.

The "blue" pearls, or "Panama" pearls as they are sometimes called in the trade, must not be confounded with the blue white pearls just mentioned. "Blue" pearls are of a dingy, slaty blue tint. They have a dark appearance and the luster is seldom good. As many of this character are found in the Panama waters such pearls are often sold as "Panama" pearls.

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They are even less desirable than those which are decidedly yellow, though persons of a little knowledge will often buy them in preference to others which are better, because they are not yellow and are cheap.

"Fancies" include all decided colors, or those having a rare and beautiful tint. Yellow pearls as generally found are not classed among them because the color is not fine, but dark,—"brackish" one might term it. A clean buttercup yellow, or an orange yellow, would be "fancy" however. On the other hand a deep pink is seldom fine as the color is then almost invariably muddy, whereas the clean delicate light pink pearls are rare and highly esteemed. A clear grass green is never seen but the color occurs in very beautiful bronze and peacock shadings. Various shades of blue, rose, copper, and red with bronze effects, and black are included in this classification.

Black pearls are much prized, and the term covers a wide range of dark shades of gray, slate, brown and red. The ideal color however is sufficiently deep to be, as the name indicates, black, though it has not the metallic

appearance of hematite, nor the polished shine of the black clam pearl. Black pearls having a bronze effect are open to suspicion, especially if they are pierced, as many of them are artificially colored and are liable to fade. Such pearls have a somewhat metallic appearance, are seldom very lustrous, and if there is a rough chalky place in the skin it will be blacker there than elsewhere.

It is difficult to give rules by which to judge color, but there is a quality which can only be described as "clean." It is free from muddiness and is desirable in pearls as in all other gems.

The proportion of fancy colors is greater in fresh-water pearls than in the orientals. In the United States the fisheries which have yielded the finest "fancies" are those of Wisconsin, Kentucky and Tennessee. Of sea pearls, most of the fine black ones come from the coasts of Mexico. Beautiful colored pearls are found in fisheries of the Oceanic Islands, for instance at the Isles of New Caledonia and Gambier, and in China and Japan.

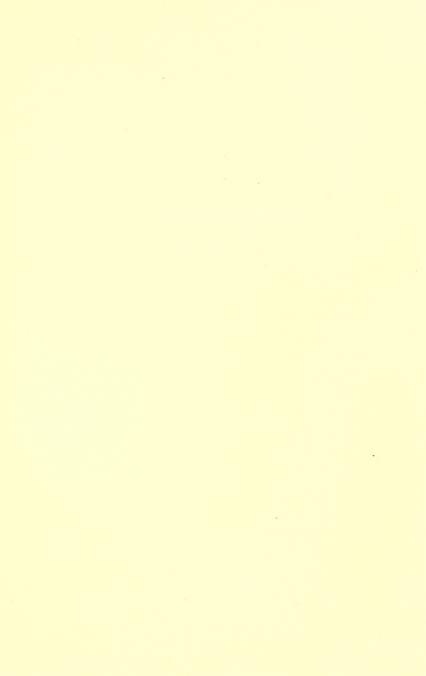
To make close comparisons of color in pearls, place them on white cotton under or opposite

COLOR

a strong natural light. To judge shape and luster, roll them on black cloth. These are the most trying conditions and it should be remembered by those who test them thus, that no position as jewels when worn can be so unfavorable or trying.







Few pearls are perfect. The great majority of small pearls even, fail in one or more of the ideal qualities, and as the size increases perfection becomes more rare. A perfect pearl is not necessarily of the finest luster, but it must be lustrous and of even luster all over. If round, it must be spherically round; if pear or ovoid, symmetrically so, and the skin must be free from blemishes.

Baroque and button pearls are naturally imperfect pearls, the former being fantastically irregular in shape and the latter partially deformed. Imperfections of shape in what are termed round pearls are more numerous than those unaccustomed to handling them would suppose.

A lot of pearls which to the casual glance seem to be all quite round, will be found often on close examination to contain many, if not a majority, that are not. Upon rolling them separately, irregularities will appear which the

luster and contiguity of others concealed. It will be discovered that the domes of some are slightly flattened at one part of the sphere; in others at two opposite points so as to form a double domed disk. Very many have slight protuberances above the contour of the sphere, or places in the spherical line, which though not flat, are depressed. While these minor imperfections of shape do not materially hurt the beauty of the pearl, they do decrease the value somewhat, and as they are quite common even among fine selected pearls they accentuate the rarity of the perfectly spherical.

The adventures of a pearl from the moment when the mollusk begins to cover its nucleus with macre, until the fisher squeezes it from the folds of the creature's mantle, are many and varied. A few only escape untoward happenings. The fortunate, born where the mollusk gathers and spreads its choice secretions of mother-of-pearl, with room to grow on every side, are nursed in the lap of good fortune and uncheckered, round out layer by layer to perfection.

But some are not so fortunate. In some way

cramped, they are held against the unyielding shell and grow flat on one side. These are the button pearls. Others either from an irregular rolling, or unequal action of the mollusk's mantle, become imperfectly round. Sometimes foreign particles attach themselves to a growing pearl and becoming enveloped with it in future layers, make an uneven surface.

Not infrequently two round pearls grow side by side until they touch, and together are enveloped by succeeding deposits; a twinned pearl is the result. For some reason, drop and pear shape pearls are seldom imperfect in shape. They may not be ideal but the form is usually good and the contour even and regular. This would imply that the simple rolling motion by the fish is more regular than the more complicated movements necessary to form a sphere.

Imperfections in the texture and luster of the skin are said to be due to the movement of the growing pearl among the zones of the mollusk's mantle supplying the varied material for the epidermis, middle shell, and lining. The difficulties confronting this theory are explained in the chapter on the "Genesis of Pearls."

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These imperfections consist generally of dead white chalky spots and streaks, distributed over the surface of the pearl, oftentimes so small as to escape notice except under the loup. Sometimes these imperfections take the form of rings or bands which encircle the pearl. Pearls so marked are rarely if ever round, but ovoid, capsule, or cartridge shaped, and these chalky lines always encircle the cylinder; they never cross the dome. Rings around the dome occur, but the surface over them is of equal luster. Frequently the entire outer skin is without luster. Whether this arises from lack of some element in the exudations of the mollusk from which the pearl is created, or from an imperfect crystallization of the calcium carbonate, is not known. Such skins have the usual nacreous surface wave lines and are often lustrous immediately under the outer plates of the skin.

It is possible that these chalky skins may result from the extraction of the pearl from the mollusk during a transitional stage, and that the presence of spots and streaks of that character, scattered over an otherwise lustrous surface, indicates that the secretions of the creature's

mantle did not hold some essential ingredient in sufficient quantity to secure perfect crystallization and thereby cover the entire surface with transparent plates of calcium carbonate. It may be also that a lack of essential elements in the creature's exudations, causes a cessation of the mantle's action which by all signs appears necessary for the production of transparent plates of nacre.

"Peelers" are pearls of imperfect skins having indications of a better one underneath. Speculators buy these pearls at a low price and skin them. Sometimes they are rewarded by a smaller, but much more valuable pearl. Many times the under skins are no better or worse, or if better, the loss in size and weight, together with the cost of the work, make it unprofitable.

Peeling should not be attempted with cylindrical shaped pearls having chalky bands or rings around them, as such imperfections usually penetrate to the interior in pearls of that character. Cylindrical pearls are almost invariably fresh-waters. The imperfections disclosed in the under skins by peeling, are commonly

irregularities of shape which have been rounded over to the improvement of the sphericity of the pearl.

It is currently reported among the pearl hunters who fish the western and southern streams, that the finding of soft pearls is not infrequent. Upon opening the mussel, they sometimes see through the mantle of the creature, an apparently fine pearl which upon being taken out proves to be a soft jelly-like substance, the form of which is usually destroyed in squeezing it out. These men do not believe that a pearl is formed in layers, but think that all pearls are originally globules of a similar soft substance, hardening later to a compact solid ball and they call them "mussel eggs."

Many pearls taken from the small thinshelled varieties of the ocean mollusk, as for instance those of Venezuela, are devoid in part, or wholly, of the nacreous luster and instead have a china like or waxy luster, or a dead chalky skin. A large proportion of the Abalone pearls and baroques are lustrous only in part, one section having an earthenware appearance. Many appear to be formed of interstratified

layers of nacre and conchiolin. This construction is very distinct in a formation peculiar to the Abalone, consisting of two nacreous shells joined perfectly at the edges, the inside walls of both being covered with rough black conchiolin.

Peculiarities in the quality of the nacre sometimes give an appearance of uneven shape which does not exist in reality. The light falling upon such pearls produces a knobby effect, as though there were protuberances on the surface. The texture of others is such that when looked at squarely from the front they appear pyramidal in form, the rounded apex pointing toward the observer. Such pearls have a soft, waxy appearance generally.

Another common imperfection consists of pits in the surface. These may result from various causes: in many cases from the dislodgement and rolling of a pearl which has been flattened during earlier stages by pressure in one position against the shell. Freed from this hindrance to spherical growth, the later concentric layers would round over the edge of the flat spot and thereby leave a pit, or cavity, in the centre.

In other cases pressure against the pearl, or the partial inclusion of foreign substances, especially of an organic nature which decay before being entirely covered, are possible causes. The reverse of this also occurs; grains of sand or other minute particles adhering to the surface are covered by succeeding layers, thereby producing knobs, more or less observable according to the lapse of time between their inclusion and the taking of the pearl from the oyster.

If undisturbed, the fish will by the deposit of sufficient layers of nacre, fill the intervals and round the surface again. That this is done in time is shown by the occurrence of pearls having an even dome over a nucleus formed by a cluster of small round and irregular pearls enveloped together. In the process of skinning, or the removal of one or more of the layers of nacre, it is sometimes found that a depression has been filled by a thickening of the deposits in the hollow; at other times extra layers fill the space, and these flaking out with the outer skin reveal the hidden irregularity which lay beneath the round surface, thus

necessitating the removal of several entire skins before a sphere is reached again. The under skins of some pearls appear to have failed to completely envelop the nucleus. The cavity resulting is then filled to an even surface and is succeeded by fully developed skins. It is, therefore, not certain that a pearl, perfect in form and skin when found, has been so at all stages of its growth. Broken pearls sometimes show not only differences of color but of thickness in the successive layers. The skins of fresh-water pearls especially are often very irregular in thickness.

Many pearls have cracks in them. These generally escape the observation of inexpert persons, as they are usually under the outer layer. The fact that they rarely extend to the surface suggests that the solidification, or drying out of the confined interior layers, may be the cause. These are considered detrimental and dangerous by dealers, so that pearls with cracks in them will not bring as high a price as they would if free from them.

As cracked pearls are liable to break, especially when pierced for stringing, it is well to

avoid them, though the percentage of those which do break is small. In reality these cracks are more of an imperfection than a danger. Occasionally they are quite noticeable and are then a bad imperfection, but frequently a sharp eye or the loup only will detect them. Surface cracks however are quite perceptible. They are dangerous and are considered a serious imperfection.

There is a peculiarity of rare occurrence which, as it is a departure from the ideal, may be termed an imperfection, though some regard it of value as unique. It is a similarity under the surface of some pearls to a metal which has been hammered into small flat spots identical in appearance with the jewelry in vogue during the latter part of the 19th century made of "hammered gold." It is scarcely noticeable except under a loup, when the fine lines dividing the confused planes appear. These pearls are usually slightly pink or pinkish yellow. Sometimes these planes resemble the facets on a cut diamond, generally lozenge shape, and often grouped similar to those on the under side of a diamond.

Small holes and blisters on the surface are quite common, but ordinarily they are scarcely perceptible to the naked eye.

Many faults can be concealed by the jeweller when the pearl is mounted. Slightly buttoned pearls are set on a peg in the centre of a small shallow cup; they then appear quite round. A spot, blister, or cavity, in a round pearl can be obliterated by pegging, or hidden in the setting. Great irregularities in the sphericity are lost to the eye when the gem is set in the prongs of a ring or other piece of jewelry. Pearls shaped like a double convex lens may be made to look round, or very nearly so, by piercing them so that the flattened domes are brought in contact on the cord holding them together as a necklace.

Piercing and stringing obliterates or hides many flaws. By careful selection, the jeweller can utilize pearls having a blemish by drilling through the spot where the flaw is, and if there is another on the opposite side that also will disappear. Other imperfections near the hole are often hidden in necklaces, as they cannot be seen when the pearls are held close together

on the string. It is for this reason that a string of pearls can often be bought for less than a like number of loose pearls apparently no better but which in reality are much more perfect in shape and free from flaws. Imperfections unseen in the strung pearls would be quite noticeable in the loose and undrilled.

The irregularities of baroques cannot properly be called imperfections; nevertheless a baroque is more valuable as it is free from indentations and approaches the round in appearance, or has sides which will give it a round face when mounted. The curious forms into which nature moulds many of them are very attractive, and as they lend themselves to the imaginative skill of the jeweller, are valuable. The faults common to them are rough places uncovered by nacre and colored streaks or spots, usually yellow tending to brown. These discolorations are confined generally to the point where the baroque was attached to the shell, but not infrequently they extend far enough to leave no front which would be quite clean to the eye, when mounted.

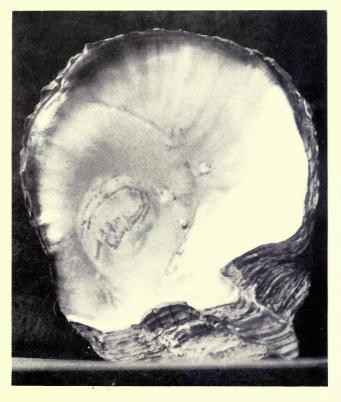
Oriental baroques as a rule are more lustrous,

more even in shape and seldom discolored. Many of them are sufficiently regular to string for necklaces, and some can be used in jewelry so that on the face they appear like round, drop, or pear-shaped pearls.



GENESIS OF PEARLS





TUAMOTU PEARL-SHELL

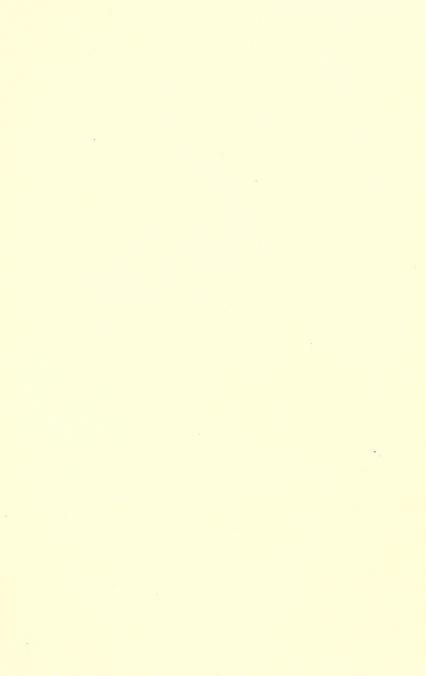
one distinctive feature which places them in the class under consideration is the possession of a nacreous lining to the shell, for no shell fish can produce a true pearl without it. The fresh water pearl-bearing mollusk is a mussel, unio margaritifera, also found in many varieties, but all characterized alike by the nacreous lining of the shell.

These creatures, living upon the earth where water always covers it, create in the building of their habitations a material of great beauty, and sometimes produce gems which princes covet. Of the most delicate nature, they build for themselves out of the water by which they are surrounded, houses strong and enduring, fitted for their protection from the rough chances of life, yet so furnished within that they suffer no inconvenience from the rugged strength which encloses them. Few things are coarser than the exterior of these domiciles, but nothing in nature is finer or more exquisitely beautiful than the substance with which they are lined.

The avicula margaritifera is a habitant of the coral reefs and shoals about the islands and shores of the tropics; there are none living



AUSTRALIAN PEARL-SHELL



now in northern latitudes, though fossils of many species are found north of the present boundary of their habitations. An idea can be formed of the general shape and appearance of pearl-oyster shells by the neighboring illustrations of three varieties. These show the two extremes of the marine mollusk, the meleagrina of the South Sea and Australia, and the squamulosa of Venezuela.

In some of the small species, that of the Venezuelan Coast for instance, the outer shell is yellowish, with fan-like markings of dark reddish brown radiating from the boss or beak and growing darker as they near the lip. This shell is thin and frail. The nacreous lining is also thin but brilliantly iridescent and shows a series of fine lines and irregular fissure-like markings extending outward from the hinge and crossed by bands of color which curve with the outline of the lip edge of the shell.

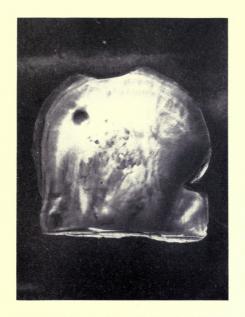
These colors, as brilliant but more evasive than the hues of the rainbow, are not due to the presence of a pigment; they arise from a phenomenon of light and form one of the most wonderful illustrations of the ease with which

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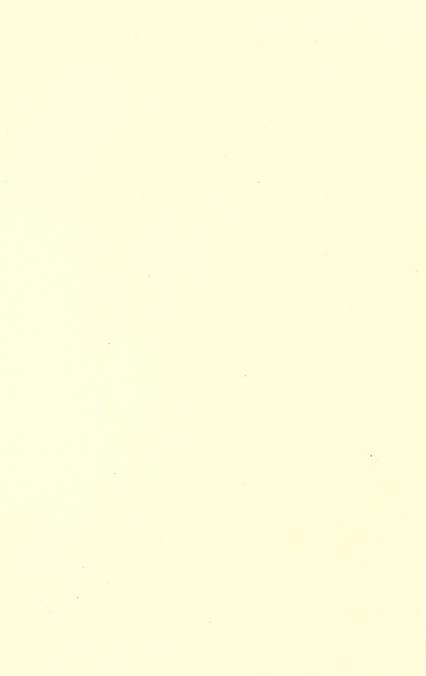
our senses play tricks upon judgment and understanding. It is the striated surface and the very thin transparent plates of nacre, which cause a double interference and produce the beautiful iridescence peculiar to the lining of these shells.

"Interference," as it is called, is an optical phenomenon arising from two causes. When light falls upon a sufficiently thin transparent surface covering a denser substratum not exactly parallel with it, part of the light is at once reflected. Of that which passes through to the under surface a part also is in turn reflected through the first surface, and the confusion of rays or "interference" resulting, produces to the eye the sensation of color.

A familiar illustration is seen when a thin film of oil is spread over water. The other way in which iridescence by interference is produced in shells, may be demonstrated by drawing fine lines close together on glass with a diamond. Light falling upon them will make the surface iridescent. Melted wax dropped upon this striated surface would, upon removal, show a like iridescence, reproduced with the



VENEZUELAN PEARL-SHELL, WITH PEARL ATTACHED



impression of the fine lines. The outer markings of the large Australian shell are similar to the small Venezuelan. The mother-of-pearl interior is not so iridescent.

Pearls and the shells in which they grow are composed almost entirely of calcium carbonate or lime. A small percentage of organic matter and water are the other ingredients.

As pearls are accidental and the result of a misdirection of normal processes, a general knowledge of those processes is necessary to an insight into the nature and genesis of the pearl, and as pearl shells and the pearls in them are constructed on the same general plan, a knowledge of the former will assist to a better understanding of the gem and its eccentricities. The mother-of-pearl shell is built up of a series of calcium carbonate plates or prisms set in organic matter. In the material of the inner shell, the calcium carbonate greatly preponderates; on the outside of the shell, the organic matter is largely in excess. In the building of its shell, the animal deposits the finest material and does the best and most compact work where the house is in touch with itself, the walls becoming

coarser in construction and quality as they approach the outer surface.

In the inside of the shell, the calcium carbonate plates are very fine and transparent, and the animal membrane in which they are set is of extreme tenuity. In the middle shell these plates become more chalky and less compact; in the exterior shell they are set in a thicker binding of organic matter and terminate outside in rough, horny fringes, completely covering the shell.

In a general way therefore, the animal deposits the best of its secretions about itself and pushes out to the outer extremities, the coarser elements which are fitted to preserve the finer parts of the shell, as the finer parts of the shell are fitted to protect the delicate organism which they enclose. The building of the shell is done by a membraneous covering of the fish which entirely envelops the body and is attached to the shell a short distance from the inner edge, leaving a rim of membrane free around the fish and the edges of the two valves. This membrane is called the mantle. It extracts lime from the water, and at different parts exudes modified solutions of it mixed with

animal tissue, suitable for the construction of the various parts of the shell.

The exterior of the shell or epidermis consists of conchiolin, an organic compound. It is a horny-looking substance, and in the large saltwater shells and in most of the fresh-water mussels, the nigger-head of the Mississippi Valley especially, it appears to the eye as a series of extensions, sometimes terminating in ridges, which curve about the umbo and spread to the edge of the shell, each extension coming from under the one preceding. In some varieties it is attached as an excrescence to the prismatic formation immediately under it, and may be easily detached in thin flakes: a rusty black in some, brownish-yellow in all on the inner surface and in some on the outside. The substance is generally opaque, but contains spots of which some are translucent, resembling horn or amber, while others are more transparent, similar in formation to the inner parts of the shell.

In most of the marine and fresh-water varieties, unlike the nigger-head, the conchiolin exterior does not easily flake off. In these the

outer shell is composed of wave-like plate extensions, superimposed one upon the other recedingly from the lip to the umbo as in the others, but without the ridges, the plates being flat and the edges more irregular. These extensions are formed of a number of horizontal composite plates, which penetrate the shell to the mother-of-pearl.

Not only may they be separated into thinner horizontal plates, but they divide vertically into prisms. Under the microscope the edge of a composite plate appears as a number of prisms placed side by side lengthwise across the plate edge, but showing dark, intersecting lines through the series where they divide as plates.

These prisms appear on the face of the plates as translucent hexagons, separated by dark lines like a tessellated floor, and under a powerful microscope are seen to be composed of similar smaller particles, also joined together by a binder of tissue. The exposed parts of the epidermis plates, forming the outer skin of the shell, are more dense than the unexposed portions; the hexagonal dividing lines are thick and blurred, and the faces are almost opaque,

whereas in the unexposed parts, the faces are translucent and the hexagonal markings are clear and fine.

Though constructed in the same way throughout, these plates appear to follow the general plan of shell construction, the preponderance of calcium carbonate in the interior parts gradually changing to an excess of organic matter as they become exposed to form the outer part of the shell. The outer shell is in some varieties of a brownish-yellow with radiating fan-like markings of a deeper tint or red; in others, dark gray and brown to almost black. Immediately under the surface, the plates become lighter in color, and finally almost white as they approach the nacreous interior.

In all varieties the outer plates lie almost parallel with the extension of the shell, so that, lapping each other as they do, the outer contour of the shell is raised by a series of low steps from the edge to the umbo. These plates appear to have been superimposed one upon the other. On the contrary, they are added on the under side. Starting from the umbo, which is the oldest part, the shell is enlarged by the addition

of a succession of plates from beneath, each series extending a little beyond its predecessor, the rough conchiolin fringe at their extremities forming the outer covering of the shell. Following the growth of the epidermis, the shell and the lining are also extended and built up, so that the entire shell is constantly pushed to dimensions necessary for the proper and commodious housing of its growing tenant.

Under the thin coat of epidermis on the Unio nigger-head, is a stratum of prism plates similar to the outer plates of the Venezuelan oyster. The prism faces are however smaller and the organic intersections are thicker and darker. Immediately under and abutting, is another series of plates which penetrate the shell almost horizontally at the lip end, to the lining; diagonally at the thick part of the shell near the umbo to another series of the same kind. Here, owing to their diagonal set, upon peeling off the epidermis and the epidermis plates, the edges appear as a series of fine lines curving about and spreading out from the umbo. The plates set outward, away from the umbo, from the lower or inner edge.

The effect is similar to that made by a pack of cards set diagonally so as to spread the edges sufficiently to show the merest trifle of the faces of the cards between the edges. The arrangement of these plates, not only produces a series of fine lines curving about the umbo, but, as the edges are slightly irregular, another series of fine lines cross the others at right angles, radiating from the umbo. This doubly striated surface, by interference, produces an iridescence more full of color than the mother-of-pearl of any but the thin shelled varieties.

Though similar in construction, these plates differ from those of the epidermis. In some respects they suggest a transitional stage between the outer and inner shell. A plate, as it separates from the series and which appears as one line in the striated surface of plate edges, is in reality a number of very thin plates, or waves, so welded together that they cannot easily be separated. In this and the presence of fine surface lines marking the wave edges, they resemble the nacreous plates.

The composite plate is opaque, but when split so that light can penetrate there appears

on the face, markings similar to the unexposed portions of the Venezuelan epidermis plates only the hexagonal faces are very much smaller and less distinct. So also the edge of the composite plate appears as series of prisms crossing it from face to face on the plate, in sets which show plainly, lines marking the juncture of the individual plates or waves. Although the individual plates or waves, can only be separated with great difficulty, together, as composite plates, they can be flaked off from the shell very easily, and they crumble and break into fragments under slight pressure. The component plates or waves are very thin, and appear under the microscope as white and translucent planes marked by outlines of the prism faces.

The inner series of these plates as they near the nacreous lining become harder and more compact, and incline more and more to a horizontal position, so that at the point where they abut upon the nacre it is not easy to distinguish them from the nacreous plates. At the thinner end of the shell, about the edges, the plates are all of this nature. They grow

more friable and chalky as they incline to the perpendicular, where the series are more numerous and are situated at the thicker part of the shell about the umbo.

Adjoining the inner edges of the middle shell plates is the nacreous lining. In this the calcium carbonate takes the same form as the mineral aragonite and is identical with it. As a mass however, the specific gravity is somewhat less, owing to the inclusion of organic matter with the mineral in the shell. This material is harder, finer, more compact, and contains less organic matter than that of which the middle and outer shell is composed.

The lining is constructed of thin waves of transparent calcium carbonate set in animal tissue of great tenuity. This is the mother-of-pearl, and the gem differs from it only in its more or less rounded and independent formation. The plates of which the lining is composed lie almost parallel to the plates of the epidermis. They are bent a little toward the interior at the inner surface of the shell, but the general sectional structure of a shell, cutting from the umbo to the lip, is fairly represented by that

stem of the letter X which extends from the right upper to the left lower, the diagonal line representing the middle shell; the horizontal lines at the extremities show the general trend of the epidermis and the nacreous lining. The diagonal trend downward is from the epidermis toward the boss-end of the shell.

The nacreous plates, or mother-of-pearl, unlike those of the middle shell of the nigger-head, cannot be easily separated. On cutting them across the grain they appear as distinct and separate strata and show dividing lines, yet the mass is compact to a great degree. Upon being broken, these strata separate only at the edges, so that the entire set usually breaks diagonally, showing a small strip of the surface of each plate along the broken edge and forming a series of ragged edge steps.

These plates or strata are composed of a great many very thin waves following one upon the other, and thereby producing series of fine, irregular lines upon the surface which, though trending generally in straight lines, curve and twist about as do the edges of water waves, when they run up on the sands of the sea-shore. It is

the lapping of these thin transparent waves, and the minute undulations of the layer edges reflecting through the transparent plates, which produce the soft luster peculiar to the linings of the shells and the surface of pearls, and which is known as "pearly."

The wave edges do not usually produce iridescence, but if the waves are very thin and transparent the undulating lines of many under waves following close upon each other appear on the surface, under the microscope, as dark lines when the light is passed through the skin, or silvery lines if the light be thrown upon it from above; to the naked eye this becomes the tempered brilliancy of the pearl's orient. Under the microscope these waves appear to be constructed of minute hexagonal plates or prisms set in animal membrane.

A set of waves forming a plate, when broken at right angles to the trend of the wave, shows under the microscope a rough irregular edge, and the small plates of which they are composed sometimes appear separated individually from the mass though more often they are dislodged in clusters or strips. Broken with the trend of

the wave edges, the plate breaks diagonally in steps with undulating edges, which correspond in appearance with the successive underlying waves as they are seen through the surface under the microscope.

Although distinct dividing lines between the plates appear when a sectional cut is made across the grain, there is no indication of a division between the waves which make up the plates, and there is no apparent difference in the structure or compactness at the junction of the plates though a clean division can only be made there. It would appear, therefore, that the plates mark intervals in the process of construction and that the animal tissue is somewhat thicker between the plates than between the waves of which they are composed, where the formative process has been continuous.

In all parts of the shell, the calcium carbonate takes the hexagonal form: in the nacre, as thin waves composed of hexagonal faces, and in the middle shell and epidermis, as plates of hexagonal particles grouped as hexagonal prisms whose terminations form the front and back of a plate. All the parts show a similar plan of

construction, *i.e.*, separable plates composed of thinner plates more compacted together, and these in turn of infinitesimal hexagons of calcium carbonate; full plates, component plates, and particles, all alike surrounded by animal tissue.

The shell is built up of secretions from the water in which the oyster lives, made by the mantle, a membraneous covering of the fish. The function of this mantle, in part, is to obtain from the water the elements required and exude it at different parts of its folds in the various forms required for the several parts of the shell. The necessary lime exists in the surrounding water and is supplied sometimes by the calcareous beds upon which the oysters grow, and in other cases by surrounding vegetation.

In all mother-of-pearl oysters and the freshwater mussel unio, the lining is usually quite thick, but in some pearl-bearing species having small, frail shells, it is, though beautiful, too thin to be of use. In the meleagrina, this nacreous lining lies in the interior of the shell like a congealed pearl wave, the smooth even

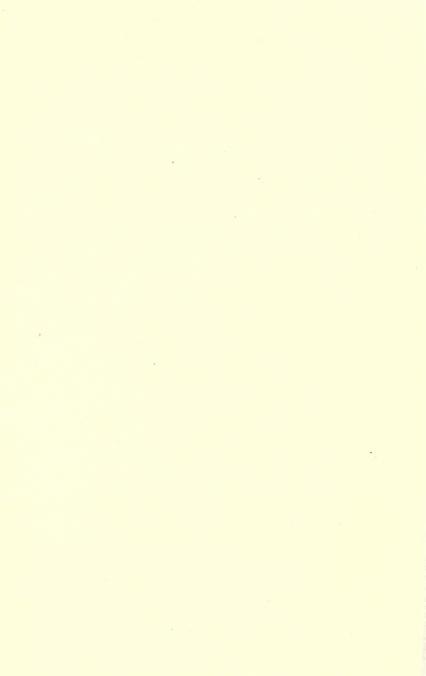
rim following the curve of the shell about an inch to an inch and a half within the jagged edge of the epidermis, as shown in the Manilla shell illustrated herewith, in which the lip, usually trimmed off for commercial purposes, is preserved. The lining of the meleagrina is not as iridescent as that of the thin shell varieties.

Thus the shell is being constantly enlarged at the edge, by a deposit of the exudations of the mantle; conchiolin for the epidermis outside, lime for the prisms and inner layers of transparent plates, until the shell has attained its full growth in size, after which some varieties continue to lay on nacre only.

The linings of some have a black rim, extending from the hinge on one side, around the edge to the hinge on the other side. Viewed from the edge this dark band appears to be a sixteenth to half an inch wide (widest at the lip), fading out as it becomes lost under the thicker white nacre of the interior, but turn the shell up and look at it squarely from the front and it is black only around the extreme edge where it joins the epidermis. This kind of shell is found in the Pacific about the islands of Polynesia and is



MANILA PEARL-SHELL WITH THE LIP CONSERVED



called the black shell. In others the nacre is white to the edge. The iridescence of the white shell generally shows more play of color than that of the black. The white shell is usually somewhat flatter and broader than the black, and the epidermis is light yellowish-brown. This variety is found in great abundance on the northern and western coasts of Australia. The yellow, greenish and grayish shells (these colors refer to the edge of the lining), are similar in every way, but inferior, the yellow being the best of the three.

The shell lining of a common form of the unio, or fresh water mussel pictured at page 146, like that of the meleagrina, shows little iridescence except at the edges outside the pallial lines, where the nacre is comparatively thin, and at the striated surface of the scar or bed of the adductor muscle. In quality of color and luster it is inferior to the nacre of the sea fish, the white being more chalky in appearance and the luster less pearly. The material of which the shell is composed and its construction are however almost identical with that of the saltwater mollusk. In fact all shells are made of

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the same ingredients and are constructed on the same general principles by the animals inhabiting them.

This description of pearl shells has been given here because a knowledge of the shell enables one to understand the formation and characteristics of a true pearl, and the differences which exist between the gem and other similar formations formed in pearl and other oysters, mussels, and univalves. Many such formations are found, having the elements and constructed like one or both of the outer parts of the shell, and some, in part like the lining, but these are not true pearls; the gem has neither the material nor construction of the middle and outer shell. Except that the pearl, because of its form, is rarely iridescent even to a slight degree, whereas the nacreous lining of some pearl-bearing shells is brilliantly so, the pearl and the nacre of the shell in which it grows, are essentially the same. Pearls are more or less spherical and independent formations, made by the fish on the same plan and from the same secretions with which it lines the shell, misdirected by abnormal conditions. Those con-



MISSISSIPPI NIGGERHEAD PFARL MUSSEL



structed like any other part of the shell are not true pearls.

The normal instinctive action of the mollusk is self-protective and adaptive. By the secretive action of its mantle it gathers from the water in which it lives, material to build a shell with a rough and rugged exterior for its enemies, and adapted to resist the chemical activities by which it is surrounded, and a perfectly smooth lining suitable as an interposition for its own delicate organism.

Barring accidents, the building functions of the animal are employed only in the extension of the shell to meet the needs of its own growth and protection. But should a particle of secretion intended for the shell, harden within the folds of the oyster's mantle, or some parasite or other intruder present itself within the nacreforming sphere, the instinctive action which lines the rougher part of the shell is also directed toward the foreigner, and it is at once covered with a like deposit. This is the birth of a pearl, and it grows layer by layer as long as it remains within the scope of the nacre building instinct. These layers, or skins as they are called, are

seldom iridescent. Occasionally a pearl of that character is found, but it is generally from a fresh water mussel, and the nacreous plates are of unusual tenuity.

Although the pearl like the lining of the mollusk's shell is composed of carbonate of lime in series of thin waves lapping each other, each series constituting a plate or separable layer, there is a distinct difference in construction.

Whereas the lining is a series of horizontal layers, the pearl is made up of concentric layers, each addition enveloping those preceding it. These skins however are not always absolutely distinct and separate. Instead of being like a succession of globular skins, each completely covered by its successor, the growth is often spiral and the construction is as if the nucleus had been rolled one, two, or three complete revolutions in a continuous plate of nacre, and the spiral envelope then finally merged into another plate and the process repeated. That which to a casual glance, therefore, appears to be six rings of nacre in a sectional cut, is in reality, several spirals of two or three turns each.

It is also noticeable that whereas the wave edges, with all their eccentricities, trend generally in one direction in the shell nacre, in the pearl, the lines twist and curl with a concentric tendency, as though the waves had been laid on by turning or rolling the pearl in the material of which it is composed.

A white pearl on being cut in half shows a number of faint dark rings one within the other, from the surface to the nucleus in the centre: usually these rings occur at almost regular intervals. Upon close examination under the microscope, it will be seen that the inner part of these intervals is white, and that the color gradually changes to a yellowish tint which deepens until it culminates in that which appears as a dark line against the succeeding outer formation, the material of which is also white in the beginning. Although this change of color is very slight, a section between two rings will often show three distinct bands: the inner white, the centre one faintly yellow and the outer one of a deeper tint. In some cases the dark concentric rings succeed each other very closely, in which case no abrupt changes of

color between them are noticeable. The material occupying the space between the rings is the sectional appearance of the skin of pearl. Upon applying a weak acid to the surface of an entire section of a pearl, it effervesces, and the inner colorless parts of the bands are at once attacked. After several hours the white inner part of the skins will show depressions where the calcium carbonate has been dissolved, and the outer parts of the skins will be marked by coarse black rings of undissolved animal tissue, similar in appearance to the epidermis of the shell. Now as these skins are made up of many very thin waves of calcium carbonate lapping each other and set in animal tissue, it would appear, therefore, that in the beginning these waves of transparent calcium carbonate are set in animal tissue of extreme tenuity and that the proportion of animal tissue increases with the growth of the skin until it reaches a stage provocative of a new skin, which begins with purer layers of the smoother crystallized mineral like its predecessor, and identical with the nacre of the shell. If this be so, it would account for the various tints of color and degrees of

luster in white pearls and for the fact that the outer skins of very lustrous pearls are usually very thin also. Similar conditions exist in colored pearls, though the presence of a pigment makes them less noticeable. The skins of the haliotis pearl, which separate easily, usually show remarkable luster on the inner surface.

Sometimes the nucleus is surrounded by a confused mass without apparent concentric markings, as though it had been enveloped in nacre which had solidified while stationary, or the first deposit shows the concentric skin arrangement at one segment of the circle only; followed by layers which appear in the depressions of the mass and are continued until they finally include the whole pearl. These layers are usually very thin, and the partial or segmentary layer formation is quite common in the early stages of the pearl's growth. At that period the concentric lines are also irregular, and in many cases where the curve is true, they extend about one quarter of the circumference only, another concentric skin being lapped on the ends, as though the globular skin had been. formed in sections.

As before stated, it often happens that the skin division lines are spiral, as though the nucleus had been rolled one way in the nacreous material. In all cases the first deposits of a skin, that is the first of the nacreous waves of which a skin is composed, appear to be most transparent and lustrous. The component waves of nacre then gradually become more impregnated with animal tissue until they apparently reach a stage which induces either a rest on the part of the fish, to gather nacreous material, or a new deposit of less impure nacre, to protect itself from the increasing impurity of the pearl's skin.

The skins undoubtedly mark certain stages in the formation of the pearl, though the skin and the nacreous waves of which it is composed are often confounded. In the skinning of pearls an entire skin is seldom peeled off. The surface is scraped, a number of the component waves being taken off, until the luster is improved and it is then supposed that the entire outer skin has been removed. A close examination however, will show, by breakages in the surface of the waves, that the under skin with its peculiar

and systematic arrangement of surface wave edges, has not been reached.

A sectional view as seen in a half pearl would lead one to infer that a free pearl in the beginning lies stationary in the oyster; is turned or partially rolled as it grows larger; and finally, on attaining about a one grain size, is kept in constant motion with a concentric rolling in the nacreous exudations of the mantle which are deposited upon it.

The nuclei of pearls were long thought to be grains of sand, but late and careful research has shown that in the majority of cases they are minute parasitic or domiciliary worms.

Professor Herdman and James Hornell, after three consecutive inspections of the oyster banks in the Gulf of Manaar in 1902–3, stated in a paper contributed to the British Association for the advancement of science, that after examining many hundreds of oysters and decalcifying a large number of pearls, they had come to the conclusion, that grains of sand and other inorganic particles formed the nuclei of pearls only under exceptional circumstances, as for instance, when the shell was injured by the

breaking of the ears, which would enable sand to get into the interior.

Pearls, or pearly excrescences on the interior of the shell, were due to the intrusion of leucodore, clione and other borers. Pearls found in the mussels, especially at the levator and pallial insertions, were formed around calcospherules, minute calcareous concretions produced in the tissues. But most of the fine pearls found free in the body of the Ceylon oyster, contained the remains of platyhelminthian parasites. These observations agree with the opinions formed, after careful study, by several eminent conchologists.

The action of the mollusk results differently as the object to be covered is free within the folds of the creature's mantle or, rising above the surface of the nacreous lining, presses upon it. If free, the intruder is enveloped by the animal's exudations and the deposits become concentric instead of level, or nearly so, as in the construction of the shell. It is said that the foreign substance acts as an irritant, causing the fish to exude its secretions abnormally in order to protect itself, and thereby creating a diseased

condition; but from the fact that the process continues after the intruder has been enveloped and rendered as non-irritant as the natural lining of the shell, it would appear that the introduction of a foreign element simply draws upon it the normal impulse of the fish to cover with nacre anything with which it comes in contact, and that the method of doing it is similar to the instinctive rolling action of the tongue when some insoluble globule is put in the mouth, for not only do free pearls grow spherically, but a nucleus fast to the shell is not covered simply but it grows to a pearl, round and domelike, as nearly spherical as its juncture with the shell will permit.

Not only is the composition of a pearl identical with the lining of the shell where it is formed, but in a general way its appearance and characteristics are the same, except that free pearls are sometimes colored when the nacre of the shell is white.

Button pearls, warts and baroques, grown fast to the shell, are usually like the surrounding nacre in every respect.

Salt-water pearls are characterized by the

soft velvety luster of the oriental mother-of pearl, and fresh-waters, like the lining of the unio, have a somewhat thinner looking and more chalky texture.

Abalone pearls have the irregular surface and coloring of the haliotis. Conch pearls resemble the delicate pink china-like lining of the shell, and clam pearls have the glazed earthenware appearance of the inside of a clam shell. The one material difference between a pearl and the lining of the shell in which it grows is, that in the one case the fish deposits the nacre over an even surface, and in the other wraps it around a central point with delicate precision in successive filmy layers.

Dissection shows that a pearl during growth is liable to many mishaps. As with the human creature, a promising youth may end in a wretched maturity. It is also possible that an ugly period may be redeemed by later happenings, and the thing that was worthless in its early existence, be found in its age worthy of a place among the great gems. Pearls found with a dull, chalky exterior sometimes have lustrous skins beneath. Sometimes a bony-

looking formation will be found, on breaking it, to have a variety of skins in the interior, some of which are very lustrous, others white and chalky, like the middle shell of the mollusk.

Many of these dead pearls are formed throughout of this material. Others, perfectly spherical, are simply successive layers of prism groups like the conchiolin plates of the shell. Upon cutting these through the centre the skins are shown by the concentric rings marking their divisions and the prismatic formation appears as glistening lines radiating from the nucleus to the surface. Under the microscope these layers, which are thicker than the nacreous skins of true pearls, appear identical with the epidermis plates, except that they are concentric instead of flat, and are free from the coarse. rough, conchiolin deposit which forms the extreme outer coating of the shells. deposit is also found, however, in some pearl formations, as many of the abalone baroques, especially when they are somewhat flat in shape, are like two pearl blisters joined, with the shell-building process reversed, the rough, black conchiolin being inside, and the nacre

outside. Undoubtedly pearls containing hidden qualities which made them once gems are thrown away as valueless, while others found just as nature had covered their earlier coarseness with a coat of beauty, are worn and excite much admiration for their skin-deep beauty.

Though the successive skins of a pearl do not usually vary much in color, except in abalone pearls, it does happen occasionally, for the removal of dark yellow skins sometimes discloses another of better color—a good pink for instance. From the sectional appearance of pearls it seems probable, that in the majority of cases the color of yellow pearls would be improved by the removal of the outer waves of the outer skin.

Changes in shape sometimes occur during the growth of the pearl, the tendency being always toward the rounding of the surface. If the nucleus is fast to the shell, a dome is built over and around it. If the nucleus permits, the nacre is deposited not only over but under its edges to the point of contact with the shell, so that a button pearl connected with

the shell at the centre only, results. Two pearls held against the shell and growing side by side are separately enveloped until they touch each other, after which they are included in single deposits of nacre and the depression between their domes becomes less distinct with each successive coating. Similarly, a cluster of small pearls lying together often forms the nucleus of a large rounded baroque or button pearl. Examination of such formations shows, that up to a certain period the pearls have a separate existence and growth. They then become joined in an irregular mass of twinned pearls, and finally, if allowed to remain in the oyster long enough, all individuality is lost in the tendency to round over. The same thing occurs when grains of sand or other intrusions become attached to a growing pearl. They are quite prominent when first included in the nacreous deposit and can be easily detached from the under pearl by breaking through the layer which binds them on; but they are soon obliterated by succeeding deposits. This filling-in process is sometimes accomplished by additional layers in the depression, sometimes by thicker layers.

It happens occasionally, when skinning a round pearl, that one of these fillings is uncovered and flakes out, leaving the pearl irregular, as it was in a former stage of its growth.

Although pearls naturally grow spherically, many free pearls are more or less buttoned, that is, have a flat place from which the pearl rises like a dome, high or low. This happens when the pearl is held during growth by the fish against the shell with a part of its body intervening. According to circumstances, the pearl varies in form from slightly button, to a low dome, rising from a plane at its greatest diameter. Should a pearl of this description become dislodged, the rounding action of the mollusk would begin at once to obliterate the plane.

If undisturbed, the process would result eventually in changing the button to a round or nearly round pearl, but should the pearl be taken from the fish before the metamorphosis is completed, a depression, or pit, would mar its contour. When borers intrude through the shell, the presentation is at once covered with nacre, and successive deposits are built up around it resulting in the nacreous wart known



VENEZUELAN PEARL-SHELL, SHOWING BAROQUE



as a baroque. The rounding action of the mollusk is clearly shown in these excrescences, as the borer is not simply covered and levelled with the shell, but the slight elevation above the level of the lining receives a continuity of concentric deposits which finally raise it very considerably above the surface and separate it in construction from the lining to which it is attached. The shell herewith reproduced illustrates the result. Borers pierced it at the thick part of the hinge, and burrowing down, entered the interior at the point where the baroque is shown. In rare instances, pearls attached to the shell do escape the concentric deposition, for they have been found buried under even layers of nacre, when the mother-of-pearl was cut up in the process of manufacture.

From the appearance of the striæ when they are divided lengthwise, pear-shaped pearls appear to have been spherical at one time. During a stage in the growth, the forming layer has curved away from the centre at one section of the sphere to a point. Succeeding layers, following the innovation, are deposited around the extension until it becomes suffi-

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ciently elongated to give the pearl the obovoid form.

Many pearls are shaped like a capsule. The ends of most are rounded up to a full dome: some have somewhat flatter ends; many are long and cylindrical like an ordinary capsule; others are short and appear in shape like two high button pearls joined at their bases; while some resemble a cartridge, one end being almost flat and the other a somewhat pointed dome. It is noticeable that such pearls have a chalky line around the middle, and sometimes there is a lustrous band between two. These chalky lines are found, on peeling such a pearl, to extend through all the interior layers. Similarly, a high button joined at its entire circumference to the shell, if the junction is abrupt, has an intersecting chalky line, marking the juncture of the two, between the luster of the pearl and the shell lining. If the base of the pearl and the shell form a curve there is no chalky line of demarcation.

This suggests that whenever the animal is unable to envelop the thing upon which the mantle deposits its secretions completely or is

not in touch with every part of it, there is at the extremity of its action, an unnacreous deposit, corresponding to the deposit of conchiolin or calcite, at the extreme edge of the shell which precedes the nacreous layers following within and slightly back of it. As the luster of the pearl arises from the transparency of the calcium carbonate modified by the undulating lines formed by the edges of the wave-plates, it may be that the lapping action of the mantle is necessary for the regular formation and crystallization of these plates, and that at points beyond the reach of this action, the depositions of the mantle are therefore not pearly.

Much is necessarily conjectural as to the modus operandi by which the shell and the pearl are formed but the invariable tendency toward sphericity suggests that the nucleus of a pearl, when free within the mollusk's mantle, is not only enveloped in its exudations, but is either kept constantly moving with a rolling motion or lapped on all sides by the membrane which exudes upon it the nacreous material.

The instances cited of the short capsule shaped pearl and the high button joined to the shell, which seem to escape the nacreous deposit at the basis of the domes, favor the lapping or licking method of depositing the nacreous solution and this action by the mollusk would result in a constant rolling or turning motion imparted to the object if it were free within the creature's body. The licking and rolling action of the mollusk, modified by the conceivable influences of position in the shell, would account for the spherical form with all the various modifications in which the pearl is found.

To account for the variation of quality which undoubtedly exists in the successive skins of some pearls, and the imperfections in the nacre of the same skin, the theory has been advanced that the secretions for the lining, the shell proper, and the epidermis, are exuded by different parts of the mantle; the pearl traverses during growth these different bands and its skins are modified by the secretions, as they come within the various zones of influence. But there are several facts which seem to oppose the theory.

In the first place all these parts of the mantle which supply the material for the epidermis, the middle shell, and the lining, are enclosed within the shell and in touch with the lining yet each receives the exudations of that part of the mantle which supplies the material suitable for it, the mantle invariably pushing the coarser excretions outwardly to the shell's exterior. Again, whatever the quality of the skin of the pearl may be, it is never of conchiolin like the outer epidermis and though sometimes similar to the plates, of which the conchiolin is the exposed fringe, it always contains sufficient nacre to render the surface smooth. The fact that the skins of a pearl do sometimes correspond with the different parts of the shell, and that the same skin on the surface is occasionally partly nacreous and unnacreous, in connection with the variation of quality which exists in the internal composition of the skin, favors an idea that the mixed and variable quantity of nacre in the skins may be caused by the abnormal position of the mantle wrapped about the growing pearl which would thereby come more or less under the influence of the calcite and

conchiolin zones distorted from their normal extension and action.

It has also been suggested that the ovster deposits the nacreous layer in a fluid state and then rests until the deposit hardens, when the process is repeated. To a certain extent this may be true though apparently it could not be a yearly process as pearls found in the small varieties of the avicula which mature in four to six years and die out in seven years, often contain a greater number of layers than the years of the mollusk's life, and no pearl is ever found with a soft exterior, though it seems possible that pearls with a dead white chalky exterior are taken from the oyster at a period when the crystallization of the outer skin has not been perfected, or that they have escaped some action, chemical or of the animal, necessary for the formation of the lustrous waves of nacre. Mr. Ludwig Stross, who has had much experience at the pearl fisheries, says that he has frequently found pearls of fair size in shells of the Lingah type which could not be over twelve to fifteen months old. Some of these pearls weighed fully three grains. As there are many apparent

skins in a pearl of that size, the divisions could not mark either years, seasons, or breeding periods. In some experiments made by Mr. Stross, he found that borings made to the interior of a living mollusk's shell were closed by a film of hard nacre in two days.

The known facts about a pearl are these. It is composed of about ninety-two per cent. carbonate of lime, about six per cent. organic matter and a little over two per cent, water in combination almost identical with the lining of the shell in which it grows and similar to the mineral aragonite. In construction it is usually a series of layers, which can sometimes be peeled off entirely, each one successively enveloping its predecessors apparently as an independent structure though itself composed of a number of thin lapping waves. Upon cutting through these layers the divisions appear as a series of rings and the intervals, though composed of many thin waves, appear compact. It grows spherically or with such modifications as the exigencies of position in the shell would reasonably account for. These facts seem to justify the hypothesis that a foreign substance upon

entering the shell of a pearl oyster is at once enveloped or washed in the creature's exudations; that the organic matter of the secretions forms a filmy envelope in which the mineral contained in them is precipitated or crystallizes in wave-like layers of crystals of great tenuity, and that as these layers harden the process is repeated, and that during the process the creature either revolves the object, or about it, as it is free, or fastened to the shell. It is also possible that changes in the organic matter interwoven with the calcium carbonate may produce some chemical action resulting in the crystallization of the lime, and the crystallization in turn be provocative of another deposit, each process in turn being almost simultaneous and that the process is continued until a paucity of mineral in the exudations induces a rest for recuperation, after which the process is repeated, the result being a succession of composite skins as we find them. Whatever the cause, it is evident in all parts of the shell and in the pearl that continuity of construction is periodically arrested to be resumed upon exactly the same plan, except that the material used in the suc-

ceeding layer of the pearl may be formed occasionally like another of the shell sections though usually it is like the preceding one.

Marked differences in the same skin occur more frequently in the pearl formations of univalves. The skins of the abalone pearl especially, are frequently nacreous in part only.

Pearl oysters are found in immense numbers on banks having a calcareous foundation. They are extraordinarily prolific, the spat of one oyster being estimated at upwards of several hundred thousands to millions, so that were it not for the natural enemies of their young and the liability of being swept away and scattered by storms before they have anchored, the banks would be overcrowded with the myriads produced. Some idea of the numbers may be gained from the fact that during the fishing season the Ceylon divers raise about one million each day.

The oysters are seldom found in water with a temperature below 75 degrees and they seem to thrive best in warm sheltered bays and inlets, especially when the banks are situated far from the equator. They attach themselves to the

beds by a bunch of tough threads which pass out through an aperture in the shells, near the hinge, and fasten on the rocks and stones; consequently the oysters do not lie flat, as might be supposed, but maintain an upright position, hinge down, lip end up, and the shell slightly open for the passage of the food-laden water, as the fresh-water mussels do. These threads are called the beard or byssus, and are composed of material similar to the epidermis of the shell.

The abalone, which is a univalve, holds on to the rocks by the foot, a flat muscular appendage used for locomotion and also as an anchor on the principle of the leather toy known to boys as a sucker.

Although pearls of value are found only in shells containing mother-of-pearl, a small proportion only of the mother-of-pearl shells contains pearls, and many varieties in which pearls are found do not yield enough nacre to make the shells valuable. The size of the meleagrina in some seas is remarkable. That at page 127, photographed from a Tuamotu shell, measures $8\frac{7}{8}$ inches by $6\frac{7}{8}$ inches and weighs twenty-eight ounces troy.

It is of the black-edge variety, contains a large quantity of fine quality mother-of-pearl, and has a beautiful small pearl attached to the lining near the center of the shell. Though large, it is not full grown. It is probably twelve to fourteen years old and would continue to lay on mother-of-pearl and so grow thicker and heavier until sixteen to eighteen years of age, when the oyster would reach maturity. The Australian white shell at page 129 is a young shell—that is, it has not attained the full thickness and weight of a mature shell. The shells at pages 131 and 161 are from the coast of Venezuela; they measure 2½ by 2½ inches and weigh seven pennyweights each.

The common form of the pearl-bearing freshwater mussel unio (nigger-head) is illustrated at page 146. This shell measures 3\frac{3}{4} by 2\frac{3}{4} inches and weighs 3\frac{1}{2} ounces. It is from the Middle West of the United States. In construction it resembles the meleagrina, the epidermis being dark, though not as rough as that of the oyster, and the lining white, showing slight iridescence around the lip-edge and to a greater degree on the adductor muscle

scar. The mother-of-pearl under the epidermis at the thick or hinge end is quite iridescent, and the lines which make the color play are plainly discernible under the loup.

The largest and finest pearls, also the greatest number, are found usually in distorted shells. This has given rise to the idea that they are a symptom of disease in the fish, but having in mind the functions of the three zones of the creature's mantle by which they supply separately material for the epidermis, middle shell and lining, one may conceive that if, by some extraordinary cause, the secretions of one of these is largely withdrawn from the natural channel, the losing part of the shell would warp the normal growth of the others to its own dwarfage.

When the nacre grows to a pearl, contrary to the intent of nature, instead of a lining for the shell endeavoring to keep pace with the growing oyster, the full-growing exterior is distorted in accommodating itself to the undersized lining. In view of the fact that an oyster sometimes contains a large number of pearls (one shell in New Caledonia contained 256) the diversion of

nacre sufficient to cover them, or to produce one large pearl, might reasonably be expected to result in a considerable distortion of the shell. It may also be that the displacement of the mantle, caused by the wrapping of itself about the growing pearl, interferes with the even deposit of shell material about the edges of the shell and so distorts it.

Because deformed shells are more fruitful of pearls some have advocated the practice of throwing perfectly-formed shells back into the sea unopened, but, inasmuch as the mother-of-pearl of the shells often exceeds in value the pearls found in them, this is not likely to happen. Few fisheries could be made to pay if they were fished for the pearls alone. In many of them the shells yield 90 per cent. of the total value and are in fact the sole incentive for the investment of the necessary capital.

Luckily for the world's supply of pearls, however, the disturbers of the mollusk which cause these gems by their intrusions appear to be more abundant in waters where the shell is valueless, the banks about Ceylon especially being infested with the cestodes which are

commonly the nuclei of Indian pearls. It is interesting also to learn that Mr. James Hornell (inspector of the pearl banks) finds these worms in another stage in the file-fish, which frequents the banks to prey upon the oysters, and confidently expects to find them in the adult stage in the shark, which in turn devours the file-fish.

It is the opinion of Jameson of London and others, that the parasite which causes the formation of pearls in the mussels of Europe is frequently the larva of distomum somateræ, from the eider-duck and scoter, and that the larva first inhabits Tapes, or the cockle, before getting into the mussel.

Generally the nuclei appear to be the bodies or eggs of minute parasites—distoma, filaria, bucephalus, etc., and they vary in different localities according to the animal life of the neighborhood. In the still parts of the river Elster, where water-mites (Limnochares anodontœ) were abundant, Kuchenmeister found that the mollusks contained more pearls.



The beds of the marine shell-fish from which pearls are taken lie always under water. Unlike others which are sometimes left exposed by the tides, to be gathered by man without difficulty, the pearl oyster is never left uncovered by the sea. It is found usually on shoals some distance from shore, sometimes but five to seven feet from the surface; more frequently fifteen to forty feet deep, and often one hundred to one hundred and twenty-five and even one hundred and fifty feet deep.

Everywhere, then, man's quest for pearls is confronted by the heaving, restless waters of the sea, for the greater part of the year rough and turbulent, frequently lashed to furious racing by tropic tempests but through which he must in any case go to get them. In a few places where the beds lie in shallow inlets and sheltered bays they can be dredged, but almost universally the oysters are gathered by divers. During the greater part of the year, when storms

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rage, diving is very dangerous if not quite impossible; but when the song of the sea is hushed to low crooning, and the gentle roll of the waves does no more than playfully slap the boats in passing, then in the seas where men dive for pearls they gather to the harvest of gems.

There are two ways of diving—naked, and with dress. The former is the common method throughout the Orient and is practised to-day after the same manner that it was in the days of the Pharaohs and the Cæsars, for the primitive method survives with few variations wherever eastern people control the fisheries.

In the fishing season one sees now in the Red Sea and the Persian Gulf and about Ceylon, the same scenes as they were enacted there before Rome was a city, or France a nation, or the Macedonians overran Egypt. Naked divers, diving into fifteen to forty feet of water, use few aids. They grease their bodies, put greased cotton in the ears and a forked stick, or tortoise-shell clip, upon the nostrils to compress them, hang a wide-mouthed wicker basket or net at the waist, and they are ready.

There are several methods of naked diving: head-first from a spring-board attached to the side of the boat, as the Malabar coast Hindus and some of the Egyptians do; swimming to the bottom, as practised in the deep waters of the South Sea; and dropping to the oyster bed with a stone. The latter is the most common way in Indian, Egyptian, and Arabian waters, especially where the banks lie in forty to fifty feet of water.

Standing on the spring-board a few seconds to fill his lungs, the head-first diver suddenly plunges overboard and passes smoothly and rapidly through the water straight to the shoal below. Gathering quickly as many oysters as possible while his breath lasts, he places them in the net at his waist, attaches them to a convenient rope hanging from the boat's side and shoots to the surface. There he recuperates by lazily floating about if the water is shallow, if deeper, by climbing back into the boat for his next plunge. If diving in pairs, one rests while his partner dives.

Expert divers who dive singly have an attendant, a manduck, who attends to the lines

and looks out for his interests generally. The manduck drops a line with the oyster basket overboard and attaches to it another weighted with a forty to fifty pound stone. These are so fastened that they can be quickly released. The diver then drops into the water feet first and placing his foot in a loop in the line over the stone puts the basket on it, and releasing the lines, sinks to the bottom. Disengaging himself, he proceeds to fill his basket while the attendant pulls up the stone and adjusts it for the next descent. When ready to return he signals his attendant, and holding on to the line with the basket is drawn to the surface, occasionally accelerating his own return by climbing the rope hand over hand at the same time. He rests in the water by the boat's side until ready to dive again, making seven or eight descents before climbing into the boat-for a longer rest and sun-bath.

The divers of India, Arabia and the Red Sea are natives of the Madras Presidency, descendants of Arab fishers at Jaffna in Ceylon, Arabs, and Egyptian Negroes. They travel long distances to the fisheries and there are

many of them between the Red Sea and Ceylon. At the last fishing in the Gulf of Manaar there were about forty-five hundred. Their dress during the time of the fishing consists of a loin cloth only. They have many hereditary and class superstitions, chief of which is their faith in shark-charmers. While waiting for the fishing to begin they also seek to get from the fates an inkling of the luck which will attend them. One common method is by breaking a cocoanut on the diving stone; the more clean and even the break, the better the luck.

The mortality among divers at the fisheries is not great in Asiatic waters. Pneumonia is the greatest scourge, fatalities in diving being few. It is necessary however to select robust men for depths beyond forty feet; comparatively few can work without injurious effects below that.

Some curious mixtures of ancient days and present times, of the Pharaohs and infant industries, are seen. One may see a black slave diver in the Red Sea hanging over the edge of his boat taking observations through an old tin kerosene can with a bit of glass in one end of

it. This he sinks a little way in the water and gazes through it below. Presently the can is discarded, over he goes and returns shortly with a few shells; while near by a clumsy monster emerges and a diver in dress climbs into his boat. This use of modern tin cans and glass is adopted in seas where the shells are scattered and is common to pearl-divers the world over.

The Moros have a method of fishing in very calm weather peculiar to themselves. They drop a three-prong catcher attached to a rattan rope upon the oyster bunches and so haul them up to the boat. This can only be done when the sea is perfectly still, as even a ripple would render a sight of the oysters impossible. Ordinarily they dive to any depth down to twenty fathoms.

Many attempts have been made to introduce dress-diving among the natives of the east but so far few have been successful. Results from experiments have not compared favorably with naked diving and so, with few exceptions, naked diving is still the rule in the east where natives control the fishings.

But of all, the Polynesians, both male and female, adhere most closely to the old way. Most of them will not even use a stone to assist the descent, and they probably reach greater depths than the naked divers of any other sea. Travellers report that, at a coral atoll in the Southern Pacific owned by the French government and known as Hikuereu, where the natives of Tahiti and other islands flock during the season to fish for pearls, the boys and girls and women are almost as expert as the men.

Whole families congregate here, remaining during the season housed in huts framed of light cocoanut palms roofed with leaves. These they bring with them, some coming several hundred miles. The shells are mostly in sixty to seventy feet of water; some however are brought from a depth of one hundred feet. It is reported that a boy, on an exhibition dive, remained under water for two minutes and forty seconds, going to a depth of a little over one hundred feet. He was in sight all the time, the water being so transparent that he could be seen on the bottom, leisurely selecting pieces of coral for the officers of the ship above. These divers

hang in the water by one hand grasping the gunwale of the boat while they examine the bottom for oysters through a glass which they hold below the surface in the other hand.

When shells are sighted the glass is discarded, the lungs are filled several times and the air expelled slowly. Upon reaching a certain fit condition a long breath is taken until the lungs are inflated to their utmost capacity; the diver then suddenly lets go, sinks a few feet below the surface, turns quickly and head-first swims rapidly to the bottom.

Arriving there, he pulls himself along by grasping the coral branches and breaking the shells loose from their anchorage with his right hand, which is protected by a cloth wrapping, and stows them away in a cocoanut fibre basket slung over the shoulder. This done, he straightens himself and shoots to the surface with astonishing rapidity, seeming to leap up from the water as he arrives with almost sufficient impetus to carry him into the waiting canoe. In a few minutes he is ready to dive again. In some localities where divers were employed the women were preferred, not because they could

do better work always, but one could depend on them more safely. This was true of the divers in Torres Straits between Queensland and New Guinea.

Before dress-diving was introduced these naked natives would dive into ten or twelve fathoms and bring up an oyster under each arm. The shells were large, weighing three to six pounds together and sometimes ten, but they contained few pearls and those were generally small. As they were brought up the oysters were searched for pearls and the fish used for food. The shells sold in Sydney then for eight to nine hundred dollars the ton. Years ago the women of Chile about the Bay of Concepcion claimed as a right the fishing for mussels. The men rowed them out to the beds and stuck long poles into the shoal below, down which the women would slide, returning with both hands full of mussels. The fishing was done from canoes, each holding one man and one woman. The women did not consider this a hardship but a privilege of which they were quite jealous, for they devoted the proceeds of their catch to the purchase of finery.

Wonderful stories are told of the great depths to which these naked divers go and the great length of time they can remain under water. Many of these tales are gross exaggerations, yarns which have grown more wonderful with the telling, or the reports of careless or inexperienced observers. As a matter of fact at most of the fisheries, twenty to thirty feet is good diving, and from forty to fifty feet is the maximum depth. Sixty to eighty seconds is the average limit of time they remain under water. If one will try to hold the breath for sixty seconds, even while remaining perfectly still, it will be at once understood that to do so while moving and working rapidly under water is a great feat. Nevertheless there have been instances undoubtedly, where naked divers have gone to much greater depths and remained under for several minutes. Such cases are rare however and occur most frequently among the natives of the South Sea Islands, who, male and female, are expert divers from childhood and spend much of their lives in the water.

Visitors have claimed that natives of the Tongarewa Islands, in longitude one hundred

and fifty-eight degrees W. and latitude nine degrees S., can do twenty to twenty-five fathoms and will even go deeper when tempted by the sight of a few oysters lying in a hole or depression near by. Going below twenty-five fathoms results almost invariably in a sort of paralysis. The diver comes up howling and incapable of motion and unless companions at once seize and rub him vigorously with salt water until circulation is restored, a process lasting sometimes many hours, he dives no more. If restored he will dive again next day, and such is their recklessness that the same temptation would lead him to take the risk again.

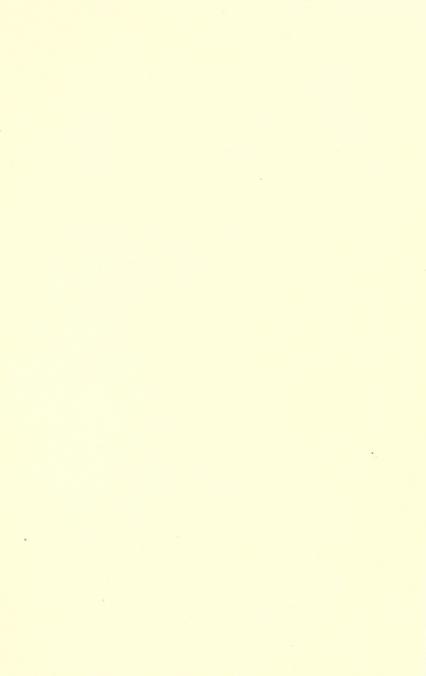
Monsters abound in these waters. Should the diver be attacked by a devil-fish, shark, or sword-fish, he does not use a knife, as blood would attract other devils of the sea and becloud the water to his own confusion. Instead he seeks to avoid his enemy, and if the troubler is a sword-fish, tries to find shelter among the rocks. If the fish departs quickly, he escapes; but the time of a live man one hundred feet under water is short and sometimes the sword-fish over-stays it.

Helmets have been used to a certain extent in all parts of the world. Many of them were clumsy affairs, abhorred by all native divers, and were a bad introduction to the "dress" used in the large operations of big fisheries such as those of Australia and the Pacific coast of this continent. In the seas about Australia, modern appliances are being rapidly introduced. The Australians use them if possible, wherever they fish. On their own coast all diving is now done in dress; but among some of the islands of the Pacific, where they are extending their interests, native prejudice is still able to hinder the use of it.

Probably the chief reason for the general use of the dress on the Australian coast so early was that the shallows were soon exhausted, and naked diving was not successful beyond a depth of fifty feet. With the dress, a diver can work at much greater depths, remain under water an hour or two, and work all the year round.

In fisheries like those of Ceylon, where the banks are seldom over forty feet deep and well known, being fished over and over again at one





season of the year only, at comparatively short intervals (four to six years), the necessity for dress-diving is less and the naked native diver will probably survive for many years although modern innovations are gradually creeping in even among the fisheries controlled by Orientals.

The dress consists of a rubber suit all in one piece, which the diver gets into through the neck; leaden-soled boots, corselet to which the helmet is screwed, and chest and back weights. The diver dresses and steps on to the ladder hanging over the boat's side. The air-pipe, lifeline, and helmet are attached, the man at the air-pump is set to work, and last of all the face glass is screwed up.

A plunge, a splash, and he drops swiftly through the heaving billows to the quiet depths below, his life in the hands of the tender he has left in the boat. This man must feel the diver constantly by the life-line, keep him supplied with air and be ready for any of the emergencies always liable to arise. Only an alert man of good judgment and quick action should tend the life-line, though the most successful diver, a Japanese, on the Australian coast some years

ago, had the best tender of that section in the person of his wife.

If it is the diver's first plunge, his ears and head will be racked with pain as he descends. This pain will leave him when he reaches bottom, but on his return to the surface he will find his nose and ears bleeding and will probably spit blood also. After this he will not experience pain in diving, but in common with nearly all divers will never be quite free from extreme irritability and bad temper while below; he will also have gained the diver's ability to blow smoke through the ears.

Diving is injurious to the health and, if persisted in, produces deafness and incipient paralysis. Few of the divers on the Australian coast now are aborigines. Their antipathy to the dress amounted in many cases to a superstition, so as the fishing was pushed out to deeper waters and the dress became a necessity, they were discarded with the old methods. It is said that in the old times diving had a peculiar effect upon the black-haired natives. By the end of the fishing season the color of their hair became yellow though the natural hue returned later.

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With the dress, a diver can work comfortably at one hundred to a hundred and twenty-five feet, but men who know the fisheries doubt if that can be exceeded. Nor does it seem needful to go deeper, for in seas which have been explored at greater depths it is usually found that the bottom consists of ooze unsuitable for the life and growth of the oyster.

Beyond those inherent to the art of diving, either method has its peculiar difficulties after bottom is reached. In naked diving, especially at the shoals of Ceylon and Venezuela, where the shells are small and abundant, it is simply a question of gathering as many as possible while the breath lasts and looking out for the dangerous fishes indigenous to tropical waters.

Sharks are common in many of the pearloyster seas, but experienced divers do not fear them greatly, as the fish, formidable as it may appear, and dangerous as it is when it can come upon one unawares, is easily frightened. Many expert swimmers of the Indian and Pacific oceans do not hesitate to attack them in their own element. Usually vigorous splashing will frighten them away. The dress-divers of

Australia scare them off by allowing a jet of air to escape. As the bubbles start for him, the man-eating monster shoots away from them as if terror-stricken.

The diamond-flounder of the Pacific and Indian oceans, a huge flat fish with a habit of seizing its prey between the side fins and crushing it, is more dangerous. If a dress-diver of experience sees one of these approaching, he is apt to shut off the air-escape of his helmet and signal to his tender that he is coming to the surface as fast as he can get there.

The rock-cod also is sometimes troublesome on the Australian coast. Occasionally he attains an enormous size. This fish lies hidden in submarine caves, his head protruding and his monstrous jaws yawning vertically wide like an entrance to the cave itself. But accidents from the denizens of the sea are comparatively few; the physical results of deepsea diving are more to be dreaded, for paralysis hovers close to the thirty-fathom line.

Although dress-diving has the advantage over naked diving that it gives a supply of air

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to breathe while at work, it also entails dangers and difficulties from which the old method is free. An imperfect supply of air may cause the bursting of a blood-vessel. Fouling of the lines might not only cut off the air supply entirely, but prevent the man, anchored by his heavy dress under twenty fathoms of water more or less, from signalling the man at the life-line. As on dry land, there are holes and precipices at the bottom of the sea to be avoided.

In some seas there are swift currents and as the dress-diver remains under water for some time, instead of returning at once like his naked brother, he must keep moving with it, and as he moves, the boat must move in unison and his tender must keep the lines free. Both diver and tender must be skilful and alert to do this. Nor is it always easy in deep-sea diving to find the oysters. They lie in scattered bunches, often hidden by sponges, coral or other sea growths, their gray or moss-grown exteriors scarcely to be distinguished from the surroundings; if in mud, only an inch or so of the sharp lips of the two valves projecting above the surface are in evidence; while if in stooping to

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gather the shells he should fall, he is likely to shoot feet foremost to the surface.

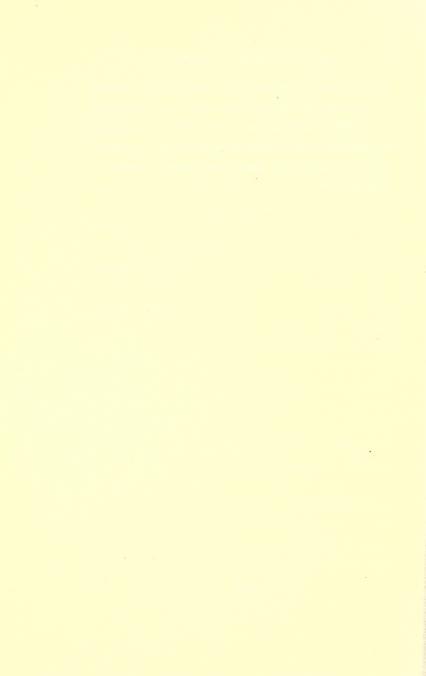
Though dress-diving has heretofore been confined almost entirely to white men, the Japanese, Chinese, Malays, South Sea Islanders, and others in different places, are now being educated to it chiefly through an Australian fishery.

At the northwestern corner of Australia, a thousand miles from the nearest railroad and ten days from the nearest port, there are pearl-fisheries where the climate is so hot that white men cannot be obtained for the work. Colored men are shipped there from Singapore to man the boats, the pearl-fishers giving a bond to the government of 100 pounds sterling for each man employed, as a guarantee that he will not go to other parts of the state. A fleet of about three hundred boats and fifteen hundred men are employed there, the supply station being at Broome township.

In all things, when once the improvements of science gain a foothold anywhere in the world, the whole earth succumbs eventually to their advantages, and so with diving; the habits and

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prejudices of thousands of years will be forced by commercial pressure to submit themselves to modern appliances, and the picturesque nakedness of the swarthy orient will soon be hidden under the ugly but useful dress of civilization.





The Pearl Oyster is found in more or less abundance on the shoals and reefs about the shores of every land within a belt of the earth lying between 30 degrees north and south of the equator. Coral reefs and limestone foundations usually form the beds on which they propagate. Beyond these limits the abalone is found at Japan, on the California coast, Queen Charlotte's Island, the Cape, Australia, New Zealand, China, about the English Channel, and on the coast of France, where the shores are washed by equatorial currents. It exists also on the shores of India and the Canary Islands.

The largest and heaviest shells, which yield fine mother-of-pearl most abundantly are confined almost entirely to the Pacific Ocean within twenty degrees south of the equator. The best white shells come from the northern shores of Australia and the Aroo islands. The best black shells are found about Tahiti, the Gambier

Islands, and the Tuamotu Archipelago. Of the big yellow variety, the best are obtained in the Merguian Archipelago and Dutch Indies. The shells of this district at Ceram, Batjan, and elsewhere, vary somewhat but the bulk of them are yellow.

Beginning with the east coast of Africa, the pearl oyster is found in the Red Sea, where it has been fished for ages. The shell here is of medium size and weight; much larger than those of Venezuela, Ceylon, or the Persian Gulf and smaller than the shells of the Pacific. The mother-of-pearl is not of the finest quality and is used now for inferior work only. It was more used formerly but since the fresh-water unio shell of the United States came into the market, it has displaced to a great degree the Egyptian and Panama shells. The inner edge of the Red Sea shell is of a greenish gray color.

South of the Red Sea, on the East of the African coast, pearl oysters are found in a number of places between Zanzibar and Inhambane, particularly at the Bazaruto Islands, but nowhere in sufficient abundance to develop the fishing for them into a regular industry. Good

mother-of-pearl is abundant on the German East African coast, but the oysters carry few pearls.

Travelling east, they are next found in large numbers in that arm of the Arabian Sea known as the Persian Gulf. Here they have existed for many centuries. The mollusk is of the smaller species and the shells are known in the market as Lingahs, from the name of the centre of the pearl trade in this district. The shells are of no commercial importance.

After these come the ancient fisheries of India, the most prolific in the world. The oysters here are smaller than those of the Arabian Sea and the shells are of no value, but they mature rapidly and yield great quantities of pearls. Myriads of them cover the shoals and banks between the coast of India, at the Southeastern point, and Ceylon, and as the beds are under government supervision, they cannot be destroyed by the reckless fishing of immature oysters.

Crossing the Bay of Bengal and the Malay Peninsula, between longitudes 100 and 120 degrees E., there are pearl oysters on the coasts of China, the Merguian Archipelago and western

Australia. Between longitudes 120 degrees E. and 150 degrees E., these mollusks flourish on many coasts, including those of Japan, the Sulu Archipelago, the Dutch Indies, the Spice Islands, the Banda Islands, the Aroo Islands, New Guinea and northern Australia.

The Australian shells are large and the lining is white and fine. As shell fisheries they are the largest in the world and although the value of the pearls found is small compared with the amount realized from the sale of the shells it is considerable and growing. The Aroo shells are white like the Australian. Those from the Banda Islands are a smaller black-edge shell. Most of the others like the Manila shell of the Sulu Islands, are yellow.

At longitude 165 degrees E. the fisheries of New Caledonia are becoming notable for the number of fine fancy colored pearls found there. Both avicula margaritifera and meleagrina margaritifera are taken off the west coast.

In the waters of the Fiji Islands, longitude 180 degrees E. pearl oysters of the black edge shell variety similar to the Bandas but a little larger are fairly abundant.

Fine shells, often containing very beautiful pearls, are taken off the coasts of Tahiti, Gambier, and throughout the Tuamotu Archipelago, lying between longitudes 130 degrees W. and 150 degrees W. The shells are of the black-edge type, large and heavy. The nacre is thick and has a particularly mellow luster; throughout this section both shells and pearls rank among the best.

All over the South Sea, pearl oysters are found about the islands and in the lagoons within the atolls which stud it, but in quantities too small in many places to induce capital to establish fisheries. Fishing for them is confined therefore to native divers who are rewarded by the occasional find of a few pearls, which often they sell at ridiculous prices to the stray traders who may chance to come their way.

This eastward journey now brings us to the Pacific coast of the American continent. Here the pearl-bearing mollusk is found on the shores of Lower California, about the Islands of the Gulf of California, at various points on the Mexican coast-line south to Acapulco and at Panama. They exist also on the coast of

Ecuador but of late years fishing has not proved remunerative and it is now carried on in a desultory way only. They are found also on the western coast of Nicaragua.

The Mexican shells known as Panama shell or bullock shell have a dark, dirty, greenish rim and are much less valuable than the white or black shell. Similarly, dark, slaty-colored pearls are known as Panamas because many pearls taken on this coast are of that character. This color tendency however often results more advantageously as many of the pearls are sufficiently dark to be classed as fancy and some beautiful black and red pearls are found in these waters. Panama pearls also have the reputation of being softer than others. There are pearl oysters also on the Peruvian coast but this section has not yet been fished.

On the Atlantic side of America pearl oysters are abundant in the Gulf of Campeche and on the shoals about the islands and shores of Venezuela. The shells of Central America are similar to the Panamas only more yellow, while those of Venezuela are small and valueless. Between the east coast of America and the Red

Sea are no fisheries save at Haiti, for no discoveries of any importance have been made on the western coast of Africa.

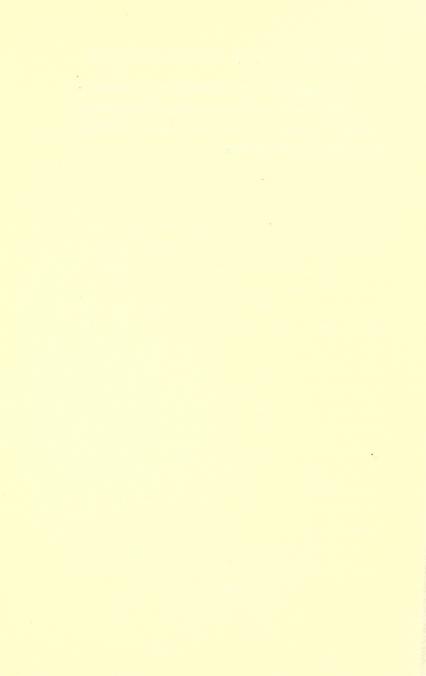
Consideration of these homes of the pearl oyster shows it to be a tropical fish and that it attains greater dimensions in the Pacific Ocean and near the equator than elsewhere. Beyond 30 degrees north it is found only at two points, the western shore of America and on the Japanese coast. These shores are washed by equatorial currents. The small varieties of the Indian seas and Venezuela, mature rapidly in four to six years, and if not taken they die out after the seventh year. The meleagrina of the Pacific however, though it attains its full size in six to eight years, continues to lay on shellnacre up to twelve and even twenty years. A shell which is of good size but comparatively thin is called by the dealers in mother-of-pearl a "young shell." The Australian pictured at page 129 is such an one. The Tuamotu at page 127 is not full grown but well along in years, probably fourteen to sixteen years old.

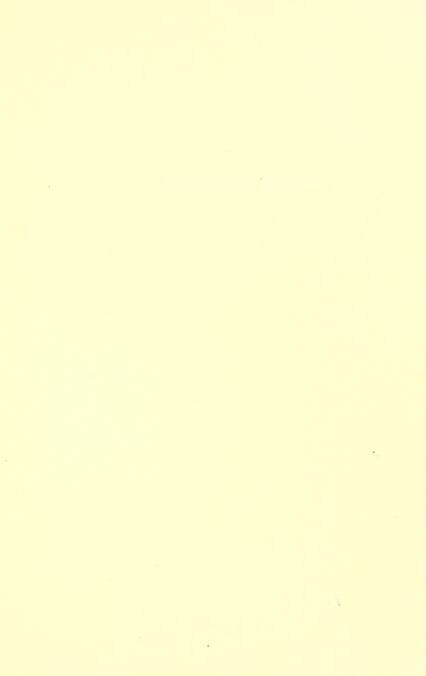
Of the sea mollusks yielding formations which, though not true pearls, are so called,

the conch, a large univalve fountain-shell-fish (Strombus gigas), is a native of the West Indies. Another, a gasteropod, the ear-shell (Haliotis) known in the United States as the abalone, is found on the coasts of California, Japan, the English Channel Islands and elsewhere. The Californians are divided into three classes, the blue backs, about six inches long, and green and red ears, which are half as large again. Pinnas yielding black seed pearls are found south of the Island of Mafia on the east coast of Africa. On the banks and shoals between Mafia and Zanzibar is a red mussel from which white pearls are taken.

The fresh-water pearl-bearing mussel, the unio, unlike the sea oyster is most abundant north of 30 degrees N. In China and the Hawaiian Island Oahu it is found a little to the south of 30 degrees N., and it has been discovered lately in Southern Rhodesia a little north of 30 degrees S., but the countries and streams in which the unio is plentiful and where it yields the most pearls lie within latitudes 30 degrees N. and 60 degrees N. They have been taken from the streams of Great Britain

since the times when the Romans had a colony there. They exist in Bohemia, Saxony, Bavaria, Lapland, Canada, Labrador and in great quantities in the United States.





The pearl fisheries of the Red Sea are at Lohia. At the lower end of the Red Sea, at Massawa on the African side, and at Lohia on the Arabian side, are a number of small barren islands; the banks lie in shallow water between them. The industry is financed by merchants, principally natives of Bombay, India, who in partnership with the Bedouin boat-owners, control the fishing. The Bedouin captain takes with him a few Arabs to man the boat and a number of black slaves as divers. The shells have a market value for mother-of-pearl but the quality is inferior. They have a greenish-gray edge and are fairly heavy and formerly they were much in demand.

Of late years the fresh-water unio shells have replaced them to a certain extent for cheap material but the shells are yet about ninety per cent. of the value of the fishings. Returns show exports of pearls averaging one hundred thousand dollars per annum but as a large

number go direct to Bombay and are not reported, this does not fairly represent the extent of the industry.

The beds vary in depth, thirty to forty feet being the maximum depth fished. Naked native diving is the rule, but the Italian government has lately farmed out concessions at Dahlak and Farsan where they are experimenting with helmets. The fishing season is from the beginning of March to the end of May.

The arm of the Arabian sea lying between Arabia and Persia known as the Persian Gulf, has always been rich in pearl-oysters and is a prolific source of supply to-day. These banks are fished chiefly for the pearls. The shell, though larger than the Ceylon, is of the "Lingah" class as it is called, and is of little value for mother-of-pearl.

Though pearl-oysters are found all along the coast of Arabia, the most productive shoals are between the Islands of Halool and Katar. These shoals commence at the Island of Bahrein immediately off the Arab coast near the centre of the gulf and continue east and south along the district of Katar for nearly two hundred

miles after which the banks are lost in deep water. The chief centre of the pearl trade is Lingah, hence the name given to the shells of this district. Most of the pearls go to Bombay and are known as Bombay pearls, many of them having a distinctly yellow tint. The whitest and finest go to Bagdad and eventually the best go to Europe. India takes the irregular ones and China gets the seed pearls.

The principal banks are at Bahrein. This island is the most important one of a group situated in an indentation of the Arabian coast and is about seventy miles long and twenty-five broad.

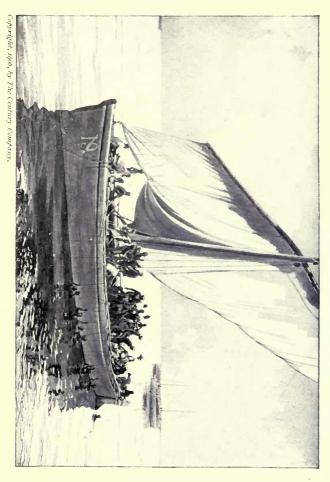
Small boats carrying from five to fifteen men fish the shallows near the coast, but larger boats, manned by from twenty to fifty men, put out for the banks further from shore into deep water. These remain out during the entire season coming into port once or twice only for supplies. The owners of the boats are generally poor. They depend upon the dealers for advances at the beginning of the season for supplies, and many of them are therefore practically in a state of bondage.

When the deep-water boats reach the fishing grounds, half the crew is selected for diving. The diver uses a small braided mat basket as a receptacle for the shells and has a long line attached to him by which he can signal to the man in the boat who manages it. There is a man to each diver's line. Except for the short intervals at the surface necessary for air and rest, the divers remain in the water for hours. The oyster beds vary in depth from six to eighteen feet in the shallows, to forty feet at the banks.

The duration of the fishing season depends on the temperature of the water. It lasts usually through July, August, and September, though some of the larger boats remain out from the end of June until the beginning of October.

The pearls are sold by weight, sales being made sometimes while at sea and a duty equalling about twenty per cent. is levied on the spot. A large number of Hindu traders come during the season to buy, returning to India at the close as they have done for centuries.

No exact statistics of the output of these





fisheries are to be had but the yield is said to average well; some authorities placing the value of the fisheries of the entire district in the sixties at nearly two millions of dollars per annum, and the number of boats engaged at 4,000 to 5,000.

As ancient as those of the Arabian sea and even more important are the pearl fisheries of India. These are also fished for the pearls, the shells of these waters being smaller than those of the Persian Gulf and valueless for mother-of-pearl. The pearls however average whiter than those of the Red Sea and the Persian Gulf. Although equally fine pearls are found in other waters the Ceylon, or Madras pearls as they are called, have long been esteemed the best because of their good average color and quality. These banks are situated in the Gulf of Manaar between the southern point of India and the island of Ceylon.

On the Madras (India) side the banks are off Tinnevalli and Madura at Tuticorin. The Indian revenue realized a profit of £13,000 from a fishing here in 1822, and £10,000 from another in 1830. Examinations showed

that there were not sufficient oysters for profitable fishing after that until 1860, when the government netted £20,000, and a fishing the following year, 1861, was equally successful. The banks failed in 1862 and there was no fishery until 1874. Pollution of the water from the Indian shores has been detrimental to these banks and they are now of little importance.

On the Ceylon side, the banks lie six to eight miles off the west shore and a little south of the island of Manaar. Fishing has been an industry from early times before history began. There are records of these fisheries under the kings of Kandy and later by the Portuguese after they took possession of Ceylon about 1505, to 1655 when the island passed into the hands of the Dutch. In old times they were called the fisheries of Aripo after a fort on the coast. Not until the English gained control were the fisheries so managed that definite knowledge of the results could be obtained.

After the Dutch gave way to the English, until 1903, these fisheries had yielded a net income to the government of over £1,000,000. This covered a period of over one hundred

years, as the British occupied Ceylon in 1796. In the early years of this period and prior to that, the fishings, or rights to fish, were sold to the highest bidders, usually Hindu merchants. In 1796 the fishing brought £60,000. The year after the British took possession, 1797, it realized £110,000 that amount having been paid by Candappa Chetty, a native of Jaffna for the fishery right, and for that of 1798, the same renter paid £140,000.

These fishings, which were prolonged, so exhausted the banks that the fishery of 1799 yielded but £30,000. From 1799 to 1802 the yearly product ranged from £12,000 to £55,000. In 1804 they were leased for £120,000 but from that time on declined so that in 1828 they brought only £30,612. There were no fishings from 1820 to 1827, nor in 1834 and after 1837, until 1855. The supply failed in 1864 and for several succeeding years, and again for a decade, after five successful fishings from 1887 to 1891. The average yearly profit up to 1891 was about £34,000.

The Ceylon and Madras fisheries are now in charge of a government officer, who spends a

part of each year inspecting the various banks so as to be informed as to the whereabouts of mature oysters, and the location and progress of the young and immature. They keep a record of their condition at different periods, and regulate the fisheries by permitting fishing only when they consider the banks to be ripe for it.

The oysters mature in from four to six years so that ordinarily a bank may be fished once in that period, but it sometimes happens that the young oysters are swept away by violent storms or crowded out by natural enemies. In 1901 the Ceylon banks were found to be in a bad way, there were plenty of young oysters but none full-grown. The government officers could not account for the condition, and in response to a report of the facts the government sent Prof. W. A. Herdman to Cevlon in 1902. He examined the whole of the bottom of the Gulf of Manaar and discovered banks on which were full-grown oysters, so that a fishing was fixed for the 23rd of February 1903. Weather prevented commencement until the second of March, when fishing began and lasted forty-

two working days until April the fourteenth. The fishings take place in March and April because the sea is usually calm at that period.

The banks lie in five to ten fathoms over a shallow area nearly fifty miles long by twenty miles broad, opposite Aripo. A steep declivity on the western edge gives the sea a depth of one hundred fathoms in a few miles. In the centre of the southern part of the Gulf of Manaar, west of the Chilaw pearl-banks, the sea is one to two thousand fathoms deep.

Of all the paars, or oyster beds (paar means rock or hard bottom) the Periya paar is the largest. It is about eleven nautical miles long and from one to two miles broad. Situated in about five to ten fathoms close to the top of the western slope of the shallows, and running north and south about twenty miles from land, it is exposed to the southwest monsoon which runs up toward the Bay of Bengal for about six months of the year. The natives call this the mother-paar, believing that the young oysters are carried from it to the other paars, which are thus stocked at its expense.

Between 1880 and 1902 twenty-one examina-

tions showed that the Periya paar had been naturally stocked eleven times with enormous quantities of young oysters, which as regularly disappeared before they were old enough to yield a fishing. The most reliable paars are in the Cheval district and it is probable that the government, acting on the suggestion of Prof. Herdman, will hereafter dredge the breeding Periya paar of its young oysters and plant them where they will be able to mature. It is estimated that many millions of millions of oysters have been lost from this paar during the last twenty-five years.

A fishing is not only a matter of commercial importance, but of wide-spread interest among the natives of Ceylon and India. The romance of the situation, the hope of gain, the great gathering of people from many and far-off countries, the opportunities for barter, the possibilities of securing priceless gems for little, and for making money quickly, all appeal to the oriental mind.

For this they will endure the discomforts of long and painful journeys and the dangers of crowded camp life with a recklessness that con-

trasts curiously with the wild panics into which they are sometimes thrown, as for instance in 1889, when the Ceylon fishing collapsed on account of cholera. In a few hours a fleet of 200 boats disappeared, the camp was burned, and the multitude gone.

Great precautions are taken by the government officials in every direction. When they have decided that there are banks in condition to be fished, notice of a fishing is advertised. The following notification of the fishery for 1904 is an illustration.

"Government Notification.

Pearl fishery of 1904.

Notice is hereby given that a pearl fishery will take place at Marichchikaddi, in the Island of Ceylon, on or about March 14, 1904.

- 1. The bank to be fished is the southwest Cheval Paar which is estimated to contain 13,000,000 oysters.
- 2. It is notified that the first day's fishing will take place on the first favorable day after March 13.
- 3. Marichchikaddi is on the main land, eight miles by sea south of Sillavaturai and supplies

of good water and provisions can be obtained there.

- 4. The fishery will be conducted on account of the Government, and the oysters put up for sale in such lots as may be deemed expedient.
- 5. The arrangements of the fishery will be the same as have been usual on similar occasions. Persons attending the fishery camp from India will be permitted to travel to Ceylon by either of the following routes: (1) Tuticorin to Colombo or (2) Paumben to Marichchikaddi and by no other. Arrangements will be made as at the last fishery, for travellers to proceed from Paumben direct to the camp. The only restriction imposed on travellers by the Paumben route will be inspection by the medical officers at Paumben.
- 6. All payments to be made in ready money in Ceylon currency.
- 7. Drafts on the banks in Colombo or bills on the agents of this Government in India, at ten days sight, will be taken on letters of credit produced to warrant the drawing of such drafts or bills.
 - 8. For the convenience of purchasers, the

treasurer at Colombo and the different Government agents of provinces will be authorized to receive cash deposits from parties intending to become purchasers, and receipts of these officers will be taken in payment of any sums due on account of the fishery.

9. No deposit will be received for a less sum than Rs. 250.

By His Excellency's command.

Everard Im Thurm, Colonial Secretary. Colonial Secretary's Office, Colombo, Feb. 27, 1904."

The sanitary precautions are of the utmost importance, for a plague stricken Hindu, if he were dying, would still endeavor to go where he might "get rich quickly."

As the time draws near, thousands of speculators and sightseers from farther and nearer India arrive. Berbers, Arabs, Persians, and Burmese, mingle with the Singhalese and Tamil divers. A town of huts to accommodate perhaps 50,000 springs into existence. Steamer service to Colombo is started, post and telegraph service is established and sanitary measures put in force. Conjurors employed by the divers go

through incantations to preserve them from the sharks which abound in these waters.

This shark-charming power is believed to be hereditary and not dependent on the religion of the conjuror and he can, if ill or absent, convey the power to a substitute so that it will be respected by the sharks. To make matters doubly sure the divers arm themselves with a short, pointed piece of ironwood. This however is not their main reliance for a "wise woman" was able to avert a panic which was well under way, after one of the divers was bitten at the Tuticorin fishing of 1890. Excepting the loss of a limb occasionally not much damage is done by the sharks, a fact which sustains the implicit faith of the natives in their shark-charmers.

When the day set by the Government officials arrives, the fleet puts to sea after numerous ceremonies. The boats, which range from ten to fifteen tons, are grouped in fleets of sixty to seventy. Beside the divers they are manned by ten or more sailors, a steersman, and if possible by a shark-charmer (pillal karras). The boats leave at midnight in order to be

ready on the banks at sunrise. At the firing of a signal gun diving commences. A stone of granite, shaped like a pyramid and weighing about thirty to forty pounds, is attached through a hole at the smaller end to the cord by which the diver is lowered. Some divers prefer a half-moon stone fastened to the waist. Above the stone when attached to the line is a loop for the diver's foot. The divers work in pairs, one going down and the other remaining in the boat to attend to the line, and in some cases exchanging positions as the diver becomes exhausted. Naked divers stay below fifty to eighty seconds on an average, though some can remain under water longer. Each man makes forty to fifty descents a day and brings up fifteen to thirty oysters each time. As a rule the maximum depth in these waters is about fortytwo feet though fishing at twelve and thirteen fathoms is reported. The divers work from sunrise to noon, which allowing for shifts gives each man four hours diving for a day's work. A gun is fired as a signal for the day's fishing to cease and the fleet starts at once for shore. Upon arriving there the oysters are immediately

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landed by coolies who carry them in baskets, on their backs, to the "Kottu," or government stockade. There they are counted and each boat-load is divided into three equal parts; Two of these are chosen by officials for the government and the remaining heap is the boats' share. Formerly the catch was divided into four parts of which the government took three. Of the boats' share the divers get in some cases two thirds. As soon as the division is made, those belonging to the boat are quickly traded or sold to the numerous small speculators which abound in the camp. Six evenings in the week the government auctions off the catch in lots of one thousand.

While each day's catch is being counted the average run is carefully watched by experts who judge by the size, weight and general appearance of the oysters as to the probable yield of pearls. Opinions so formed are usually quite correct and bidding at the auctions are based on them to a great extent. The principal buyers are from Madras, Bombay, and other cities on the Coromandel and Malabar coasts of India, though local speculators buy many.

The catch runs about one million per day. In 1903 forty-four million oysters were taken, but they realized much less than the catch of 1904, when the number was not quite twenty-six and three-quarter millions, though it netted the government \$350,000; 1905, however, will be the record year as it is claimed the profits will reach the large sum of \$830,000. These figures represent the government's share only.

The price realized at these sales varies not only with the season but from day to day. Ten to fourteen dollars per thousand is a fair average, though there are days when as much as twenty-four dollars is realized. Prices have ranged from \$7.50 to \$40.00 per thousand in one season. The net proceeds go to the revenue of Ceylon.

This has been the system under which the Ceylon fisheries were managed until lately. For some reason unknown to the public, the government, after a season of unequalled profit in 1905, leased the fisheries to a company, the Pearl Fishers of Ceylon (Limited), for a period of twenty years from January 1, 1906. The company is to pay the government \$103,333 per annum and is to expend annually upon the

improvement of the fishery not less than \$16,666, or more than \$50,000, at the discretion of the government. The expenses of supervision and protection by the government must also be borne by the company.

As a result of the first fishery (1906), the company after setting aside \$49,628 for depreciations and reserve and carrying forward \$77,382, show a profit of \$256,960 which affords dividends of 36 cents on ordinary shares and 18 cents on deferred shares, a remarkably good beginning. The government revenue from the fishery of 1905 was \$801,882 after the expenses, \$73,510 were deducted; over \$111,000 more than the profit of 1904 which was the most successful up to that time.

The inspector of pearl-banks anticipated a good fishery in 1906 but was of the opinion that after a small fishery in 1907 and probably 1908 the banks would fail for some years as they have done in the past.

After the pearls are taken from the dead oysters they are first sorted for size. This is done by passing them through a series of ten small brass sieves known as baskets, containing

from twenty to one thousand holes. sieves have twenty, thirty, fifty, eighty, one hundred, two hundred, four hundred, six hundred, eight hundred and one thousand holes respectively. The pearls are then sorted for color and quality, weighed and valued. As with all things, really fine pieces are rare, the great mass being ordinary or poor. Herein lies the attraction and excitement of the business for some will find great gems. One may imagine the keen interest of the swarthy buyer who has parted with his hoards, hoping to find a "pearl of great price" when he washes the lustrous spheres from the putrid mass of decaying fish: the eager search; the joy when his eye lights upon a big, white, shining sphere rising up among the heap of little ones; the growing exultation as he picks it out and with feverish interest rolls it about between his fingers to find it without flaw or blemish, or the keen disappointment should his inspection show, as it most frequently does, that it is full of imperfections.

Hovering about are the buyers for the great Hindu merchants, agents of far-off princes and

Europeans, all watching sharply for great finds and ready to enter into the combat of wits which marks an oriental trading.

If one remembers that there are probably twenty-five thousand traders congregated on the hot sands of this far-off shore, the fair dame, whose neck is clasped by a string of these precious globules, may conjure from their lustrous skins, scenes as wild and weird as any fairy tale that set her youth to dreaming.

The pearls are sorted into a number of grades. Those perfect in sphericity and luster are called "ani." Anitari meaning "followers" or "companions," are of the same general character, but poorer in those important qualities. Masanku are somewhat irregular in shape and faulty, especially in luster and color. The poorest of this class, lacking the essential qualities, are separated into another grade and called "kallipu." Next come "kural," double or twinned, and "pisal," are misshapen or clustered. Folded or bent pearls are "madanku," and what we would call "rejection," a mixed lot of all sorts and sizes too poor to include in any of the regular classifications, are termed

"vadivu." Seed-pearls, the very small pearls of which there are great quantities, are known as "tul." Many of these are ground to "chunam" or shell-lime, and used as an ingredient in a favorite masticatory.

The assortments being made, they are weighed and recorded in kalanchu (kalungy) and manchadi (manjaday). The kalanchu is a brass weight equal to 67 grains troy, and the manchadi is a small red berry that is of very even weight when full sized, and is reckoned twenty to a kalanchu.

In the valuation of ani, anitari and vadivu, the individual size, form, and color is considered, but the others are simply valued by weight.

The modus operandi of these fisheries like all others managed by Orientals continues much the same from fishing to fishing. Experiments have been made at the Tuticorin fishery with helmeted divers but their catch compared unfavorably with that of the naked natives, who will sometimes under favorable circumstances bring up two thousand in a day. It is said that the X-ray is being used to some extent in the examination of shells and that

those found to be without pearls are thrown back into the sea, but it is doubtful if the general use would be practical or advantageous while oysters remain abundant; so far, the use of it has been experimental only.

Fine pearls are found in Dutch India among the Molucca Islands. Fishing is done by the natives, and as they seldom go deeper than ten or twelve feet the probability is that they do not get the finest shells or pearls, for it seems to be quite well established that the shells taken from deep water are larger and more likely to contain large pearls. Whether this arises from deep water being more favorable to growth, or an unmolested opportunity to grow, has not been determined.

Hitherto the Netherlands Indian government has opposed encroachment upon the rights of the natives and colonists, and has patrolled the waters with small gunboats to prevent any attempt by Europeans to fish. But lately concessions have been made to British firms so that shell is being shipped direct to London, and it is now thought that these fisheries will soon rival the Australian. The pearls were

formerly bought from natives, principally of the Island of Aroe, by Chinese and Arabs who took them to Macassar. From there they were sent first to Singapore and then to London, Paris, and Amsterdam. Most of the pearls brought to Macassar are baroques, though fine specimens of more regular shape arrive there occasionally. The mother-of-pearl from these shells is of good quality.

Some pearls are found at the Bazaruto Islands, Portuguese East Africa, a few miles from the coast, midway between Inhambane and Beira. A concession was granted to a company about 1892, but bad management, lack of funds and political difficulties, killed the enterprise.

General reports indicate that it is very difficult for any enterprise subject to the officials of this district to succeed. The Bazaruto Kaffirs still fish, but without system or intelligence. They are wasteful and damage many of the pearls by cooking the oyster. The few found are shipped by Indian traders to Bombay and Zanzibar.

Pearl fishing has been attempted on the

coast of German East Africa at Zanzibar Island and south, between the Island of Mafia and the main coast. Mother-of-pearl is abundant but few pearls have been found and there has been no sustained effort. There are large coral banks about the islands of the coast favorable for the growth of mother-of-pearl and there is shallow water over large areas.

Good white pearls have been taken from a red mussel found there. South of the Island of Mafia are beds of large pinna shells which yield black seed-pearls. There are pearl-shell fisheries in the Merguian Archipelago and in the government of Burmah and some pearls are found. The banks, scattered over an area of eleven thousand square miles, are rented from the government and rights to fish are sublet on royalty. The fishing is nearly all done by helmeted divers.

Avicula and meleagrina margaritifera are taken off the west coast of New Caledonia. From the former large numbers of pearls are taken, and from the latter, very beautiful white pearls. Fine colored pearls pink, yellow, gray and black are often found in this district. A

variety of oyster commonly called shoulder of mutton, and another shell-fish called jamboneau (pinna) of which the pearl is very fine, are also found in these waters.

A syndicate was formed in Paris to exploit these beds and obtained concessions covering one hundred and thirty miles. Owing to the difficulty of getting divers, the waters had not been exploited to any great depth up to 1898, the regular fishings being confined to the shallows of six to seven feet, though larger shells were known to be in deeper water. More systematic work with modern appliances and in deeper waters has since been done with good success, but late reports show an accumulation of shell and indications that the industry has not been profitable.

In 1904 the price of shell (black-edge mother-of-pearl) fell to \$250, U. S. gold per ton of 2240 pounds, from \$700, the former price, with six hundred tons stored in London, Paris, Berlin, New York and San Francisco, making a prospective loss of \$270,000 for 1904. There was an attempt to limit the production by a return to native diving. With dress the output would be

about 500 tons for the year, with naked-diving 200 tons less. This would operate against the local government, as it not only levies \$38.60 U. S. gold per metric ton as an export duty, but makes a large profit on the diving machines by way of license. The pearl fisheries of French Oceanica therefore face a grave situation.

Pearls are found occasionally on the western coast of Nicaragua at San Juan del Norte. The Panama coast still yields great quantities of pearls as it has done for many years. When Spain controlled the northwestern section of South America with the Isthmus to the borders of Guatemala, under the name of Colombia, immense quantities of pearls were sent home by the colonists.

It is recorded that 697 pounds of pearls were imported into Seville from Colombia in 1587. A large proportion of these undoubtedly came from the coasts of what is now Venezuela. The Panama or bullock shell as it is called, is not of the finest quality and the pearls are apt to be dark and inferior to the Indian pearls in luster as well as in color; nevertheless fine pearls are found there and the fisheries yield a greater

average of black pearls than any other. Beautiful iridescent pearls are also found there.

The Pearl islands are on the east side of the Bay of Panama about forty miles from the city. The banks there may only be fished by divers but between Chiriqui and Veragua dredging is allowed. Since the United States government has become interested in this section there is a tendency here to exploit the Panama coasts and companies have been formed in the States for that purpose. The pearl fisheries formerly carried on along the coast of Ecuador about two hundred miles north of Guayaquil, are no longer operated.

On the Atlantic coast of South America the most fruitful pearl-banks lie along the coast of Venezuela and west to Rio Hacha on the Colombian coast. This was the first part of the American mainland sighted by Columbus and the quantities of pearls owned by the natives did much to draw the tide of adventurers which set this way in the sixteenth century.

The oysters are taken from reefs and bars about one mile from shore and about the islands. The principal beds are at El Tirano,

northeast, and Macanao, northwest of the island of Margarita. There are fisheries also at the neighboring Islands of Coche and Cubagua. About four hundred sail-boats of from three to fifteen tons, employing two thousand men, are constantly at work in these fisheries.

A French company purchased a concession about the year 1900 from a Venezuelan to fish in this neighborhood. It was to pay the Venezuelan government 10 per cent. of the profits as royalty and use divers and diving apparatus so as to select the oysters and avoid waste of the immature. Fishing by natives is done mostly by dredging with metal scoops. It is estimated that upwards of \$600,000 worth of pearls are found about the island of Margarita per annum, most of them going to the Paris market.

Exclusive rights have been granted a Venezuelan citizen by the local government lately to exploit the Gulf of Cariaco for pearls and other sea products. The contract is for twentyfive years. Certain advantages are guaranteed by the government which is to receive fifteen per cent. of the net profits of the enterprise.

About forty or fifty years ago several English

companies conducted profitable fisheries in the lower Gulf of Maracaibo and on the coasts of the Goajira territory and Paraguana. They employed Indians as divers. Revolutionary troubles during the last twenty-five years so demoralized the Indians, that the industry was finally broken up. Reports from authoritative sources indicate, that not only could paying fisheries be established here, but that the interior is rich in minerals and precious stones.

Until lately there have been few restrictions upon fishing along the Venezuelan coast beyond a tax of fifty dollars imposed by local authorities upon the buyers and the payment of fifteen bolivars (\$2.90) by each boat for a fishing permit at Margarita.

The oysters of this coast mature rapidly and like those of Ceylon live but six or seven years. They are small and the shells are so thin that they can be crushed between the fingers. They are of the Lingah type and are named by some avicula squamulosa. The nacreous lining is also very thin, but lustrous and beautifully iridescent. The pearls run small and very many of them are quite yellow.

Many fine white pearls are found however, though they incline frequently to a waxy luster and are often marred by chalky spots. Great quantities of baroques, notably beautiful for color and orient, are found. Round pearls with a china-like skin in many colors are also quite common. The average size and quality is not equal to those of the Indian waters, though it is much better than is generally credited, as the traders in this country for some inexplicable reason have an idea that Venezuelan pearls are necessarily poorer than others.

This notion has probably been fostered among American buyers by the Parisian dealers who at present well nigh control the output of these fisheries and naturally fear the diversion to a neighboring market which now pays a heavy toll to Paris on pearls taken from this continent. It is true an unusually large percentage of cracked pearls is found among Venezuelans, and they lose perceptibly in weight after being brought from the fisheries the loss averaging fully one-eighth of one per cent., nevertheless many pearls of the finest quality are taken from

these fisheries. All pearls are subject to slight variations in weight.

It was from the fisheries of Colombia that Philip II. of Spain received the large pearl of 250 carats, about the size and shape of a pigeon's egg, so often mentioned in the chronicles of precious stones.

The management of the pearl fisheries of the Colombia of to-day is in the hands of the central bank of Colombia which is empowered to transact business pertaining to property belonging to the government. This institution holds a public auction and awards the lease of the rights to fish for pearls, coral, etc., on the Colombian coasts of the Atlantic and Pacific oceans, to the most desirable bidder. The lessee must be governed by the rules and regulations laid down by the bank. The lease is for five years and went into effect August 1st, 1906.

New pearl oyster-beds were discovered in 1903 in the Gulf of Campèche near Coatza-coalcos and application was made by a Mexican to the Mexican government for a concession to work them. There are extensive beds, which are constantly fished, along the eastern coast of

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Lower California from its junction with the United States to Cape San Lucas. La Paz is the principal centre of the fisheries. An English syndicate has a concession from the Mexican government which was lately renewed, for fishing about La Paz. Pearls worth \$350,000, among them many fine black pearls, and five thousand tons of shells valued at \$1,250,000, were taken in 1904. This syndicate employs all the modern appliances.

Beds are known and worked from La Paz to and about the island of Loreto on the east coast, and at the island of Tiburon over on the East side of the gulf, and from Mazatlan all along the coast of Mexico proper to the boundary line of Guatemala. These beds were discovered by Cortez in 1536 and were worked spasmodically for two centuries; then for a period they were fished so constantly and thoroughly that the market was over-loaded with pearls and the supply of oysters seriously diminished. Of late years fishing has been again carried on systematically and with sufficient judgment to prevent the immediate destruction of the beds as before.

A pearl oyster-bed ten miles long has lately been located at the Punta de Santa Cristoval. The Mexican season for fishing varies in localities from May to November, or June to December. The day's work of the diver commences at near the ebb tide and ends shortly after the beginning of the flood tide, about three hours in all. Much fishing is done by independent naked native divers, in a manner similar to that of the Hindus and Arabs, but some of the large concessionaires supply their divers with helmets and other modern appliances.

Schooners of various sizes having several boats, carry the fishing parties to the banks and the men live on them through the entire season. The daily catches are delivered to an armed boat which carries the oysters ashore, where they are at once searched for pearls. These when found are immediately sorted and valued, a percentage going to the diver in addition to his wages, if he is a regular employee of the Company.

The oysters are found adhering to rocks by the byssus, generally in bunches, hinge-side down, curved side up and the shells slightly

parted. The diver cuts them loose with a knife and deposits them in his basket or net. One hundred to a hundred and fifty is a good day's work for a naked diver, but with the appliances now being introduced, a diver in dress can raise fully double that number. It should be remembered that there are elements of uncertainty and irregularity in the catch of the meleagrina. As compared with the enormous and crowded beds of the small varieties as they exist in the Gulf of Manaar and at the island of Margarita, Venezuela, where they can be literally scooped up, the scattered bunches of the meleagrina do not afford easy data for reckoning averages.

On the coasts of China, Japan, Korea, some of the South Sea Islands, the English Channel islands, the Canary islands, about St. Malo on the coast of France, at Queen Charlotte's island and along the coast of California from north of San Francisco to the border of Lower California, at the Cape of Good Hope, India, Australia and New Zealand, a shell-fish is taken which has considerable commercial value and yields pearls to a limited extent.

It is called in this country abalone. In the

Channel islands it is known as the ormer. It is the Haliotis or Earshell. The Greeks called it venus earshell and used it as a food, considering it most nutritious. Old English writers praised it as a delicious morsel under the name of ormond saying that it was bigger and infinitely better than the oyster. This shell-fish attaches itself to the rocks by a flat, disk-shaped foot and must be taken when the tide is low. The fisherman can then insert a knife by stealth under the foot and taking the fish unawares, destroy the suction. Otherwise the hold of the fish could not be broken without destroying the shell. New Zealanders call the fish itself the mutton fish.

The Japanese, Chinese and Indians of the Pacific coast have long used it as an article of food. The shells are valuable on account of the very beautiful nacreous lining which is exceptionally good material for buttons and various ornamental purposes. The lining has an exquisite play of colors in the richest tones of peacock greens and reds. There are about seventy species of the Haliotis and the shells vary greatly in size. The British ormer (H.

tuberculata) is of small size, about six inches long and is silvery. The shells are sometimes called in trade aurora shells. After being well beaten to make them tender the animals are used for food.

The ormer or auris marina was esteemed by the ancients as a very sweet and luscious dish. The people of the Channel islands ornament their houses with the shells and farmers use them to frighten the birds from their corn-fields. They string several together and suspend them from the end of a slender pole stuck in the ground. The wind swaying them, makes a constant clatter. The Haliotis iris of New Zealand is green and brilliantly iridescent. A Cape of Good Hope species (H. Mida), under the epidermis is tinged with color, principally orange.

Some of the more beautiful species were formerly very abundant on the coasts of China and Japan, but the constant use of the animal for many years as a food stuff has made them less common there and the Chinese and Japanese now obtain a large part of their supply from California, where the haliotis or abalone, as it

is called is taken in great quantities. The two most beautiful species found on this coast are, the Haliotis splendens, a magnificent shell of rainbow coloring in which peacock green predominates, and H. rufescens, the lining of which is red. When found, the latter is usually thickly incrusted and coated with vegetation. The green and red range from seven to ten inches, the latter being generally the larger.

Another variety, H. cracherodii, very dark green or black without, and with no apparent beauty, has a small opalescent bit inside the shell which is cut out and made into articles of jewelry. This is common in crevices of rocks. A variety called bluebacks has a bright clayey blue exterior. The Indians of the Pacific coast have used these shells as material for jewelry and decoration for centuries, but not until the button-makers of Europe and New York began to utilize them did they become an item of importance among the exports of the Pacific coast.

Few pearls are found in the abalone but they yield a considerable number of large rounded baroques and excrescences, rich and beautiful

in color and of fair luster, also odd-shaped pieces like blisters matched and joined at the edges. The greens have a bronze appearance and the reds and pinks are often iridescent. Quite a number of good "peelers" are found among them. These are pearly formations which can be improved by taking off one or more of the outer skins.

Pearl-fishing, principally by Greeks, has been carried on about the west and south coast of Haiti, but lately the government has granted a concession to four of its citizens covering nine years with the privilege of renewal at the end of that period. This will prohibit all others from fishing unless they rent the privilege from the concessionaires.

To the south of the Philippines, pearl-fisheries were worked by the natives before the arrival of the Spaniards, and the industry is still carried on, chiefly by antiquated methods. The coasts of the Sulu islands, at Jolo and elsewhere and about the island of Mindanao, have yielded many fine pearls and continue to do so. The shells from these waters furnish very fine mother-of-pearl.

All things considered, the largest and best equipped fisheries in the world to-day are those on the coast of Australia. Not as many pearls are found as at Cevlon. The main object of fishing is the shell, which is large, heavy, and furnishes the best quality of mother-of-pearl of the white variety. From Charlotte's Bay on the north-eastern coast, all along the northern coast and around to Exmouth Gulf on the western coast, pearl-oysters are abundant. Farther south at Sharks Bay, the oysters are smaller and the pearls, though of good shape and luster, run yellow. Shells from the coast of Queensland are sold as Sydney shell; those from the northern territory of South Australia, as Port Darwin shell, and from there to Exmouth Gulf on the western coast, they are marketed as West Australian shell.

The fishing is carried on by organized companies having capital, and every modern appliance of practical value is utilized. The divers fish with the dress. The usual method of fishing is for a schooner of eighty to one hundred tons to put out with a number of luggers of from eight to ten tons. Each lugger

is manned by a captain, a cook, one man at the life-line, two men at the air-pumps and one diver. Each lugger will average half a ton of shells per month ranging from 1600 to 2000 to the ton. The pearls like the shells run white.

The Australians are not only pushing this industry along their own coast, but are extending operations along the islands north toward the equator, wherever it is possible. And wherever they go they carry with them the best modern appliances and methods. Lately however operations have been considerably curtailed in the Torres straits owing to the enforcement of laws for the protection of divers.

Lack of men for diving caused some of the operators to use questionable means to obtain a supply. Boats were sent through the South Sea among the islands and aborigines, Chinese, and even European sailors, were kidnapped and held in practical slavery. Many lives have been lost in these fisheries and the evils connected with the industry became so notorious that the government took action. It is probable that the business will be reorganized and either conducted by the state or under government

supervision. Natives are now being trained to use the dress.

Few pearls are found and it not infrequently happens that as many as fifteen to twenty tons of shells are raised without finding a single pearl of value. At this time shells from these fisheries bring from \$500 to \$750 per ton in the New York market. Helmets have been used to some extent throughout the Pacific for a number of years, but many were crude affairs, carelessly managed and the loss of life was as great as by naked-diving. The training of the natives to the use of the more modern appliances will however engender confidence and the probability is that dress-diving will become general in the south seas wherever the industry is organized.

As a rule the largest oysters and pearls, where there is a calcareous foundation for the bed, are taken from the deeper waters, and it is probable that as modern appliances are more generally used by the larger organizations now taking hold of the industry, the fisheries will be extended with good results in many localities to waters beyond the shallows now fished. More syste-

matic methods will prevent waste and the destruction of the beds.

The English Colonial governments of India are doing much in this direction. By keeping experts upon the ground, they have learned how to fish without destroying the beds, and to fish when it is possible for the oysters to contain pearls. Strict supervision and protection of the beds result in more frequent fishings and greater returns to both the government and the fishermen.

This example is being followed, and pearl fisheries are gradually coming either under governmental supervision or into the hands of concessionaires, whose large investment makes the preservation of the beds a business necessity, whether they fish mainly for pearls or shells.

The best pearls and the largest number are found usually in mature shells which are distorted; it has been stated as a possibility, that in the future some of the new rays will be used in fisheries where the pearl is the main object of the fisher, to ascertain if the oyster contains any before destroying it. M. Dubois of Lyons

has experimented with Roentgen rays for that purpose.

As the fish is enormously prolific it is more probable however that effort will be directed instead toward the preservation of the mollusk from the enemies and accidents which are occasionally greater than its productiveness.

One of the greatest dangers in Indian waters to a bed of young oysters is a little mollusk known locally in Ceylon as suran (Modiola). These cluster in masses on the sea bottom and spreading over the surface of the coral, crowd out the delicate young of oysters recently deposited.

The Japanese fisheries suffer from the occasional infection of the waters by a weed, dinoflagellata gonyaulax. It accumulates in immense quantities, causing a wide discoloration of the sea water and is very destructive to an oyster-bed. It is called the red current or red tide. So far no preventive or remedy has been found.

Hitherto the most general and fatal danger to oyster-beds has been the ungoverned extravagance of irresponsible fishers who seek to harvest

in the present regardless of the future, but these are gradually being made amenable to restrictive laws as authorities awake to the value of the industry. A greater danger which threatens the unio of American streams, is the pollution of the water by the discharge of the refuse of factories and the sewage of cities into them. A mussel bed will recover in time when denuded by fishers, but sewage and poison kills it out entirely.

Although fresh-water pearl-bearing mussels are found in the streams of many countries, only in the United States are they taken in sufficient quantities to make the fishings important as an industry. They are to be found throughout the Mississippi drainage area and in part of that of the St. Lawrence. Few exist on the Pacific coast and those of the Atlantic coast are generally inferior as pearl mussels. There are many varieties of the unio which yield pearls. Latin names are given by different writers to distinguish them, but as scientists differ in their classifications, the names are not always uniform and are not sufficiently well established to be useful, descriptively, to the

general reader. In treating of the various kinds of pearl-bearing unios of the United States therefore in these pages, the common names by which they are known will as a rule be used with the scientific names appended, as revised by the department of mollusks of the United States National Museum.

From the times of Roman colonization until now, pearls have been taken from the mussels of British streams. There are three varieties of pearl-bearing mussels in Great Britain: Painter's mussel (U. pictorum), the Swollen River mussel (U. tumidus) and the Pearl mussel (U. margaritifera).

The first two occur only in the streams and ponds of England and Wales and the pearls found in them are of inferior quality. The latter inhabits the streams of Scotland and the northern counties of England and to some extent are found in Ireland and Wales also. The shell is oblong, rather flat and heavy and about five and one-half inches long. The exterior surface is rough, and blackish-brown; the pearly interior has a tint of flesh color mottled by stains of dull green. It was from this variety

the Perthshire Tay pearls were taken, which gained so much notoriety in the middle of the eighteenth century when some fifty thousand dollars worth were sent to London from this stream in three years.

Scotch pearl-fishing was revived in 1860 and some fine ones were sold to Queen Victoria, the Empress of the French, the Duchess of Hamilton and others. Pearl-mussels have been found in Lochs Rannoch, Tay, Lubnaig and Earn, also in the Don, the Leith and other streams. Some are found in the Welsh streams, and the river Bann in Ireland was noted for the fine pearls found in it. Many years ago there was a pearl fishery at Omagh in the north of Ireland. An old writer claims that Cæsar obtained pearls of such bigness in Britain that he tried the weight of them by his hand.

The fishers wade for them in shallow pools, or thrust sticks between the open valves, or drag branches over them, for as soon as anything enters between the two shells they close upon it at once. The mussels are found generally set up in the sand of the river-bed with the open side, if the current is very strong,

turned away from it. The custom of the peasantry is to fish for them in the autumn after harvest.

Pearl-mussels are found also in Saxony, Bavaria, Bohemia, Mesopotamia, Lapland, Canada, Labrador, the Hawaiian Island Oahu, Japan (especially the anodonta japonica), China, the United States and Italy, in the Gwaai and Shangani rivers of Southern Rhodesia, South Africa. Nowhere are they found however in such quantities or in so many varieties as in the United States. The number taken from the streams here of late years has been so great that the shells have largely displaced the marine Egyptian and have affected the demand for the better qualities of South Sea mother-of-pearl. The pearls found in them also have been of such quality and quantity that they now have an important place among the jewels of the world.

Old records and the contents of Indian mounds show that the unio was taken from the rivers by the aborigines for the pearls they sometimes contained; but no wide interest in this possible wealth of the rivers appears to

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have developed among their white successors until the finding in 1857 of a large pearl weighing ninety-three grains at Notch Brook near Paterson, N. J. It was afterwards sold to the Empress Eugénie of France for \$2500. This became noised abroad and immediately multitudes began to search for pearls.

Mussels were gathered and destroyed by the million, few pearls being found. The excitement subsided as the searchers learned how few got adequate reward for their time and labor. They soon began to realize that the finding of a pearl of value is usually preceded by the opening of hundreds or thousands of shells containing none, and that in the aggregate, the shells thrown away were worth more than the few pearls found.

Another pearl hunt developed along the Little Miami River in Ohio from the finding of several fine pearls near Waynesville in 1876. This reached its height in 1878. In 1880, pearls began to come into the New York market from the West and South. Immense beds have been fished in the White, Wabash and Ohio Rivers in Indiana. In the summer of 1889 a number

of fine pearls were found in the southwestern corner of Wisconsin, in Crawford, Grant, Lafayette and Green counties. Not only were they notable for extraordinary luster, but many were of beautiful color. The sale of some at prices which seemed fabulous to the people of that section, when it became generally known, caused such a scramble for them by the natives that the streams were rapidly denuded of mussels, and that section has become of much less importance than others since developed. Prairie du Chien is the center of the Wisconsin market, from which point the shells are distributed to the button factories.

The following year (1890) pearl-bearing mussels were found in several of the central counties of Illinois—McLean, Tazewell and Woodford, in the Mackinaw river and tributaries, but no discovery equalling that of Wisconsin occurred until 1897 when the Arkansas beds were discovered. A peculiarity of this district is that whereas the unio is usually most abundant in swift clear water having a sandy or gravelly bottom, many are found here in the mud.

They have been taken over a wide territory from the rivers and streams of the eastern half of the state, including the Black, White, Cache, St. Francis, Ouachita, Saline and Dorcheat rivers, and in the valley of the Arkansas. Following this were finds in Indian Territory, Missouri, Georgia and Tennessee, the latter being the most prolific. The finest pearls in Tennessee are found in the fluter, or lake shell, which is the same as the mussel known on the Wabash as the washboard. A yellow shell is found in the Clinch River similar to the mucket of Arkansas, from which pearls are taken.

Unlike the pearl oyster, the unio seems to be more prolific of pearls in the shallows and riffles near the edges of the rivers. Most of the fine pearls are found between the pallial line and the lip in the free portion of the mantle. Those found within the pallial line, where the mantle is attached to the shell, are seldom as lustrous or perfect.

Pearls are found in many States besides those mentioned, but the fishing is done quietly and in some cases the sources of supply are known to only a few who in the marketing of their

pearls carefully avoid giving any information. This is particularly true of some of the eastern states. Streams in the Northwestern section of New York State are regularly fished, but without excitement. The large fisheries of the Mississippi and West are fished principally for the mother-of-pearl in the shells. As with some of the marine fisheries, the pearl is regarded as an extra.

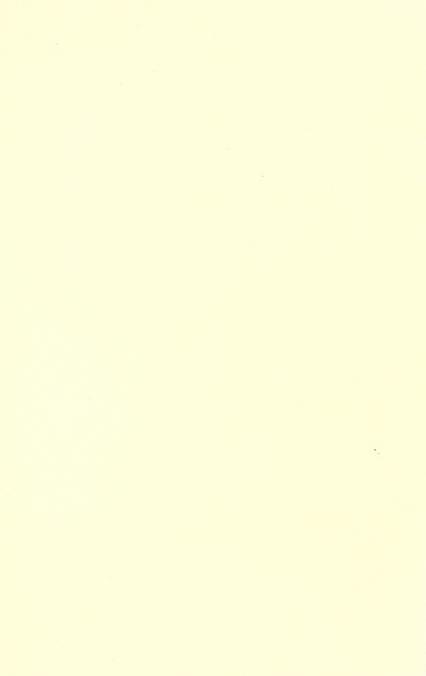
The mussels are taken in various ways. In Canada, boats drag brush and the branches of trees over the river bottoms, gathering the mussels into the boat as the twigs become clogged. In the large beds often found in our Western Rivers, fishing is done wherever possible by dredging. Metal scoops, hand, shoulder and scissor-rakes are used and the mollusks, taken in immense quantities are cooked to open them, then cleaned of the meat which is afterwards examined for pearls. This method is used where the mussels lie in great masses or on sandy bottoms. Where there are boulders or large stones, a great number of hooks are dragged over the beds.

The mussels, partially buried, lie lip-end up

and the shell slightly parted. Should anything come within this gaping aperture, the mussel at once closes upon it, nipping on with such tenacity that the hold is not loosed until the fisher draws it into the boat and forcibly releases the hook. It is said the mollusk's shell would remain thus tightly closed for ten or twelve hours. After dragging the hooks over the bed, the mussels are taken off and the process repeated.

Various rough devices are used, the principle in all being the same. One, illustrative, consists of a piece of lead pipe or an iron bar several feet long, from which depend a number of double or triple hooks several inches apart. This is dropped overboard, the rope on which it is hung is fastened to the stern of the boat, and the boatman rows over the mussel bed dragging it after him. Men who dredge for the mollusks are called clammers. Pearlers are those who at odd times fish for the mussels with pearls as the main object. This class is composed of the backwoods natives who live about the streams in which the mussels are found. They are people who usually follow their inclinations as





nearly as they can, working only as it becomes requisite to obtain the few coarse necessities of their lives. With them also are small farmers who at seasons when farm work is not pressing, seek the excitement and possible profit of the hunt for pearls.

For all such persons the occupation has a great fascination. The difficulties of following the streams through almost impenetrable surroundings, the coarse fare of bacon, meal and coffee; the long tramps back and forth to their mountain huts, or the exposure to night in the tangle of the woods, have no terrors for them; they are but common experiences.

Few pearls of value are found, but the occasional pearl which each one does get, makes expectation tingle, and hope recounts again and again the great finds which others have made. There are curious happenings which illustrate the uncertainties of the work.

It is told on the Clinch river in East Tennessee that a pearler, having patiently fished all day, examining the fish from time to time as little heaps of them were gathered, without finding even a small pearl, finally decided to quit.

He was about to examine his last small heap when a man standing by offered him fifty cents for the lot. The offer was accepted. From the first shell opened, the buyer extracted a ball pearl which was afterwards sold for one thousand dollars. Two of the finest pearls taken one season from the same section were obtained from a heel-splitter, carelessly dug out of the sand by a man wading in the shallows of the river. The heel-splitter is a large thin-shelled variety, so named by the natives because of the sharp, cutting quality of the shell which protrudes from the sand of the river. They rarely contain pearls, but when they do, the pearls are usually fine.

The largest proportion of fine pearls to the yield of any section since discoveries have been recorded, came from Wisconsin, and many of the best of these, especially of the fancy colored ones, were taken from Sugar river. Many of these were exceptionally beautiful in both color and luster and a good proportion of them were also round.

Much is written and told of the marvellous pearls found in our streams worth large sums

of money. Such pearls are found undoubtedly but not in such quantities as one might think from the enthusiastic reports current in daily papers. Finds are written up by reporters who know nothing of pearls and prefer to write a readable story of wondrous gems and great values to a statement of plain unvarnished facts. In this the news-gatherer is assisted by some simple native with an eye single to a good price and a capacity for exaggerated ideas of value impossible to Maiden Lane.

It is no uncommon trick when buyers are present, to find again, a pearl, which has been to New York and back and the ruse often succeeds. Pearls are frequently sold at the fisheries for much more than they would bring in the east. In fact it is difficult to buy ordinary pearls at a reasonable price. The natives will sometimes sell a really fine pearl for less than it is worth because they do not understand the relative values of quality; but they usually over-estimate pieces of poor quality.

A large majority of those found in our freshwater mussels fail in some essential quality. Many are chalky, or lustrous at one or two

points only. Others are faulty in shape, or if spherical, deeply pitted. Really fine pieces are usually small or button, and when large, are baroques. Some of the latter are magnificent. Weighing fifty to over one hundred grains, with skins of extraordinary luster and iridescence; white, or of a beautiful pink tint, these strawberry or rose pearls, as they are called, frequently excel, by every standard of beauty, the imperfect spheres which command a greater price in the market because they are round.

The most common variety of unio in American rivers, especially in the Mississippi river, is that known as the nigger-head (Quadrula ebena). It is also the principal species used for button-making.

Similar is the warty-back (Quadrula pustulosa) so called because the shell has a number of warts or excrescences on the outside of the valves. The "bull-head" (Pleurobena Aesopus) is found in abundance with the nigger-head. It has a blackish-brown exterior, presenting several radiating ridges, and a white lining. The two latter are inferior as material for buttons as the shells are brittle. The mucket

(Lampsilis ligamentinus) is a large shell, average size 4 inches, has a dark brown exterior and cream-white lining. It is too thin and brittle to make first class material for buttons though fine pearls are sometimes found in them.

The sand-shells furnish good material for buttons. They are long, sometimes six inches, and narrow. They are usually found on sandy bottoms and are said to move from the channel toward the shores in the morning and back in the evening. The most abundant is the yellow sand-shell (Lampsilis anodontoides) so called from its bright yellowish brown exterior. Another kind, the black sand-shell (Lampsilis rectus) has a black epidermis. A smaller variety, less abundant now than formerly, is the slough sand-shell (Lampsilis fallaciosus). These are generally found in coves or the mouths of rivulets.

The deer-horn or buckhorn (Tritigonia verrucosa) is a large variety, sometimes attaining a length of nine inches in the Iowa river, though the average in the Mississippi is about five inches. The shell, as the name indicates, has

a rough, warty exterior. The supply is small and uncertain.

Another rare species is the butterfly (Plagiola securis). It is a small, flat, thick shell of fine color, and the valves are butterfly in shape with a reddish-brown epidermis striped by darker radiating lines. It is abundant only in the Illinois and Ohio rivers.

The hatchet-back, hackle-back, or heel-splitter (Symphynota complanata), is a large black mussel having a thin sharp-edged shell, one valve-edge projecting. It yields few pearls though fine specimens are occasionally found in this variety.

The blue-point (Quadrula undulata) has a large, thick shell, with ridges on the exterior, curving round the umbones and extending to the edge. Like the black-edge meleagrina, the nacre at the edge is discolored. In this case by a bluish or purplish tint.

Some idea of the enormous quantities of mussels contained in some of these beds in our western rivers may be gained from the reports of the fisheries in the first years of their discovery. Ten thousand tons of shells were

taken in three years near New Boston, Ill., from one bed. Reckoned by the usual average this would mean not less than 100,000,000 shells. In some beds, the mussels have been found several feet deep, the bottom layers being dead.

Notwithstanding the enormous numbers, these beds are often completely exhausted in a few seasons. When the beds are first discovered, men will take as much as 1500 to 2000 pounds of shell each, in a day's fishing. In one hundred pounds of shells as they are taken, the average number of valves or half shells will be, nigger-heads, about one thousand; sand-shells, nine hundred; muckets, eight hundred, which would be an average of nine thousand mussels per ton.

The meat in a ton of nigger-heads weighs over three hundred pounds. This is usually removed by the fishermen by boiling the mussels for ten or fifteen minutes in crude sheet iron tanks when the shells open and the fleshy part falls out or may be easily removed by hand. To show how little the pearls they may contain enter into the calculations of these

fishermen, it may be stated here that the shellbuyers pay about twenty-five per cent. less for the mussels as taken from the river than they do for the shells when cleaned.

On the Californian coast when the divers worked independently, they preferred to sell the oysters unopened. They received about \$4.50 per thousand on an average for the shells and double for the oysters complete.

The fishing season for pearlers is from August to December. The large operations for shell, in the early days of the industry, were confined to the same period, but of late, fishing is carried on throughout the year, immense quantities being taken through the ice. The shells are better in cold weather, being less brittle than when exposed in the boats during warm weather. Fishing through the ice is very wasteful however, as the undersized, which are dropped back from the scoops and rakes in the summer, when thrown out on the ice are allowed to remain there and die.

The price of shells varies considerably from season to season. An average price for niggerheads is about ten dollars per ton; sand-shells

bring about twice as much, muckets half that price, and the other varieties together will average about twenty-five per cent. more than nigger-heads, though among these the deerhorn is worth about four times as much as the nigger-head.

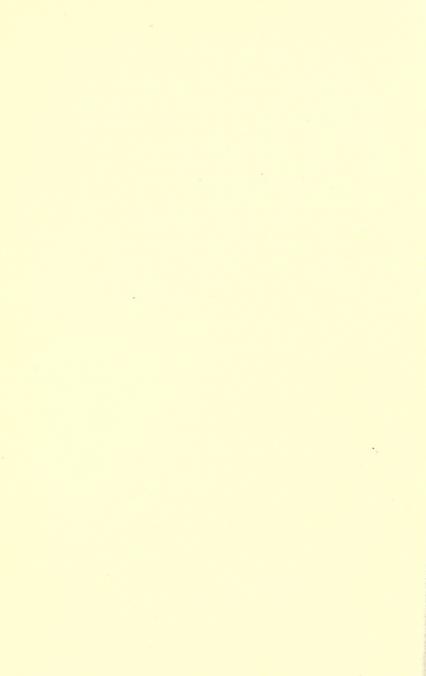
In the first six months of 1898 nearly four thousand tons of mussel shells were sold by mussel fishermen on the Mississippi. They brought about thirty-nine thousand dollars, 94 per cent. of these were nigger-heads.

The spawning time of the unio varies with different species. In the central Mississippi basin it is normally February, March and April for nigger-head, and summer and early fall for the mucket and sand-shell.

The unio is a slow growing animal. Under normal conditions it takes ten years for a nigger-head to reach a size of three inches; fifteen to eighteen years to attain a shell diameter of 4½ inches. This corresponds very closely with the life of the meleagrina, though the shell of the latter ceases to grow in size at about eight or ten years. After that it continues to lay on thickness up to eighteen or twenty years.

Although the discoveries so far in Africa are unimportant, it is possible, now that the unio is known to exist there, that the streams of that wonderful land of precious things may add a companion gem to the vast natural hoards there of the diamond. In two years succeeding his first find, the discoverer secured one hundred and fifty pearls at an average of one pearl to eight hundred shells.

Authorities tell us that the nucleus of a mussel-pearl is usually the larva of a distoma. Nuclei of pearls vary according to the circumstances surrounding the beds of the shell-fish and those circumstances have much to do with the occurrence of the pearl.



Value, except in things which are constant and constantly changing hands, is a matter of opinion. Price is the expression of that opinion in money terms. Except in a few staple sizes and qualities, pearls are affected by so many details which determine their value that it is difficult to formulate rules to correspond and establish a base by which all may be judged.

Shape, size, color, luster, and perfection, afford a multiplicity of combinations sufficient to puzzle the judgment of the most expert, and when to this is added the fact that there is no other one like the piece to be valued so as to gauge opinion, there remains but one finality, the agreement between buyer and seller on a price.

Disregarding the fluctuations of price occasioned by temporary influences and the variations arising from local causes, this chapter is intended to give information of the price of

pearls in the United States to retail dealers, and an idea of the relative value of different qualities and shapes.

First it should be remembered that the price of pearls is reckoned by the square of the weight, with the pearl-grain, \(\frac{1}{4}\) carat, as the unit. Given the price at \$3.00 per grain base or multiple, a half grain pearl would be half of \$3.00 or \$1.50 per grain flat, or seventy-five cents for the pearl. At the same price a one grain pearl would be at \$3.00 per grain multiple, \$3.00 per grain flat and \$3.00 for the pearl. Upon the same basis a two grain pearl would be twice three are six, \$6.00 per grain flat and twice six are twelve, \$12.00 for the pearl. Or it may be stated thus: multiply the grain number by itself and the product by the base price, as a 6 gr. pearl at \$3.00 base, 6 x 6=36 x 3=108 dollars, the price of the pearl. This rule applies to all but rejections or those too poor for classification, and extraordinary pieces which by their extreme rarity pass beyond the governance of rules. The sign used in quoting a multiple price is a square. placed after a price quoted means that it is

the multiple price per grain, not the flat grain price.

The price of pearls has increased even more than that of diamonds in the last fifteen years. In common with many other things it has risen with the rapid increase of wealth and the tremendous additions to the world's stock of the standard or measure of values,—gold. Beyond this, the demand for pearls, owing to the adoption of them as a fashion in the United States where a large proportion of the world's wealth is being created, has been stimulated to such a degree that the price of them has advanced in a greater ratio to the depreciation of gold and other forms of wealth than most commodities.

Twenty years ago good round Indian pearls up to five grains could be bought for \$1.50 base; to-day such pearls would cost \$4.50 base and whereas in those days pieces of extraordinary luster were allowed to remain in the parcels and were sold at the same rate with the others, they are now culled from the lots and held for extraordinary prices. Size also now counts beyond the multiple of the square. The quality

held at \$4.50 base up to five grains costs \$6.00 above that size, and at ten grains will bring \$8.00 and over.

The yield of fine white pearls in sizes over ten grains is not large and as there has been and is a steady demand for large pearls for the centres of necklaces, sizes from ten to fifteen grains bring from eight to eleven dollars multiple when matched. Egg and pear-shaped pearls of the same grade, from five grains down, are worth twenty-five to thirty per cent. less than round pearls; between five and ten grains ten to fifteen per cent. less, and as they near fifteen grains and over the pear-shape become of equal value with the round.

Imperfections which can be hidden by the setting decrease the price twenty to thirty per cent., and there is about the same difference between button and round pearls, according to the size of the plane. The difference is still greater in the larger sizes. A yellow color reduces the value in the market from fifteen to fifty per cent. according to the depth and quality of the tint. The so-called blue pearls, which are of a dark leaden white, are worth

about half as much as ordinary white, and about one-third the price of fine white Indians. These blue pearls must not be confounded with the deep gray, slate, or black pearls, included in the general term black pearls, as the latter frequently command fancy prices.

Salt-water pearls taken from the smaller varieties of the avicula of some seas, though of the same grade in the qualities of color, luster and shape, are nevertheless worth less than Indian pearls, because they lack a certain quality of texture which the latter, together with those of some other waters, possess to an eminent degree.

American fresh-water pearls have been and are lower in price than Orientals. They have however commanded much better prices of late than formerly and are increasing in value. At present they bring about one-third less than corresponding qualities from the seas. There is a greater difference in the price of baroques. Fine Venezuelan baroques from a half to seven or eight grains are worth now thirty-five to fifty cents base.

Some of these when mounted appear like

round or pear-shape pearls and are in good demand. Larger pieces can rarely be made to appear other than baroque and do not therefore command as good figures. They seldom bring more than five dollars per grain flat, in sizes from ten to twenty grains. Fresh-water pearls likewise fetch better prices reckoned by the multiple in the smaller sizes, though they are usually quoted by the grain flat at five to twenty-five cents under ten grains, and twenty-five cents to three dollars per grain in larger sizes.

Iridescent, finely tinted, very lustrous, strawberry, and rose baroques of large size, are worth five dollars per grain and very exceptional pieces bring even more. Slugs, or ordinary baroques, are sold all the way from six dollars an ounce to ten cents per grain. Good wingpearls can be bought at one to five cents per grain; small wings and rejections are sold by the ounce.

Perfectly round fresh-water pearls of good quality and even skin are rare and prices are advancing steadily. Good buttons have advanced fully twenty-five per cent. in the last

year. Fine fancies such as were found at one time in the Sugar River, Wisconsin, since the fisheries there have been exhausted, are scarce and high.

The low prices paid by button manufacturers for mussel shells for the mother-of-pearl in them during the past year, has been one of the chief factors in reducing the quantity of pearls found and the consequent increase of price. It seldom pays the fisher to gather mussels for pearls only; it is the steady returns from the sale of the shells which ensures an adequate reward for his labors. Shells that once brought twenty dollars per ton fell during the early part of 1905 to a third of that amount and later went as low as two dollars and a half. They are now going up again.

Many pearls are seriously injured by the practice of fishers who rely upon the sale of the shells for their returns, of throwing the mussels into vats of hot water to open them. The pearls released from the shells fall to the bottom and getting too near the hot iron are killed, which means that the luster is partially or wholly destroyed.

Dredging is now quite common and is doing much to deplete the mussel-beds of the west. When one bed is completely divested of shells, the clammer moves on to another and repeats the process, so that the supply of fresh-water pearls is coming to depend on the constant discovery of new mussel-beds. Unless legislation regulates the industry the American supply will soon cease.

The cheapest fresh-water pearls in the market to-day are the finest. The pearlers along the streams of the west and south will no longer part with the pearls they find to the speculators at the old time prices. In fact they generally want much more than they are worth and often get more than the speculator can afford to pay to ensure a profit when he comes to sell them in the business centres.

But these fishers know little of the merits and value of the finer qualities. They do not yet realize the great difference in value which accrues as the pearl exceeds the average of luster, color, or perfection, consequently the speculator can often buy a very fine pearl for little more than he would have to pay for an



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ordinary pearl and though he knows that the piece is worth much more than he has paid, and tries to get as nearly what it is worth as he can, both his judgment and disposition to sell are affected by the low price he has paid and the chances are that he too in turn will sell it at much less than its relative value as compared with the ordinary market price of poor or medium quality goods.

This condition will gradually change. As in the past the fisher learned more and more of the market value of ordinary pearls, so also he will learn to know the price of exceptional pieces and to know them when he has them. Even now, speculators hold fine large pearls at high prices because of the ready sale for them in Europe.

It is difficult to compare the price of pearls in ancient times with that of to-day. We make much finer and closer assortments and gradations of quality and the business now is on a more distinctly commercial basis. People generally are better informed and more critical; they are not influenced by wonder, sentiment, superstition and the "Arabian Nights" atmosphere, as much as formerly.

The Orient is not as strange and far away as it was. In the old times, jewellers could and undoubtedly did take advantage of the awe with which things from the mysterious East were regarded, and of the general ignorance, to obtain large sums for very ordinary if not inferior gems. Even in these days, many are influenced more by the source from whence they come than by a critical knowledge of the gems they buy. Some, who would not buy the most beautiful fresh-water pearl, will pay an exorbitant price for one poorer and less valuable because it is oriental. La Pellegrina in the hands of an obscure dealer would be passed unnoticed by many who would be enraptured by a more ordinary gem from a jeweller or person of renown.

It is presumable therefore that prejudice was more influential when ignorance prevailed to a greater extent than now. John Spruce of Edinburgh in 1705 complained that he could not sell a necklace or pendant of fine Scotch pearls in Scotland. He says "the generality seek for oriental pearls because farther fetched," and continues: "At this very day I can show

some of our own Scots pearls as fine, more hard and transparent than any oriental. It is true that the oriental can be easier matched, because they are all of a yellow water, yet foreigners covet Scots pearls."

The price in those days was regulated by general appearance and loosely with regard to weight, rather than by definite assortment and the exact system of reckoning by the multiple of the weight as now, for he says, "If a Scotch pearl be of a fine transparent color and perfectly round and of any great bigness, it may be worth 15 to 50 rix dollars, yea I have given 100 rix dollars (about \$82.00 U. S.) for one."

In 1862, Scotch pearls sold for about seventy-five cents to ten or twelve dollars each, an extraordinary piece bringing occasionally as much as twenty-five dollars, but after they were brought to the favorable notice of persons of distinction and it was known that Queen Victoria had bought one for one hundred and ten dollars, the price of them quadrupled. In the time of Charles II. of England an Irish pearl weighing 144 grains was valued at two hundred

dollars. In London during the early part of the nineteenth century, pearls from Panama of good size and quality brought about four dollars per grain.

About 1865, fine oriental pearls were sold in London for \$1.25 to \$1.50 per grain in sizes up to three grains. Over that the price increased gradually with the size so that five grainers were worth about \$2.50 per grain; ten grainers, \$5.50 per grain; twenty grainers \$13.00 per grain and thirty grainers about \$17.00 per grain. If their fine grade equalled ours, there has been a remarkable advance in the last forty years, as fine oriental round pearls of thirty grains to-day, are worth in the United States \$240.00 per grain flat.

Up to this time and after, prices were quoted very generally by the carat. Later, the method of reckoning by the square or multiple became more general, and the price went to about two dollars per carat, in London, or fifty cents per grain base for ordinary sizes, the larger ones being valued by the piece according to the individual rarity and particular qualities, as before. At the Navigator's islands in 1858,

fine round pearls of one to two grains were valued at about fifty cents per grain, the price increasing until those of twenty grains were considered worth twenty dollars per grain. Second class pearls under one grain, averaging half a grain, were sold for about five cents a grain. The same grade about nine grains average, were worth about sixty-five cents per grain.

A third and fourth grade brought about twenty-five and fifty per cent. less respectively. These prices, compared with those of London, indicate that fine, large, round pearls commanded better prices then in the East than they did in Europe. Seed pearls sold at Tahiti for ten to fifteen dollars per pound. The island of Labuan, a British possession in the East Indian archipelago, shipped pearls to Singapore in the sixties at an average price of ten to fifteen cents per grain. In 1871, 35 ounces of pearls shipped from Guayaquil were valued at \$100.00 per ounce.

As in former times, at many places where the fishing is done by independent naked divers, especially among the remote islands of the

South Sea, there is no grading of pearls or definite ideas of value. The natives dispose of their pearls, as they are able, to traders, often for a very small price. It is so to-day at many points in the Sulu archipelago from Mindanao to the Tawi Tawi islands. The smaller established fisheries of the seas east of China assort roughly and sell in bulk to buyers from neighboring trading centers.

The output of the large fisheries is practically controlled by the great merchants of neighboring cities who know the methods and intricacies peculiar to the localities. For instance, the pearls of Ceylon go to Madras, and Bombay handles the bulk of those from the Arabian coast and the Red Sea. Lower California pearls are marketed chiefly at La Paz. Those from Venezuela are shipped principally to Paris and definite figures cannot be obtained. A few are brought to the United States direct from Venezuela, chiefly by Syrians who barter for them with the independent divers. These traders have no knowledge of market rates for assorted goods but sell them in mixed lots for as much as they can get.

The price of pearls of the first grade, in Ceylon in 1904, weighing four grains and upwards each, was about \$5.00 per grain. At Macassar, prices for the irregular shaped pearls of the Dutch Indies ranged from twenty-five cents to \$1.25 per grain base according to quality.

At the Ceylon fisheries, two-thirds of the oysters taken have been the government's share. These were auctioned off daily. The prices varied considerably, not only from fishing to fishing, but daily during the season. If the oysters sold one day, yielded well, prices went up and vice versa. In 1860, at the beginning of the Tinnevelly fishery, they realized Rs 15. (\$7.50) per thousand and rose later to Rs 40. (\$20.00). In 1861 on the contrary they sold in the early part of the season for \$35.00 to \$40.00 and fell to \$20.00, at one time touching \$8.50.

In 1871, the Tuticorin catch brought a little over \$40.00 per thousand average. The average price paid in 1858 at the Ceylon fisheries was a little less than ten dollars, and as the pearl yield was good, the speculators made

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enormous profits. In consequence, the average of 1859 went up to \$22.50, the oysters bringing at one time during the season as much as \$42.00; 1860 realized an average of \$66.00, the highest price paid during the season being \$90.00.

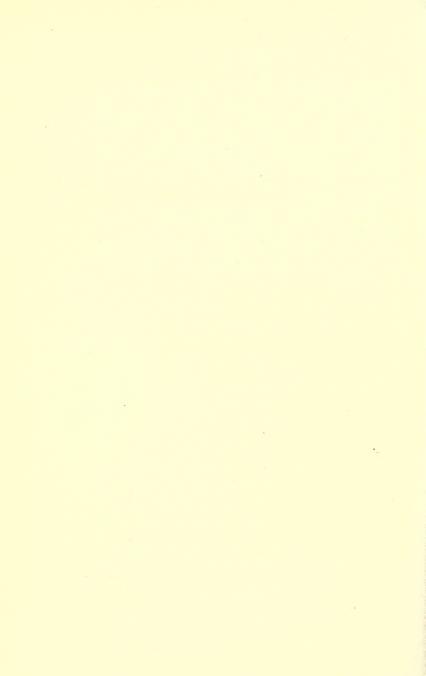
The fishery of 1863 though it realized more for the government on account of the large catch, brought an average of \$33.50 per thousand only. In 1874 the oysters brought about \$40.00 per thousand: Of late years the average has been less, ranging from \$12.00 to \$14.00 though at times double that price has been paid.

The pearls found in the oysters came quickly into the hands of Hindu merchants who assorted them and shipped a large part to Europe at prices much less than those which rule in the United States, though they usually made a good profit over cost. With the leasing of the Ceylon fisheries much of this speculative business will undoubtedly be eliminated and the pearls marketed at more regular prices.

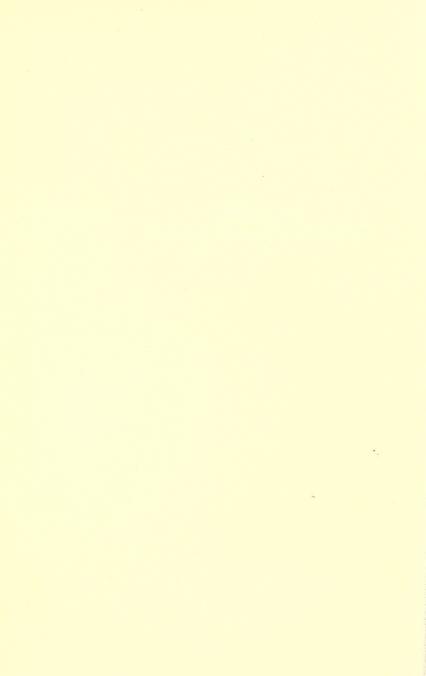
At fisheries where mother-of-pearl is the chief factor of the industry, it is difficult to get

statistics of the number or value of the pearls found, but in a general way India governs the market. Prices in other sections adjust themselves to Madras and Bombay with such modifications as quality and place would naturally make.

Mother-of-pearl shell varies in price from \$250.00 to \$500.00 per ton for Mexican to \$700.00 to \$800.00 per ton for the white shell of Australia and the South Sea.



IMITATION AND DOCTORED PEARLS



IMITATION AND DOCTORED PEARLS

In common with all other precious things, pearls have been long imitated. The early method of making imitation or "mock-pearls" as they were called, was to cut them out of the mother-of-pearl and polish them. Another crude way was to make solid beads of glass containing various ingredients which gave them a slight similarity to the nacreous luster of the pearl. Beads of gypsum or alabaster were soaked in oil and coated with wax. The scales of the bleak fish dissolved in liquid ammonia or vinegar, was also used for covering beads, the solution imparting a somewhat pearly appearance.

To coat one thousand ounces of glass beads, a French manufacturer used three ounces of fish-scales, one ounce white wax, one ounce pulverized alabaster and half an ounce fine parchment glue. Another made beads of opal glass which he covered with several layers of

isinglass; over this was laid another coating of a mixture of spirits of turpentine and copal, and a fat oil to exclude moisture from the isinglass, following it with a thin layer of tinted enamel to give resemblance to the orient of the pearl.

Some claimed that the best artificial pearls were made from pulverized pearls. Seed pearls or valueless baroques were ground to a fine powder, soaked in lemon-juice or vinegar and mixed with gum tragacanth. The paste after being shaped and partially dried, was then enclosed in a loaf and baked in an oven. The luster was obtained by a final coating of fish-scale solution. A lighter and better imitation was made by blowing hollow glass beads. The inside surface was covered with a preparation from the fish-scales, after which the bead was filled with wax. This method continues in use to-day.

The fish-scale solution used is a guanine, the mucus which lubricates the scales of the bleak fish (alburnus lucidus). The white scales of the fish are carefully scraped into a horse-hair sieve over a shallow tub of fresh water. The

IMITATIONS AND DOCTORED

first water is thrown away. The scales are then washed and pressed. The mucus sinks to the bottom and is gathered as an oily mass, very brilliant and bluish-white. This is packed with ammonia in tin boxes and sealed for shipment. It takes about 20,000 fish to make one pound of the mucus.

A cheap imitation pearl is made of opal glass, a bluish-white milky appearing material, to which a pearly effect is given by treating it with fluoric acid. Imitation black pearls are made from hematite, but as they require careful finishing to hide the metallic luster and are much heavier than pearls, they are seldom used.

The Chinese and Japanese have been much more ingenious in their methods and have long produced, with enforced aid from the animal, imitations which are in part real pearl. The former insert in the Chinese pearl-mussel (anodonta herculea) small figures of Buddha upon which the fish proceeds to deposit its nacre. When they are coated, which occurs in from one to two or three years, the pearly figures are extracted and sold to the devout.

The Japanese do more. They attempt to

produce a marketable gem and have so far succeeded that a considerable number have been sold of late in the United States and in many cases the public buy them not knowing that they are an artificial production. The base upon which the nacre is deposited appears to be composed of a substance resembling porcelain shaped like a low dome hollowed out on the under side and having a hole in the centre of the cavity.

As there is no nacre on the under side, it must, when the button is placed in the mussel, be thereby protected from the action of the fish except at the edges where the nacreous deposit probably joins it to the shell but in such a manner that it can be easily detached. The pearl covered button is then fitted to a piece of polished mother-of-pearl of the same exterior size and shape and the two are neatly joined, forming a double low domed piece of pearl on one side, and mother-of-pearl on the other. These Japanese pearls as they are called, when mounted in a setting constructed to hide the under side, have the appearance of imperfect spheres of natural pearl.

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The beds where the culture of these artificial pearls is carried on, are situated in the Bay of Ago, a few miles south of the Temple of Ise, in central Japan on the Pacific side. It is a quiet piece of water, in a coast broken by numerous inlets and coves. A little north of the centre of the bay is a small island called Tadoko where the necessary buildings and the men connected with the industry are. Around the island and near it, about 1,000 acres of sea bottom are leased and used for the pearl oyster cultivation. The water is about five to seven fathoms deep.

The oyster used is the one common to the waters of Japan, the Avicula martensii Dunker. In May and June, stones weighing six to eight pounds are scattered over the bottom of the sheltered shallows which run up into the land, where the spat is collected. The breeding season is in July to August and in the latter month very tiny shells attached to the stones by the byssus may be seen already.

The number increases as the season advances until in November, in order to protect the young fish from the approaching winter cold,

the stones lying in very shallow water are removed with the adhering oysters to deeper water—over six feet. After three years the oysters are taken out and the nuclei of the culture pearl inserted. This done, they are spread over the sea bottom, about one to every square foot and left undisturbed for four years. They are then taken out and opened and both the culture pearls and whatever natural pearls there may be, are harvested. At present, upwards of a quarter of a million oysters are treated annually.

Experiments are being made constantly, in the United States and Europe, to improve upon the hollow glass bead lined with fish-scale but so far without success. The finest of these imitate the natural pearl very well and if finely mounted similar to the genuine, will deceive many while worn. Closer observation will reveal the glassy shine of the surface and it will be found under the loup to contain numerous small holes. The specific gravity is also less.

One finds occasionally in lots, a mock-pearl which has been cut and polished from the

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mother-of-pearl, but imitations of this character are scarce and find no place in the market. The few made are found usually in parcels of freshwater pearls and are put there by unscrupulous dealers, as also are hematite balls and even buckshot, to be sold with the lot by weight as genuine pearls.

Since the price of pearls has advanced so rapidly, much ingenuity has been shown in the improvement of poor pearls. Button pearls grown to the shell are broken out and the under or flat side carefully scraped and smoothed to hide the irregular lines of juncture between the pearl and the shell. Protuberances on the surface of round pearls are scraped off and the broken skin edges smoothed down so as to be unnoticeable to the naked eye.

In a like manner chalky rings and spots are toned down. Surface cracks are filled by soaking the pearls in a solution and if the pearl has been pierced, interior cracks can also be rendered unobservable. A serious objection to pierced pearls arises from the ease with which interior defects can be doctored where the skin is pierced and a boring made through the

nacreous layers. Not only are cracks made to disappear, but coloring matter can be introduced between the skins. A white pearl of very poor color can by such means be changed temporarily into a black pearl which will command a fancy price. This illegitimate doctoring of pearls, whereby defects are hidden and a fictitious appearance of quality imparted to last long enough to make sales at exorbitant prices, should not be confounded with the legitimate improvement of pearls which is now growing to be an industry of some importance. Experts are now able by careful manipulation to restore to some extent the luster which has been lost by wear or age.

Formerly this was done by skinning the pearl, *i.e.*, removing the outer skin by peeling it carefully off with the edge of a sharp knife, an unsatisfactory method at best, as the under skin may not be good and if all the outer skin is not taken off, the broken edges of the layers composing the skin, mar the luster and color when the pearl is worn. Few also succeed in removing a skin without scratching the new one disclosed by its removal.

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Pearls having a decidedly bad outer skin with a good one under it, can only be materially improved by removing the bad skin, but owing to the liability of finding equally bad imperfections underneath, or irregularities which would necessitate the removal of several skins with a consequent loss of size and weight, pearls with minor imperfections or lack of luster are now slowly rubbed between the fingers, the abrasion being assisted by various substances which differ with the judgment and experience of the operator, the preparation being in all cases kept secret by the expert using it. Many fine pearls which have lost their pristine luster are now considerably improved by this method, and without the dangers involved and the necessary loss of weight, consequent on peeling.

Large numbers of poor or imperfect pearls are scraped or otherwise doctored by the traders and speculators at the fisheries. These men acquire such pearls at a slight cost, and by various methods fix them so that by mixing them in lots with good pearls, they often make large profits. They also mix in many cracked pearls. This is done more often at Margarita

and the other Venezuelan fisheries where the proportion of cracked pearls is greater than in the Indian and South Sea fisheries.

The skins of a pearl may also be removed by the application of weak acids, but this method requires careful and expert handling or the acid will act irregularly and leave the surface, if improved in luster, uneven and pitted.

Few important fresh-water baroques and irregular pearls leave the west without receiving the attention of the speculators through whose hands they pass, and the scraping is often very roughly done. Rough and discolored projections are broken or filed off and then scraped over with a knife edge. While fresh, the broken skin edges left thus will often pass unnoticed by a careless buyer, but they become discolored and dead later. Unless one buys of a dealer in whom implicit confidence may be placed, not alone for honesty but for his knowledge of pearls, it is better to examine all pearls under a glass before purchasing.

As many persons both in the trade and out of it, are not sufficiently familiar with pearls to be quite sure of their ability to detect the

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genuine from fine imitations, the following points of difference will be of service. All imitation pearls made of some solid material are heavier than the genuine and lack the pearly characteristics of the fine imitations even. If made of solid glass without acid finish, they are shiny and too poor to require a second consideration, if acid finished they have a "groundglass" appearance which is unmistakable. If made of other material of a vitreous nature, they are heavier than pearls, dull in luster or without luster, dark in color and unmistakably lacking in pearly characteristics. The only dangerous imitations are the Japan culture pearls and the hollow, glass bead-pearls. The former may always be recognized by the motherof-pearl back, the latter by various signs.

All these hollow glass beads, have one or two holes. They are coated on the inside with fish-scale solution and filled with wax. Some are treated with acid or sand-blasted to tone down the shiny, glassy appearing surface, and to hide the blow-holes in the glass. The effect is quite pearly, but the color is somewhat darker and they show some iridescence. Without the

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surface treatment they are more shiny and under the loup one will discover the small blow-holes peculiar to surfaces which have been molten.

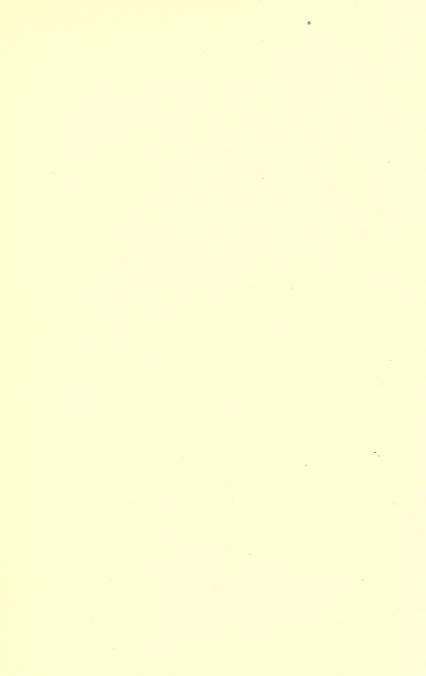
The rims of the holes have a smooth, rounded, congealed appearance, whereas holes in pearls have a rough, square, chalky edge. On looking diagonally into the hole of a glass bead, the glass will appear as a dark ring against the wax filling, and where there are two holes, one will almost invariably have a ring in the glass, a short distance from and around it. The surface over the ring is smooth, though it looks as if it were ridged; the ring is in the glass, not on it.

These hollow-blown glass pearls are lighter than the real pearls also. There is one never failing test however which discovers even the best of these most dangerous imitations. Drop a small spot of ink from the point of a pen upon one, and hold it between the eye and the light, when two spots will appear, the one nearest to the eye being a reflection from the inner wall of the glass resting against the wax, of the actual ink spot on the surface. The duplicate spot will be lighter in color than the original.

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On a real pearl there would be no such reflection, nor would it appear on a solid bead imitation, but as before stated, the weight of the latter betrays them, as they are heavier than the real, nor do they look as pearly, and on holding them between the eye and light they do not show the translucency at the edge of the circumference peculiar in a more or less degree, to the gem.





In ancient days there was a belief in the east that at the full of the moon the pearl-oyster rose to the surface of the sea and opened its shell to receive the falling dew-drops. These congealing, hardened into pearls. Similarly, the natives of India believed that Buddha in certain months showered upon the earth, dewdrops from heaven, which the oyster, floating on the waters to breathe, received and held until they hardened and became pearls. These poetical imaginations of the Orientals were carried west with the pearls. Poets embodied them in verse. Prose writers, losing the poetry of the fable, trimmed them to the bare statements of impossible facts. An English writer early in the eighteenth century speaking of the mussels in the streams of northern England said that "gaping eagerly and sucking in their dewy streams they did conceive and bring forth a great plenty of pearls."

Later writers also attributed the origin of

pearls to the reception of raindrops from heaven by the oyster, and one gravely asserted that the fishermen always found more pearls after a season of heavy rains. He did not state that the oysters rose to the surface of the sea to receive the raindrops, neither did he explain how these drops from heaven passed through the brine to the oyster inviolate. Pliny was more definite; he stated that the quality of the pearls varied with that of the dew from which they were formed and were clear or turbid as it was. The pearl would be pale-colored if the weather was cloudy when the dew fell into the shell, and large if the dew was plentiful. Thunder during the reception of the drop resulted in a hollow pearl and if lightning caused the shell to close suddenly the pearl would be small.

The people of Java and Borneo had a belief which should have been yet more difficult to acquire. They asserted that the pearls themselves breed and increase in number if placed in cotton. Clusters of twinned pearls were said to be produced thus, and it is related that some had the audacity to sell breeding pearls claim-

ing to distinguish the male from the female. This fable also travelled west and was received by the credulous. M. S. Lovell in his "Edible Mollusks" says, "A Spanish lady informed a friend of mine that if seed pearls were shut up in cotton-wool they would increase either in size or in number."

To this day the ancient superstition, or belief, is believed not only by sea-board Malays, but by Europeans, and there are those who claim to own breeding pearls and to have bred from them. The pearls are placed in a box with a layer of cotton-seed and a few grains of rice, under and over them. The box is then closed and in a year, if one account given is a fair statement of average results, one may look for a four-fold increase, though the children will not be as large as the parents. Some of them may be as large as a pin head. The rice will look crumbly and worm-eaten.

Another breeder of pearls says that the breeding pearls themselves grow in size and if the box has been kept undisturbed, there will be found with them at the end of the year others of various sizes, some almost microscopic.

A year later these would be larger. It is also said that when a pearl is about to breed, a small black speck makes its appearance on the surface, and that during the period of breeding the pearl changes its shape from a sphere to an irregular ovoid, and develops layers of scales on the surface visible to the naked eye.

After a time, the breeding pearls change their orient to a dirty white, the scales having peeled off. In all cases the rice looks as though some beetle had taken a circular bite out of the end of each kernel. Somehow a perusal of the accounts of the remarkable results, leaves the reader with a conglomerate impression of transformed rice and imagination.

Nevertheless, the breeding of pearls in cotton-wool or cotton-seed with rice, is asserted and believed, and the methods by which the wonder is accomplished may be had with great circumstance and some variations from those who have experimented. No greater evidence exists of the child-like faith of people in the old times than the incredible stories about precious stones which were current in those days.

It is equally wonderful that although it took

centuries to disprove them, they received credence for more centuries after they were shown to be impossible and one hears those same delightful fairy stories about angel's tears, drops of dew from heaven, raindrops, etc., seriously quoted in this matter-of-fact land to-day, often by people who after a moment's thought would become conscious of their fallacy.

But romance abhors reason, and though oysters cannot rise to the surface of the sea, nor raindrops pass immaculate through the ocean to the gaping mollusks, nor the downpour of one season increase the yield at once of things which are the growth of years, there will long remain some who will refuse the dictum of the biologist, that unless the dews of heaven and the tears of angels carry much lime in solution, the calcareous surroundings of the oyster's bed must have more to do with the genesis of the pearl than anything dropped into the ocean by the clouds above it, and will still cling to fancy in the face of fact. Meantime the priests of Buddha exact charity oysters from the fishers of their faith, that the god thus propitiated may cause the oysters to yield more pearls.

A question often raised, and which by its periodical revival seems to be a favorite with newspapers and magazines, as well as, to the general public, is, "Do pearls live and die?" It originated probably in observations of certain changes that occasionally take place in pearls which could be readily construed by a speculative or imaginative mind to mean death. Sometimes with pearls the brilliancy of youth fades and passes and the clear skin of early days takes on the hue of age.

If now a ready pen waited on fancy to state the facts it would establish an imaginative theory for centuries, for like gossip, a thing once printed in a book will long pass on unquestioned and be quoted or re-stated many times. There are pearls which for certain qualities invite as a descriptive term the word live. There are others which by comparison appear, and are described, as dead. Then there are others that lose by untoward circumstances the live qualities they once possessed and without dying become dead pearls. The calcite carbonate crystals of which they are formed dissolve in acids and are affected to a certain

extent by the acidity of the excretions of the human skin, sufficiently in some cases to destroy, or at any rate dim, their luster.

Gases in the atmosphere, sudden changes in temperature, heat, and various other influences operate more or less in the same direction. The chemical changes thus produced might with poetic license be called the death of the pearl and in a sense the term would be true were the whole pearl involved, but as a rule these misfortunes affect the outer skin of the pearl only, so if that dies death is but skin deep, a live pearl remaining beneath it.

As life and death means the segregation of particles into a compact individuality and their final dissolution, pearls like all other things in the restless economy of nature live and die, but the loss of some of its native charms by the gem is not more a sign of death than the rougher cuticle of a weather beaten sailor with which exposure has replaced the smooth skin of the boy.

Nevertheless the idea of death coming to the pearl fascinates and enterprising writers succeed in frequently placing very interesting and readable articles before the public which incite

the wonderment of the reader and perpetuate the impression that this beloved gem is some sort of a living creature subject to human vicissitudes. Lately a story appeared in current publications which told how the pearls of a lady's necklace sickened and lost their beauty. Much distressed she carried them to the expert dealer of whom she bought them who gravely advised her to let her maid wear them whereupon, they recovered from the illness and their lustrous beauty was restored.

Twentieth century versions of fables older than this era are common; shrewd traders and writers use them, nor are they always careful to attach the fable to the particular gem to which, by right of ancient usage, it belongs. The magical loss of color in the presence of impending danger to its wearer is the ruby's prerogative, but, though pearls may lose their charms by exposure to heat, gas and rough usage, the wily orientals of remote or later ages provided no traditional recovery more wonderful than the prosaic method of feeding them to fowls and cutting them out of the gizzard an hour or two later.

The pearl is generally considered to be the emblem of innocence and purity. A pretty fashion in vogue among parents who can afford it, is of giving a pearl to each of their daughters on their birthdays. These are carefully matched and strung so that the string grows to a necklace for maturer years.

Along with the emblematic idea and the fanciful notion of their origin, there comes to us from the old days a superstition concerning pearls which probably grew out of the statement that they were the congealed tears of heaven. It was supposed that they brought tears to their possessors. The idea originated probably about a thousand years ago in western Europe. It did not exist in Rome during the time of the Cæsars for the pearl was then the sign of power and affluence and was coveted by men and women alike and it remains a most popular gem in Italy to-day.

This absurdity has been kept alive by stories of prominent persons in whose experience occurrences seemed to confirm the claim. The Queen of Henry IV. of France dreamt that her diamonds were turned to pearls the night

previous to her husband's assassination by Ravaillac. The consort of James IV. of Scotland dreamt of pearls three nights in succession before the disastrous battle of Flodden Field in which he lost his life. These and similar stories which appeal to a love of the mysterious and wonderful have been perpetuated by writers of books, so that even to-day there are women who coveting pearls still fear to own them.

But to be out of the fashion is more dreadful to women than tears, so it has come to pass that with the increasing vogue of the pearl, less is heard of the superstition and it is dying, not of age or the contempt of knowledge, but by the potency of fashion.

A story already referred to in these pages, that has been current for over two thousand years during which time it has been mentioned by almost every writer about pearls, deserves, for its antiquity and absurdity, consideration here. It is of Cleopatra and the pearl worth upwards of three hundred thousand dollars she is said to have dissolved in wine to drink in costly fashion to her lover. This was, of course, impossible. She may, with the help of the wine

have swallowed it like a pill or, as Sir Thomas Gresham did later, have ground it to powder and mixed it with the wine she drank, but to dissolve a pearl of great size as one of this value would be, was a conjurer's feat.

The lime of which a pearl is chiefly composed will dissolve in acid, but the gem although softened, would remain a pulpy mass held by the organic matter interwoven throughout the strata of calcium carbonate. Whatever she really did, or in what form she swallowed the pearl, if she did so, Cleopatra and her pearl are better known to-day to the general public than either of her Roman lovers, and they will probably be handed down through many generations yet to come.

To exaggerate is a common tendency. Dealers usually place inordinately high figures on exceptional gems which they do for several reasons: the great price excites wonder and interest; it makes a large profit possible; it permits considerable reduction to a shrewd buyer; and it pleases the person who finally purchases it, for if the sale is made public the first asking price is usually given as the value

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of the jewel, and sometimes even that is exceeded. The buyer prefers to have it so because it increases the importance of his possession in the public mind and paves the way for a good price if he too at any time should wish to sell.

One reads constantly in the daily papers of sales where the prices given are enormously beyond the sums actually paid, for the public like big figures. Reporters know this and do not fail to supply the demand. For instance: in an eastern city of the United States, a man while at a lunch counter found a pearl in the oyster he was eating. He took it at once to a jeweller of his aquaintance who handed it to a New York pearl-dealer present and asked him to value it.

The pearl was large and round but, like all such formations in the edible oyster, quite devoid of the nacre which constitutes a true pearl. The dealer so informed them, adding casually, "If it were a true pearl it would be worth several thousand dollars." An evening paper that day had a half column story about it with, "A pearl worth five thousand dollars found in an oyster at a lunch-counter," in

black head-lines, and the morning papers of the following day enlarged the story by adding fanciful details.

Undoubtedly in the old days of license when immense fortunes were made not only in trade but by piratical wars, large prices were paid by fortune's favorites for pearls but it is extremely probable that report, bruited from mouth to mouth, exaggerated even more than the printed fables of our times do. It is doubtful if the pearls of ancient chronicles were as fine, judged by the standards of to-day, as we imagine or that all of them were as large as reported. The public were more ignorant about them than now and also more credulous and these invite exaggeration.

Very large pearls which for perfection of shape, luster and freedom from flaws are beyond criticism, are the most rare of all gems. The conditions under which a pearl grows, makes large size, without the development of irregularities in the form and imperfections in the skin, almost impossible; and as they all grow in the same way, by the same process, out of the same sources of supply and subject to the same

limitations, we find big and little, fine and ordinary, in about the same proportions as they occurred thousands of years ago; the fish that made them then makes them now, in the same kind of a narrow workshop and within the bounds of a life whose duration has not changed.

Of very ancient historic pearls, the only one of which we have reliable and expert knowledge, is that of the Shah of Persia seen by Tavernier. This and La Peregrina are supposed to be still in existence. Of the very large pearls generally mentioned by writers, three undoubtedly exist, viz., La Pellegrina, the Beresford Hope and one of medium quality in the Austrian Crown weighing about twelve hundred grains.

It is probable that very many pearls have been found, which if generally known would have become celebrated, but of those chronicled, most have passed out of public knowledge. It is probable that some of those about which much has been written were not as beautiful as others which have escaped notoriety. The writer's habit of drawing upon the past to illustrate a subject, has narrowed the literature

of pearls to reiterated records of a few great pearls which one by one have been brought to public notice during the past centuries.

Exact and reliable statements about gems are a modern innovation. In the old times unverified report was the only evidence the general public had of them. Crown jewellers, not always quite reliable, would make public some statements in general terms about the jewels of a reigning house. Occasionally, as in the case of France, the state had the crown jewels inventoried so that some fairly definite knowledge could be had of them. Infrequently a traveller published his observations, made under more or less favorable circumstances. of the jewels of some oriental prince. Chief of these was Tavernier, the French jeweller. He not only had expert knowledge of gems but was able by recommendations of the French court, to gain such access to the jewels of eastern princes and dealers that he could make critical examinations of them

For various reasons it is extremely difficult also in these days to obtain accurate knowledge of extraordinary gems. Dealers for business

reasons are chary of information, nor will they make such pieces common by allowing many to see and handle them. The buyer is equally averse to publicity, so that exact knowledge does not pass far beyond the dealer and his customer as a rule.

The finest pearl known is that in the Museum of Zosima, in Moscow, called La Pellegrina. It is perfectly round and so lustrous that it appears to be transparent. It weighs about 112 grains and was bought of the captain of an East India ship at Leghorn.

The largest known pearl to-day is in the Beresford Hope collection shown at the South Kensington Museum, London. It is two inches long and its circumference is four and a half inches. It weighs three ounces (1818 grains).

Tavernier saw a pearl in 1663 belonging to the Shah of Persia which was valued at 3200 tomans or about \$320,000 of our money. It was very perfect, pear-shaped, and nearly three inches long. It is believed to have come from the ancient fishery at Catifa in Arabia. Even this great sum was exceeded by Pliny in his estimate of the pearl Cleopatra is said to have

swallowed. He placed the value of that at \$375,000. As the Shah's pearl was about three inches long, Cleopatra's must have been large enough to reflect on the story connected with it.

It is said Julius Cæsar presented a pearl valued at an equivalent of nearly \$250,000 to Servilla the sister of Cato of Utica and mother of Marcus Junius Brutus. The pearl taken from the ear-drop of Caecilia Metella by Clodius to dissolve and drink in vinegar was valued at \$40,000.

A large pear-shaped pearl weighing one thousand grains was found at the island of Margarita off the Colombian coast and given to Philip II. of Spain. Some reports say it was obtained in 1579; others give the date as 1560 and say it was presented to the monarch by Don Diego de Temes. It was valued then at something over \$30,000, but Freco, the king's jeweller, said it might be worth twice to twenty times as much for such a gem was priceless. It was later known among the crown jewels as La Peregrina. Prior to this, a companion of Magellan reported having seen two pearls as

large as hen's eggs in the possession of the Rajah of Borneo.

The pearl which Sir Thomas Gresham drank in his wine to Elizabeth of England is said to have been worth seventy-five thousand dollars. It was reported some years ago that the Queen of the Gambiers owned a pearl of extraordinary luster, as large as a pigeon's egg. There is a story that in 1779 a pearl weighing 2312 grains which cost in India \$22,500, was offered for sale in St. Petersburg. It was called the sleeping lion because of its shape and must have been therefore a baroque.

The republic of Venice presented a pearl to Soliman The Magnificent, Sultan of Turkey, which was valued at \$80,000, and Pope Leo X. bought one of a Venetian jeweller for \$70,000. These sums make the prices of to-day seem insignificant and it is very probable that many of the pearls which brought such large amounts would not pass criticism now. Perhaps one reason for the scarcity of large pearls among those taken from the fisheries in this age is that many of them are classed as baroques or are not sufficiently fine and perfect to attract

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attention. They pass therefore among those considered unworthy of notice.

A brown pearl valued at \$25,000 was exhibited by Marchisini of Florence at the Maritime International Exhibition at Naples in 1871. Among the Dudley pearls exhibited at the London Exhibition of 1872 was a necklace of exceptionally fine pearls valued at \$150,000. The late Czar of Russia spent twenty-five years in collecting sufficient perfect Virgin pearls to form a necklace for his wife. The Countess Henckel owns a necklace of pearls which for value and associations is unrivalled. It is composed of three strands, each at one time being a separate and historical necklace. One was the famous necklace belonging to the Empress Eugénie which has been valued at £20,000; one known as "the necklace of the Virgin of Atokha," formerly owned by a member of the Spanish nobility, the third belonged to the ex-Queen of Naples. For value this is exceeded by a single strand necklace of large pearls lately bought by a western millionaire of the United States. It is composed of thirty-seven pearls ranging from

eighteen to fifty-two and three-quarter grains each, the latter being the largest central pearl. The combined weight of the pearls is 979³/₄ grains and the value is given at \$400,000.

A very beautiful and nearly perfect pear-shaped pearl was found on the north-east coast of Australia in the seventies. It weighed 159 grains. There is a pearl about the size of a pigeon's egg in the French crown jewels, valued at \$8,000. Many fine pearls, especially black or colored, have been found on the Mexican coast during the last twenty-five years, among them a black pearl of 162 grains and another of 108 grains, a white pear shape weighing 176 grains, an oval of 128 grains, and three weighing 300 grains, 180 grains and 372 grains respectively, the first two being found in the same year.

In the World's Fair in Paris, 1889, seven black pearls from this district, valued at \$22,000 were exhibited. These and others are described in "Gems and Precious Stones" by Kunz. No fresh-water pearl has attained an equal notoriety with the Queen pearl found at Notch Brook near Paterson, New Jersey, in 1857. It

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weighed 93 grains and was sold to the Empress Eugénie.

Another round pearl of 400 grains, ruined by boiling, had it been properly extracted from the mussel, would probably have been the finest and most notable pearl of this age, though another as large as a pigeon's egg, dropped from the mollusk and lost when the shell was opened, might have rivalled it. The finder was wading in a stream in Ohio, feeling for the projecting edges of the mussels with his feet, and opening them as he brought them to the surface, as was custom there. This, however, may have been like the fish that got away.





In all countries where woman has been enthroned in the respect as well as the affections of man, the pearl has been inseparably connected with her in his mind as a peculiarly fitting accompaniment to feminine loveliness. In the romantic dreams of youth, which hide betimes the harsh realism of life under a golden haze of imagery; where belted knights and fair ladies live and move unfettered, and all the impossible delights of sweet desire free from untoward consequences are reasonable; where invincible swords have no thought of the horrors of carnage, and unimpeded love is without cold calculation or following of sorrow, pearls everywhere shimmer.

And when in his exalted moods man paints the shadow picture of the goddess of his life, he finds one gem alone befitting with which to deck her, namely, the pearl. This has come to pass probably because the ideal qualities of woman and the sea gem are alike, purity and

modesty. The beauty of the most lustrous pearl is unobtrusive and its quality is virginal. In our visions of the spectral past, the shades of the consorts of the mighty all wear them.

Pearls hang pendent from the ears of Egypt's voluptuous queens, and Rome's proud matrons. Pearls clasp the dainty flesh of Moslem houris and rest in the soft folds of draperies that cling about those daughters of the Orient, the common mortals of their day might not look upon. Great pearls hang festooned and pendent round the necks of lightly draped Dianas of the warm south lands, and coiled about the brown arms of the daughters of the chiefs in far-off islands of the South Seas.

Upon reclining figures in the ancient palaces of Persia and Arab tents: wherever the proud women of the conquering occident move in stately measure across the high terraces of noble placement: in all dreams of fair women and brave men, are swords and pearls. And this is so because in all the ages, women of high position have loved pearls and writers have told it. In our old world so far, neither earth nor sea has yielded ought else so fit

to lie in the bosom of woman, or to symbolize her character and beauty, as the chaste and dainty pearl.

This high atmosphere of precious supremacy and reverence, which surrounds the gem now as it has for more than twenty centuries, is a legacy of Rome. The east loved pearls as beautiful and precious trinkets; while Rome gave to them imperial honors and drew around them the mystic circle of patrician favor. And since that day, in every land where an aristocracy existed or came into existence, pearls have been the familiars of the exclusive.

This natural fitness of the gem for refined associations is recognized by Emerson in his "Friendship." He says:

Thou foolish Hafiz! Say! do churls Know the worth of Oman's pearls? Give the gem which dims the moon To the noblest, or to none.

It is a late echo of the scriptural saying, "Cast not your pearls before swine." No modern poet shows more knowledge of the nature, or a more just appreciation of the delicate beauty of the gem than Emerson. In his "May Day,"

22

speaking of the tardiness of the spring, he writes: "Slow grows the palm, too slow the pearl."

Evidently he knew of the slow process by which the successive coats of filmy nacre increase the size of the growing gem. Likewise a couplet in "Nature" betrays the poet's observation of the iridescent nature of the colors in mother-of-pearl, and in the gem occasionally when those fleeting tints are added to the beauty of its luster; the lines are a dainty illustration:

Illusions like the tints of pearl, Or changing colors of the sky.

Some of the great poets, notably Tennyson, apparently confuse the gem with its mother-of-pearl, or refer to the latter only when they speak of pearl. In his "Recollections of the Arabian Nights," however, Tennyson in describing one of his beauties evidently refers to the gem:

And a brow of pearl Tressed with redolent ebony.

Writing of the mermaid, the lines are more suggestive of the shell nacre:

Combing her hair Under the sea, In a golden curl With a comb of pearl.

Again in a sonnet, he evidently refers to motherof-pearl when he says:

All night through archways of the bridgèd pearl, And portals of pure silver, walks the moon.

This indiscriminate use of the gem's name to appropriate its pearly characteristics is a common poetic license. In Ben Jonson's "Hymn to Diana," he bids her,

Lay thy bow of pearl apart.

Sometimes metaphor is worse mixed, as when Milton in "Paradise Lost" describes the waters above the firmament about the gate of Heaven thus:

And underneath a bright sea flowed Of jasper, or of liquid pearl.

In this poem of gorgeous description, the author makes several allusions to the gem and some of them, especially those in his word paintings of scenes in Eden, are poetically beautiful and true. One delightful to the eye of the mind,

How from that sapphire fount the crispèd brooks Rolling on orient pearls and sands of gold,

and another in the description of morning in

Eden, equally beautiful though it takes more license:

Now Morn, her rosy steps in th' eastern clime Advancing, sow'd the earth with orient pearl.

In his "Epitaph on the Marchioness of Winchester," a couplet shows that he was familiar with the superstition of sorrow connected with them:

And those pearls of dew she wears, Proove to be presaging tears.

Herrick also associated pearls and tears though more happily as in "Corinna's Maying."

Besides, the childhood of the day has kept, Against you come, some orient pearls unwept.

The same poet makes charming reference to pearls in his poem entitled: "To Daffodils."

Or as the pearls of morning dew Ne'er to be found again.

Shakespeare made frequent reference to the gem, sometimes to illustrate the magnificence of wealth and station but more frequently in connection with dew and tears. Oberon says:

And that same dew, which some time on the buds Was wont to swell like round and orient pearls.

King Richard III. when he argues with Queen Elizabeth for her daughter's hand in marriage, promises with smooth and brazen villany to so offset the wrongs he had done her, that:

The liquid drops of tears that you have shed Shall come again, transformed to orient pearls.

In "King John" Elinor speaking to Constance of Arthur, says, "Draw those heaven moving pearls from his poor eyes;" and in "King Lear," one of the gentlemen, speaking of the Queen of France when she received the news he carried, describes her mood thus:

Those happy smilets, That played on her ripe lip, seemed not to know What guests were in her eyes, which parted thence, As pearls from diamonds dropp'd.

In "Midsummer Night's Dream," Lysander says to Helen:

To-morrow night, when Phœbe doth behold Her silver visage in the wat'ry glass, Decking with liquid pearl the bladed grass.

Among his recognitions of pearls as a sign of the luxury of wealth and high position, he makes a lord say, in the "Taming of the Shrew,"

Or wilt thou ride? Thy horses shall be trapp'd Their harness studded all with gold and pearl.

And in "King Henry V," the King while deploring the sorrows incident to kingship, says:

'Tis not

The intertissued robe of gold and pearl That beats upon the high shore of this world.

These two quotations indicate that the Roman custom of decorating robes and even the harness of horses with pearls was followed in Shake-speare's day by the nobles.

A line suggestive of the high-esteem in which the pearl was held in his day, and often quoted, occurs in Othello's grand but heart-broken selfdenunciation just before he stabs himself:

> Of one, whose hand Like the base Indian, threw a pearl away, Richer than all his tribe.

It is evident also that stories were current then of the western Indian's ignorant prodigality in the disposition of things common to him but very precious among more enlightened people.

In "King Richard III," Duke Clarence sees in his dream of drowning, "Wedges of gold, great anchors, heaps of pearl."

Several times the great dramatist puts the gem in somewhat grewsome setting. In "A Sea Dirge" however, the bare horror of the

idea which grins at one in similar connections, is transformed by the poetry in which it is draped:

These are pearls that were his eyes:
Nothing of him that doth fade,
But doth suffer a sea-change
Into something rich and strange.

A favorite use of the sea-gem by the lighter poets is to adorn their images of physical beauty. In "Don Juan," Byron, describing one of the Turk's houris in the harem, says:

Was slumbering with soft breath, And lips apart, which show'd the pearls beneath,

and another poet writes similarly:

Those cherries fairly do enclose Of orient pearls a double row.

Shelley confines his references to pearls almost entirely to descriptions of Nature dew-bedecked, as in the "Revolt of Islam,"

I sate with Cythna; drooping briony, pearled With dew from the mild streamlet's shattered wave,

and another in "Prometheus Unbound" where the chorus of spirits sing:

> Nor aught save where some cloud of dew, Hangs each a pearl in the pale flowers Of the green laurel blown anew.

In "Arethusa" he uses them to enhance the idea of regal magnificence in these lines:

Where the Ocean Powers Sit on their pearled thrones.

The poets rarely refer to the gem as a symbol of spiritual attributes though it is peculiarly adapted by its natural qualities to illustrate purity, innocence, and other qualities of the human soul: nor is it often connected with religious ideas. Among the few, Andrew Marvell in his "Song of the Emigrants in Burmuda," avails himself of it somewhat prosaically thus,

He cast (of which we rather boast) The Gospel's pearl upon our coast.

One of the most poetically beautiful references ever made to the Ocean's modest jewel occurs in the "The Rosary" by Robert Cameron Rogers.

The hours I spend with thee, dear heart,
Are as a string of pearls to me;
I count them over every one apart,
My rosary.

Each hour a pearl, each pearl a prayer,
To still a heart in absence wrung;
I tell each bead unto the end, and there
A cross is hung.

No poet has made more frequent allusion to pearls than Thomas Moore. His poems give evidence that he had read much of them in ancient writings and was alive to their poetic value. In his description of Ireland in "Fairest! Put on Awhile," the lines—

Lakes, where the pearl lies hid, And caves, where the gem is sleeping,

were founded on the statements of Nennius, a British writer of the IXth century, concerning Irish pearls. In passing, it is worthy of notice that Nennius recorded also that the princes of Ireland hung them behind their ears; a fashion similar to that of Persian and Athenian youth many centuries earlier. From Cardanus, Moore learned of the ancient fable that pearls were improved by leaving them awhile with doves, and utilizes the fancy in "A Dream of Antiquity" thus:

As pearls, we're told, that fondling doves Have played with, wear a smoother whiteness.

An early reference to the gem is found in his "Odes of Anacreon" No. XXII:

Or even those envious pearls that show So faintly round that neck of snow——

If this ode was really written by Anacreon, that poet must have been more familiar with pearls than some later Grecian writers. A similar idea quite as beautifully expressed occurs in "The Loves of the Angels."

Then too the pearl from out its shell
Unsightly, in the sunless sea,
(As 'twere a spirit, forced to dwell
In form unlovely) was set free,
And round the neck of woman threw
A light it lent and borrowed too.

Unlike most of the poets, Moore does not describe the sparkling dew-drop as pearly and his references to tears of pearls include the idea of metamorphosis, as in "The Light of the Haram."

And precious their tears as that rain from the sky, Which turns into pearls as it falls in the sea.

These lines embody the ancient Hindu superstition which is also apparent in his 'Lines to——:"

Put off the fatal zone you wear,
The shining pearls around it
Are tears, that fell from Virtue there,
The hour when Love unbound it.

In his adoration of female beauty, he often holds the lustrous gem as a foil to the exceeding

charms of woman, or to lift her to higher esteem by holding her, for preciousness, above the gem. Beyond all other things most lovely, only woman was lovelier yet. In "To weave a Garland for the Rose," he writes:

Where is the pearl whose orient lustre Would not, beside thee, look less bright?

And in one of the "Odes to Nea," he expresses the jealous regard of love thus:

If I were yonder conch of gold
And thou the pearl within it placed,
I would not let an eye behold
The sacred gem my arms embraced.

Of the threads in which the woof of "The Genius of Harmony" is woven, there is one that sings thus to the passing of the shuttle:

To the small rill, that weeps along Murmuring o'er beds of pearl.

Betraying as he did so frequently in his poems, such a high regard for the pearl, it is somewhat curious that the gem was used descriptively in connection with himself. N. P. Willis, describing Thomas Moore as he met him at Lady Blessington's said of him, "His forehead shines with the lustre and smooth polish of a pearl."

Schiller takes the gem from the warm touch of human sentiment and builds it into a grand conception, poetical but untrue to Nature. In common with other poets, he credits the pearl with a play of color seldom found even to a limited degree though it does occur in the mother-of-pearl. In "Parables and Riddles," he describes the rainbow thus:

A bridge of pearls its fabric weaves, A gray sea arching proudly over.

In "The Celebrated Woman" he alludes twice to pearls; once when the husband, bemoaning the passage of his choice vintages down the throats of unappreciative celebrities, realizes that the only reward from his spouse for his endurance of it is, "sour looks—deep sighs." Because he has no stomach for her notables and their wit, she regrets—

That such a pearl should fall to swine-

Later on the husband refers satirically to the meeting of "learned Dons and folks of fashion" at their resorts, where he says:

All sorts of Fame sit cheek-by-jowl, Pearls in that string—the Table d'Hote.

Few later writers have set the pearl in as wide

a range of ideas or in language as beautiful as Edmund Spenser. The tears of Stella in "The Mourning Muse of Thestylis" are more precious and gem-like than those in any lines which have followed until now. In these lines they are priceless jewels royally set.

And from those two bright starres to him sometime so deere,

Her heart sent drops of pearle, which fell in foyson downe Twixt lilly and the rose.

As a means to wake imagination to the physical charms of woman his use of the gem is equally happy and graceful, for there is always a soul in the flesh of his beauty as when he depicts the charms of a fair one in one of his "Sonnets."

But fairest she, when so she doth display The gate with pearles and rubyes richly dight; Throgh which her words so wise do make their way To bear the message of her gentle spright.

In another place he expresses the worship of his love in this fashion:

For loe, my love doth in her selfe containe All this worlds riches that may farre be found; If Pearles, her teeth be Pearles, both pure and round.

Several of his poems show the fashion of pearls in his day as for instance where he

describes the Scarlet Lady in "The Faerie Queene" as—

A goodly Lady clad in scarlet red, Purfled with gold and pearle of rich assay.

and Hymen in "Epithalamion"—

Her long loose yellow locks lyke golden wyre, Sprinckled with perle.

There is a passing breath of spice-laden gales and the wonder magic of ships in far-off seas, carrying to perils and adventure men seeking the treasures of strange lands, while he tells in Virgil's Gnat of the shepherd's content:

Ne ought the whelky pearles esteemeth hee, Which are from Indian seas brought far away.

Poets are reminded not only of the teeth and neck of beauty by the luster of the pearl but of the forehead also. Whittier like Tennyson gives to woman a brow of pearl. In "Memories" the girl has—

Eyes glad with smiles, and brow of pearl,

and in "Stanzas," he places the beauty of flesh above that of the dainty jewel thus:

O'er a forehead more pure than the Parian stone—Shaming the light of those Orient pearls
Which bind o'er its whiteness thy soft wreathing curls.

Similarly Heinrich Heine in Longfellow's translation of "The Sea hath its Pearls" says:

And fairer than pearls and stars Flashes and beams my love.

Probably in no poem is the pearl referred to so frequently or with so wide significance as in Whittier's "The Vaudois Teacher." The missionary in his guise of peddler having obtained an audience with the fair chatelaine, while extolling his wares, says:

And my pearls are pure as thy own fair neck, with whose radiant light they vie.

Naturally, this wisdom of the serpent with which his innocence was garnished brought favorable response:

And the lady smiled on the worn old man through the dark and clustering curls,
Which veiled her brow as she bent to view his silks and glittering pearls.

After she had bought of his trinkets, the old teacher carefully introduces the covered object of his visit.

Oh, lady fair, I have yet a gem which a purer lustre flings, Than the diamond flash of the jewelled crown on the lofty brow of Kings.

A wonderful pearl of exceeding price, whose virtue shall not decay.

This statement at once arouses a keen interest, for in those days great gems came from unexpected sources and by unlikely hands and coming seldom, excited desire to an extent unknown in these abundant times. Glancing at the mirrored pearls in her own hair the lady says:

Bring forth thy pearl of exceeding worth, thou traveller gray and old—

And name the price of thy precious gem, and my page shall count thy gold.

Here is the golden opportunity of the zealot. From its place of concealment beneath the tempting wares in his pack he takes a shabby little book and gives it to her saying:

Here, lady fair, is the pearl of price, may it proove as such to thee,

Nay—keep thy gold—I ask it not; for the Word of God is free!

Nor does the religious mind of Whittier fail to remember the gates of pearl, for in "Ego" he speaks of

The pearl gates of the Better Land.

Carlyle makes reference to the gem in a line greater in conception and more poetic than most of those which occur in the rhymes of the

poets—"She died in beauty, like a pearl dropped from some diadem."

In Ruffini's "Dr. Antonio," man and woman are set in marriage as a foil and complement of each other though the metaphor shows some misunderstanding of the qualities of gems, for black diamonds are not as fiery as others. The lines are:

The fiery black diamond casting lustre over the Oriental pearl: the Oriental pearl in return lending softness to the black diamond.

Dryden does not forget pearls when he caparisons the royal mighty and in "Palamon and Arcite" fitly thus describes Emetrius, King of Inde:

His surcoat o'er his arms was cloth of Thrace, Adorned with pearls all orient, round and great.

It is remarkable that so many poets have seen in the pearl a simile for raindrops and dew. Among them, Browning in the song from "Pippa Passes," sees—

The hill-side's dew-pearled.

At its best, the pearl is not luminous, neither does it flash nor sparkle: the quality of it is softly lustrous as of light that smolders; but

transferring by imagery the mist-white texture of dew when it is spread over leaf and grass blade, to the transparent dew-drop, poets see in the sparkling globule, which in the sun is of diamantine brilliancy, a simile of the pearl.

In "By the Fireside" however, Browning creates a rain of pearls, a truer figure than pearly rain-drops:

Break the rosary in a pearly rain, And gather what we let fall.

The metaphors of Lowell are more true to the nature of the pearl and its characteristics than those of many poets. One, seldom used though most appropriate, occurs in "The First Snow Fall."

And the poorest twig on the elm-tree Was ridged inch deep with pearl.

Another instance of combined truth and poetry may be found in "An Invitation":

A cloud Byzantium newly born, With flickering spires and dome of pearl.

And in "Pictures from Appledore" the same poet in the embodiment of a delightful idea in words says of the moon:

Rather to call it the canoe Hollowed out of a single pearl.

In these illustrations, imagination is true to nature on either hand, for the beady ridges of the half melted or frozen snow on the tree twigs, the soft luster of a white cloud dome and the pale round moon, alike are characterized by beauties which are pearly. In his more involved metaphor the same nice avoidance of incongruity is noticeable. Though raindrops are not pearly, the white fringe of a shore-driven wave is, which he notes in "Sea-Weed":

For the same wave that rims the Carib shore With momentary brede of pearl and gold.

There is a hint of Cleopatra and Sir Thomas Gresham in his lines "To H. W. L."

Let them drink molten pearls nor dream the cost;

and in the lines from "Memoria Positum" there is an understanding of the processes by which the gem grows:

> This death hath far choicer ends Than slowly to impearl in hearts of friends;

and in the poetic fancy in "A Familiar Epistle to a Friend"—

Old sorrows crystallized into pearls.

Nor does he omit the time-honored custom of poets to place the gem among the chief jewels

of the great and in the mouth of beauty, for in "The Singing Leaves" he makes the King's eldest daughter ask of her royal father when he journeys:

O, bring me pearls and diamonds great, and in "A Fable for Critics" he says:

Your goddess of freedom, a tight, buxom girl, With lips like a cherry and teeth like a pearl.

Bryant does not often allude to pearls, but in two instances, both in "The Flood of Years," they appear in beautiful setting. In the first:

A beam like that of moonlight turns the spray To glistening pearls.

Later on, describing the ocean of the past, he sees—

Dim glimmerings of lost jewels, far within The sleeping waters, diamond, sardonyx, Ruby and topaz, pearl and chrysolite.

The general use of pearls in the barbaric splendor of the great in the days of Rome and Egypt and Persia, appears in Tasso's "Jerusalem Delivered." In the wizard's dwelling:

Nor failed there urns of crystal, pearl, and gold, and,

High on the Soldan's helm, in scales of pearl A rampant dragon grinn'd malignant things; and also,

The Pastors of the flocks Have on their sacerdotal albs, which pass In front divided o'er their golden frocks, Clasp'd with aigraffes of pearl.

In the review of the oriental hordes, Armida's car is thus described,

Her car, that glorious as Aurora's roll'd, With rubies, pearls, and hyacinths glisten'd clear.

Among those who passed the Egyptian prince, were:

The Islanders with fleecy curls, Whose homes are compassed by th' Arabian waves; By whom those shells which breed the Persian pearls Are dived and fish'd for, in their green sea caves.

The name of the gem is used in rare fashion in picturing the enchanted wood through which Rinaldo wanders:

Impearl'd with manna was each fresh leaf nigh.

And twice does the sweat of the human face become pearly in the poet's imagination: once when Armida watches Rinaldo sleeping:

> The living heat-dews that impearl'd his face, She with her veil wiped tenderly away.

In the second instance, speaking of Armida, the poet says:

She dies

Of the sweet passion, and the heat that pearls, Yet more her ardent aspect beautifies.

Thomson sees pearls only in the dew-impearled earth, and one must admit, after looking upon the liquid globules hanging in rows from the spreading twigs of trees before the morning sun has found them in their shaded quarters, that the pendent spheres are suggestive, and that the poet's eye needs but little assistance from imagination to see in them the soft round gems of the ocean.

In all ages, prose and fiction have treated of pearls as a form of exceeding preciousness and a chief evidence of high station and barbaric splendor. The lute of poetry has held few additional strings. Modern writers have added little to the imaginations of the ancients. All the changes made by successive poets have been rung on the tears, dew-drops, and beauty's teeth, handed down from long ago.

The wide ranges of the pearl's modest worth, exalted purity, and singular beauty, yet remain to illustrate the thoughts of future genius. Imagination has not yet brooded often over the humble and distorted creatures, whose gnarled and twisted forms, lying among their myriad shapely brethren are evidence of a precious

sacrifice of self to leave a heritage of beauty; nor dreamed of the silent acres under turbulent waters where the gem, one day to adorn the neck of beauty or the diadem of royalty, is reared. What play for imagination lies between the birth of this creation of one of the humblest of Earth's creatures, and the high placement to which it rises as soon as it is discovered.

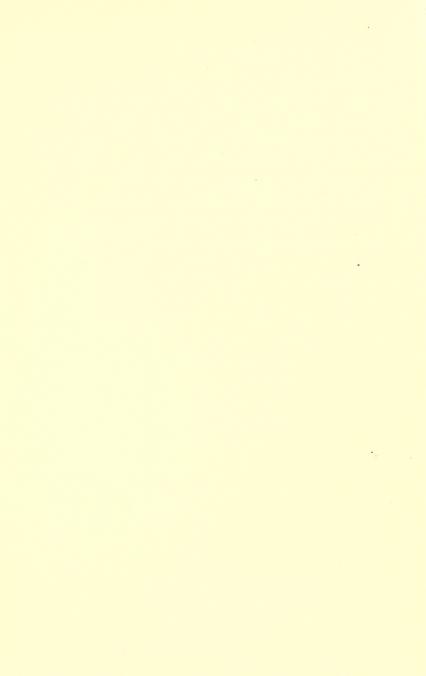
There are deserted wastes of sand and water under torrid skies, populated almost momentarily with teeming multitudes whose jargon fills the former silences with a world wide medley of tongues. As in a dream, the tremulous air is stirred by the struggling movement of naked slaves, turbanned orientals, men from all lands of the occident, the moving throng weaving constantly new patterns from the variegated colors and fantastic costumes of living threads. And everywhere, beneath the prosaic motion of labor and trading, is the quiver of hope, the excitement of the gambler; the poetry of human passions, unseen, but felt.

There are in unfrequented seas, where some lonely atoll draws its circle round a still lagoon, treasures greater than its cargo and the stately

ship sailing heedless by. So like the undiscovered pearls of the ocean's bed, the universe holds an exhaustless store of thoughts and truths for those who come after the discoverers of this age. Thought runs in grooves and the grooves outlast many generations; scarcely in a cycle does one look over the ridge and find a species foreign to the rut.

Within the walls which the past builds for the present it is more easy to adopt than to bring forth, and so the ancient metaphors, age after age, are with some changes of raiment thrown back upon the world again. But in this new era of acquisition, while this sea-gem is again lifted to the serene heights of most exalted favor, perhaps it will not only shine upon the persons of the fair, but adorn, in simile and metaphor as beautiful as the old, the pages of romance and poetry.

GLOSSARY



GLOSSARY

- ABALONE.—Name given on the California coast and in the United States to the Haliotis.
- Ball-Pearl.—Name given to round pearls by pearlers at the inland fisheries of the United States.
- Baroque.—A pearly formation of irregular shape.
- Base.—A basic price, subject to the square of the pearl's weight.
- Baskets.—Brass sieves used in India for separating pearls of different sizes.
- BLACK-SHELL.—Pearl oyster shells of which the nacreous lining has a black edge.
- BLISTER.—A piece of the mother-of-pearl lining of a pearl-oyster shell, raised above the surface like a blister.
- Bluebacks.—Shell of a variety of Haliotis.
- Blue-Pearls.—Dark, slaty blue-white pearls, principally from the Mexican coast.
- Bombay Pearls.—Fine pearls from the Arabian and Red Seas, so named because marketed through that city.
- Button Pearls.—Shaped like a dome, high or low, rising from a plane and called "high buttons," "buttons" or "low buttons," accordingly.
- CLAMMER.—One who fishes for mussels by dredging for the shells principally.
- DEAD PEARLS.—Pearls with a chalky or waxy skin having little or no luster.
- Dress.—Diving apparatus consisting of a one piece dress from the neck down, corselet, helmet, air-pipes and life-line.
- DROF-PEARL.—Ovoid, or obovoid, not necessarily of perfect shape.
- DRILLED PEARLS.—Pearls with one hole for setting on peg, or quite through the centre for stringing. Chinese drill two or three small holes half way between circumference and bottom, for holding-wires.

Egg Pearls.—Ovoid: shaped like an egg.

FLAT.—In connection with price quotation means, price per grain regardless of size.

FRESH-WATER PEARLS.—Pearls taken from inland streams.

Green Ears.—Shell of Haliotis having green mother-of-pearl lining.

HALF PEARLS.—Round pearls sawed in half.

Helmet.—Diving head-gear.

Lingahs.—Pearl oyster shells from the Arabian Sea and others of similar size and quality.

Madras Pearls.—Fine white pearls from the Ceylon fisheries, so called because marketed principally in that city.

Manul.—Loose or soft sand sea-botton (Ceylon).

MULTIPLE.—Price of pearls subject to the multiple of weight.

Mussel-Egg.—Name given to pearls by Tennesseans.

NACRE.—The substance of which pearls and the lining of pearl-shells consists.

NAKED DIVING.—Diving without any appliances.

ORIENT.—As applied to pearls, the luster of the skin.

Oriental Pearls.—Generally, pearls from salt water; specifically, pearls from the Indian Seas.

Ounce Pearls.—Poor grades sold by the ounce.

PAAR.—Ceylon name for rock or hard bottom oysterbed.

Pearler.—One who fishes for mussels for the pearls.

Pear-Shape.—Shaped like a pear; obovoid.

PEELER.—A pearl with an imperfect skin, the removal of which would improve the pearl.

RED-EARS.—Abalone shell with pearly red interior.

Rose-Pearls.—Pink, iridescent, fresh-water baroques.

SEED-PEARLS.—Very small round pearls.

SLUGS.—Nacreous excrescences from the Unio.

Skin.—As applied to pearls, the outer layer of nacre.

SQUARE.—Method of reckoning the cost of a pearl of any size at a lot price, by the square of price given, with the grain as a unit.

GLOSSARY

Strawberry-Pearls.—Large, pink, iridescent and lustrous baroques, fairly regular in shape, with the appearance of being thickly sanded under the nacre.

SWEET-WATER PEARLS.—Pearls from fresh-water.

TRUE-PEARLS.—Pearls formed of nacre as distinguished from similar formations which are not nacreous.

Twinned-Pearls.—Pearls enveloped together in one or more layers of nacre.

White-Shell.—Pearl-oyster shells with nacre white to the edge.

Yellow-Shell.—Pearl-oyster shells with yellowish nacre.



GENERAL CHARACTERISTICS OF PEARLS AND SHELLS FROM THE VARIOUS FISHERIES



GENERAL CHARACTERISTICS OF PEARLS AND SHELLS FROM THE VARIOUS FISHERIES

Arabian Sea.—Pearls have fine orient, but the color inclines to yellow.

Shells are larger than those of Ceylon but of little value for mother-of-pearl: iridescent, black edge m. of p.; known as Lingahs.

Aroe.—Pearls usually good orient; many of irregular shape.

Shells are of medium size, black edge and iridescent.

Auckland.—Pearls white, but not remarkable for luster. Shells, medium size, black edge m. of p.

Australia.—Pearls of Australia generally are of good color, but not as lustrous as those of other sections.

Shells usually large and heavy and the nacre is white.

Bandas.—Pearls good.

Shells are small but heavy and good; black to greenish edge nacre.

CEYLON.—Pearls average finest in the world for orient and color.

Shells, small and valueless for m. of p.

Costa Rica.—Pearls good average.

Shells, medium size, greenish yellow edge.

EGYPTIAN (RED SEA).—Pearls good but run yellow. Shells, medium size and nacre has greenish edge.

Fiji.—Practically the same as the Bandas.

GAMBIER.—Pearls good, many fancy colors.

Shells, large, fine nacre with very black edge.

HAITI.—Pearls fine, shells good.

Manilla.—(Includes Batjan, Bima, Ceram, Salawatti, Sooloo, etc.) Pearls, good color and orient. Shells, large, good, yellow edge nacre.
Merguian Archipelago.—Pearls and shells similar to the Manillas.
Mexico and Panama.—Pearls fair; blacks, grays and fancy colors often fine. Shells, medium size: nacre has greenish edge.
South Sea Islands.—Pearls usually fine. Shells generally large, heavy and fine black edge m. of p.
Venezuela.—Pearls, good luster and color—many fine baroques. Shells: small, beautifully iridescent, but valueless.
PEARLS.
Hardness, 3.5—4 Sp. Gr., 1.59—1.62
Composition.
Carbonate of Lime

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