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## FASHIONS IN PRECIOUS STONES.

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THE American spirit of unrest finds its outlet in an incessant desire for change and novelty. In this we are sharply distinguished from the French, English or German, who believe that a good thing once is a good thing always. For us a thing must not only have excellence, but it must also be new or unique to satisfy the demands of this American trait. So in precious stones very few escape the imperious edict of Dame Fashion, who is influenced largely by the demands of her American followers. It is my purpose to note in this article a few of the principal changes which have taken place within a recent period.

During the last decade new stones have come into favor, some neglected, ones have regained their popularity, and still others, such as amethysts and cameos, have been ushered out entirely. The latter, no matter how finely cut, would not now find purchasers at one-fifth of their former value, while ten years ago they were eagerly sought after at from four to twenty times present prices. Rubies were considered high ten years ago, and a further rise was not looked for, but to-day they are still higher, a nine and eleven-sixteenths carat stone being quoted at \$33,000.

There is no demand at present for topaz, yet a syndicate of French capitalists has been organized to control the so-called topaz mines of Spain in the expectation that after twenty years of disfavor this gem will again find favor in the sight of fashion.

Coral has felt the change of fashion, for during the last three years less than \$1,000 worth per annum has been imported, and in the last ten years, in all, \$33,956, whereas in the ten years preceding \$388,570 worth was imported.

The popularity of amber, on the other hand, is increasing. The imports of amber beads for the ten years, 1868 to 1878, were less than \$5,000 worth, whereas during the last ten years \$35,897 worth have been introduced. Amber amounting only to \$47,000 was imported from 1868 to 1878, but over \$350,000 worth from 1878 to 1888.

Ten years ago few of our jewelers carried more than the following stones in stock: diamond, ruby, sapphire, emerald, garnet, and, occasionally, a topaz or an aquamarine. The gem and mineralogical collections, however, contained a large series of beautiful stones, hard and of rich color, that are now known as "fancy stones," and by the French as *pierres de fantaisie*. Since then considerable interest has centered in these fancy stones, and a jeweler is not only expected to be familiar with, but to keep in stock almost all of these. This change may be partly referred to the fact that since the Centennial Exhibition art matters have received more attention among us than before.

That the Duke of Connaught gave his bride a cat's-eye ring as an engagement token, was enough to make the stone fashionable and to increase its value greatly. The demand soon extended to Ceylon, where the true chrysoberyl cat's-eye is found, and stimulated the search for it there. In the chrysoberyl cat's eye the effect is the result of a twinning of the crystal, or of a deposit between its crystalline layers of other minerals in microscopic inclusions. If the stone be cut across these layers, *en cabochon*, or carbuncle-cut, as it is called, a bright line of light will be condensed on the dome-like top of the stone.

In the search for these chrysoberyl cat's-eyes, there have been found an endless series of chrysoberyls of deep golden, light yellow, yellow green, sage green, dark green, yellowish brown, and other tints. They are superb gems, weighing from one to one hundred carats each, ranking next to the sapphire in hardness. They gave a great surprise to the gem dealers; for it was found that the darker leaf green or olive-green stones possessed the wonderful dichroitic property of changing to columbined red by artificial light, the green being entirely subdued and the red predominating; and in fact were alexandrites, a gem which had formerly been found only in Siberia and even there of poor quality, though in large crystals, a perfect gem of even one carat being a great rarity. Here, however, fine gems rarely under four carats were found, and an exceptional one weighed sixty-seven carats. They can be numbered among the most remarkable of known gems. Strange to say, among these alexandrites a few have been found which combine the characteristics of the cat's-eye and the alexandrite and are in reality alexandrite cat's-eyes.

The demand for the cat's-eye also brought into use the sup-

posed rare mineral crocidolite, commonly called tiger-eye, which has since been found to occur extensively in the Asbetus mountains, forty miles north of the Vaal River. It occurs in a ferruginous porcelain jasper, in veins from half an inch to four inches in thickness, and was first brought to Europe by Le Valliant, a French traveler in South Africa. Value has, more especially, attached to that variety which has been altered to a quartz cat's-eye. In this stone an infiltration of silicious material coated each fibre with quartz or chalcedony, giving it the hardness of the quartz and amethyst—seven in the scale of hardness. This pleasing stone readily sold for six dollars a carat, and at the outset even more; but owing to the excessive competition of two rival dealers, who sent whole cargoes of it to the London market, the price fell to one dollar, or even to twenty five cents per pound, by the quantity. Even table-tops have been made of this material by veneering, and vases, cane heads, paper weights, seals, charms, etc., made of it have sold in large quantities. Burned, it assumed a bronze-like lustre, and by dissolving out the brown oxide of iron coloring, an almost white substance was obtained, which was dyed by allowing it to absorb red, green and brown colored solutions, which, owing to the delicacy of the fibres, were evenly absorbed.

Ten years ago this material was practically unknown, but so extensively has it been sold, that to-day it is to be found on every tourists' stand, whether at the Rigi, on Pike's Peak, in Florida, at Los Angeles, or at Nijni Novgorod, showing how thoroughly organized is the system of distribution in the gem market. Missionaries have never spread a religion so rapidly as traders have disseminated this form of the "cat's-eye."

Since it has become generally known that Queen Victoria is partial to the opal, the old and stubborn superstition concerning it, which is said to date from Scott's Anne of Geierstein, has been slowly yielding, until now the gem has its share of popular favor. During the last two years ten times as many opals have been imported as were brought here during the preceding decade, many of these being the finest Hungarian stones. Mexican fire-opals are much more common, as tourists know to their sorrow who buy them at exorbitant prices in Mexico, hoping thus to pay the expenses of the trip, only to find, on reaching New York, that the opals are worth only about a quarter of what they paid for them.

The Mexican opal mines are near Querertera, and it is believed that a demand of 50,000 stones per annum could be supplied without raising the price perceptibly, since in the market of precious stones, the demand generally raises the price. The opal mines of Dubreck, Hungary, yield the government a revenue of \$6,000 annually. And the output is so carefully regulated by the lessees that the market is never glutted.

About ten years ago a new and very interesting variety of opal was brought from the Baricoo River, Queensland, Australia, where it was found in a highly ferruginous jasper-like matrix, sometimes apparently as a nodule and then again in brilliant colored patches or in specks affording a sharp contrast with reddish brown matrix, which admits of a high polish and breaks with a conchoidal fracture. Many of these stones are exceedingly brilliant. They are of the variety known as harlequin opals, their color being somewhat yellow as compared with the Hungarian stone, although not less brilliant. The rich ultramarine blue opal is quite peculiar to this locality, and many have a rich green tint that makes them almost transcend the Hungarian opals.

A company capitalized at £200,000 has been formed, and the gems are soon likely to be extensively mined. Many curious little cameo-like objects, such as faces, dogs, heads, and the like, are made by cutting the matrix and the opal together.

Never have pearls been more popular or commanded such high prices as during the past ten years. At present nothing is considered in better taste than the pearl, on account of its purity and subdued beauty. This unusual demand has had the effect of greatly stimulating the search for them, especially on the west coast of Australia, at Thursday Island, the Sooloo Archipelago, in Ceylon and the Persian Gulf, and also along the coast of Lower California. The demand included pearls of all colors except the inferior yellow. The fine black pearls from Lower California have been in great request, single ones bringing as much as \$8,000. With these black pearls are found many beautiful gray and grayish brown pearls. The different fisheries of the world produce fully \$1,000,000 worth annually, of which the lower California fisheries produce probably one-sixth. Kentucky, Tennessee and Texas have given us over \$10,000 worth of pearls per annum; their remarkable fresh-water pearls, especially the pink ones, which are unrivalled for delicacy of tint. The finding of two

bushels of these in the Turner group of mounds in the Little Miami Valley, Ohio, by Prof. F. W. Putnam, gives us a faint idea of how plentiful they were before the arrival of the Europeans. But within the last five years many of the fancy-colored pearls have received their variety of color not from nature but by artificial means.

The acquisition of the Burmese ruby mines cost the British Government a vast sum of money. On the wars of 1826 and 1852 England expended \$75,000,000 and \$15,000,000 respectively, and after all this sacrifice of treasure the Burmah & Bombay Trading Company claimed, four years ago, that King Thebaw, of Burmah had arbitrarily canceled the leases by which the company controlled the output of the ruby mines near Mandalay. A meeting was accordingly held at Rangoon, October 11th, 1884, presided over by J. Thompson, agent for Gillanders, Arbuthnot & Company (a firm of which Gladstone's son is said to be a partner), with a view to securing the lease of the mines. They did not succeed, however, and the war of 1886 which followed involved the raising of an army of 30,000 men and an outlay of \$5,000,000, but the British Government finally gained control of the long-coveted ruby mines. The question which next presented itself was, how should they be worked? Several firms were desirous of securing the lease, and after the Indian Government had virtually closed a lease to Messrs. Streeter & Company, the London jewelers, at an annual rental of 4 lakhs of rupees (£40,000), for a term of five and one-half years, with the privilege of collecting thirty per cent. on all stones mined by others, for some unexplained reason, but probably on account of trade jealousies, the home government revoked the lease, although Mr. Streeter had apparently every assurance of the acceptance of his proposition and had even made preparations to begin work at the mines.

The ruby mines of Burmah are situated in the valley of the Mogok, fifty-one miles from the bank of the Irrawaddy River and about seventy-five miles north of Mandalay, at an altitude of 4,200 feet. Very little has been known concerning them up to the present, as they were always the monopoly of the crown and were jealously guarded. It was said that they paid King Thebaw's government 100,000 rupees per annum and, one year, 150,000 rupees. Mining is carried on there by forty or fifty wealthy natives, who employ the poorer townspeople at liberal wages; but at present only

seventy-eight mines or diggings are in operation, and they are worked in the most primitive manner. All of the gems are sent to Ruby Hall, Mandalay, to be valued. At present the royalty exacted by the English government is thirty per cent. A stone was lately sold in Mandalay for 8,000 rupees, but without the knowledge of the officials. In the valley a number of pagodas have been erected by wealthy ruby miners as votive offerings for their success.

One thing at least we learned from the British occupation of Burmah; namely, that King Thebaw did not own the dishes of rubies which were said to outrival anything in history. His possessions of this sort were found to consist only of a few stones of poor quality.

The diamond mines at Salabro, Brazil, known as the Canavieiras, were discovered in 1882 by a poor miner who had worked in the earlier mines. They are situated two days' journey from Canavieiras, near the river Pardo, and the gems, which are found in red gravel at a depth of about two feet, are very fine in quality, and are remarkable for their purity and whiteness, the crystals being of such a form that scarcely any cleaving is necessary.

History repeats itself, and as, when the Brazilian mines were first discovered, the stones were sent to Europe by way of India to enter the markets in India wrappers, so Bultfontein diamonds were sent to Canavieiras to be shipped to Europe as the product of that mine. So great was the rush for these mines at first that, notwithstanding the rumors of a malarial climate and epidemic diseases, by the end of the first year 3,000 miners were at work where shortly before was a virgin forest, and for a time even this number was exceeded. The other Brazilian mines have been only slightly worked of late years.

India, Borneo and Australia are now yielding very few diamonds, probably not more than one per cent. of the entire product. These three countries, together with Brazil, yield probably less than ten per cent. of the total output.

The recent combination of the diamond mining companies in South Africa to regulate the production and price has led to a feverish speculation in diamond shares and awakened interest in the mines of Brazil and India. During the past month the Madras Presidency Diamond-fields Company, Limited, has been organizing with a capital stock of £190,000, and to prove that the Indian mines are not yet exhausted it is announced that operations will soon be com-

menced at Wadjra Karur Field in the Madras Presidency. On this field of 554 acres was found a very fine sixty-seven and a half carat diamond crystal which furnished a twenty-five carat stone called the Gor-do-Norr, valued by the company at £15,000.

Another English company has recently been formed under the name of the "Hyderabad Deccan Mining Company," to work the mines in the valley of Krishna in India, where it is thought that the famous Koh-i-nûr diamond was found.

The author of "Arabian Nights" undoubtedly thought that he was imagining the wildest and most improbable things when he wrote of "Sinbad, the Sailor," obtaining such fabulous treasures in the valley of diamonds. Yet the African mines have paled this profusion of wealth into utter insignificance. A glimpse at these new "diamond" valleys may be interesting.

The primitive method of diamond washing was carried on for centuries by thousands of slaves, who, like those who built the pyramids under the lash of the Pharaohs, simply followed a master mercilessly goading them on whip in hand. To-day we have the most ingenious and powerful machinery, which, eyeless though it be, allows fewer diamonds to escape than would the keenest and most disciplined army of washers.

At the Kimberley diamond mines in South Africa, a wonderful progress has been made in the last decade. About 1877 the work of consolidation of the different companies began. Originally the mines were worked as 3,238 separate claims, each thirty-one feet square, with a seven and a half foot roadway between every pair of claims. Now these are all united in about forty companies.

A mine in the early days was a bewildering sight. Stretched across in all directions were miles of wire cable, to which were attached the buckets for carrying the earth, reef, or wall-rock of the mines, and at times water, all running from individual claims. Some of these were almost level with the surface, while others next to them might be cut down two hundred feet, and others only one hundred feet, yet all were being worked independently. At the sides were endless belts with pockets for carrying the earth. The result of this independent system of working was that rock was dropped so recklessly that it is said to have been as dangerous as the battle field around the edges of the claims. Not only was the loss of life great from this source, but also from the falling of immense masses of reef, loosened by the blasting, which



sometimes buried a score of men at once. But improved methods were gradually introduced. Steam railroads were run down into the mine, and parts of it were leveled down even. Millions of tons of reef required removing, and the only way to do it was to assess every company in the mine proportionally. Many mistakes were made at first, if mistakes they can be called, when the problems offered for solution were entirely new and untried. The yellow or surface soil which overlaid the blue stuff pulverized so readily that it could be taken to the washing machine direct ; but as the claims were sunk down in the blue the rock grew harder, and dynamite became necessary. Immense quantities of it are now used for blasting.

Not only has the yield of the African mines been great, but the diamonds have averaged much larger than those from any of the old mines. The finding of a seventeen carat stone in the Brazilian diggings was sufficient to secure the freedom of the fortunate slave who found it ; but stones of this size are found by the hundred here. A one hundred carat stone scarcely creates as much excitement as a stone of one-fifth the size did in Brazil.

One-fifth to one-quarter of all the yield, it is estimated, never reached the proper owners, as the native diggers swallow and conceal the diamonds in every possible manner. Hence it became necessary for the companies, in self defense, to take extraordinary precautions against this great loss, and overseers or special searchers were appointed, who made the most thorough examination of all who left the mines. The natives use most ingenious methods for the concealment of the gems. On one occasion some officers, suspecting that a Kafir had stolen diamonds, gave chase and caught up with him just after he had shot one of his oxen. No diamonds were found upon the Kafir, it is needless to say, for he had charged his gun with them, and after the disappearance of the officers, dug them out of his dead ox. Diamonds have been fed to chickens, and a post-mortem recently held over the body of a Kafir revealed the fact that death had been caused by a sixty carat diamond which he had swallowed.

On September 4, 1886, a meteoric stone weighing about four pounds fell at Nowo Urei, Krasnoslobodsk, in the Government of Penza, Siberia. In this, MM. Latschinoff and Jerofeieff found what they supposed to be diamonds of microscopic size. In an insoluble residue appeared small corpuscles, showing traces of po-

larization, harder than corundum, having the density and other characteristics of the diamond, and present to the amount of one per cent of the whole mass (see *Nature*, December 1, 1887). Through the courtesy of His Excellency Julien V. Siemaschko, of St. Petersburg, I procured a small piece of the meteorite. Small fragments of it were boiled first with nitric acid, then with sulphuric, then with nitro-muriatic acid, which removed the iron magnetite, olivine, enstatite, etc., leaving as a residue some small transparent bodies, about twelve in all. One of these, which was unfortunately lost, was evidently a distorted trigonal tris-octahedron. Those exhibited are very much distorted, and two resemble this form, which is one of the principal forms of the diamond. The colors are either pink or light brown. The smallness of their size has prevented me from trying the hardness, but by grinding with a sapphire four particles of the meteorite, I distinctly made a number of minute but deep scratches on each polished face of nine different sapphires with each piece of meteorite. These scratches are characteristic of but one mineral that we know, and that is the diamond. Pieces of the meteorite scratched nine sapphires, producing the fine delicate lines characteristic of a diamond, and there can be little doubt that these bodies, the only residue, were the ones that produced the scratches. If a larger quantity of material comes to hand, I intend to polish a diamond with the powder of the meteorite, using a new wheel for the purpose.

Some of that very curious form of diamond known as round bort, found only in Brazil, were exhibited at the Amsterdam Exhibition of 1882. They were perfect spheres, the result of a multiple twinning of the cubic form of the diamond. One of these Messrs. Tiffany & Co. cut into the rude outline form of a brilliant, and placed its table on an iron polishing wheel with diamond dust on it revolving at the rate of 2,800 revolutions per minute. The circumference of that part of the wheel on which the diamond was placed was about two and a half feet. It remained there nearly one hundred days, ten hours per day, so that the surface which traveled over it amounted to over 75,000 miles. Four and at times eight pounds of pressure were added to the usual two and a quarter pounds and two and a half pounds of the clamps or holder, while for a time forty pounds extra were added, causing the diamond to throw out scintillations several feet long.

The wheel was ploughed up and ruined ; yet no polish was produced, and the diamond was only slightly ground away after all this immense abrasion.

As an illustration of the labor and capital employed in diamond mining, it may be interesting to note that in addition to many miles of aerial tramways there are over one hundred and seventy miles of tramway around the four Kimberley mines. Twenty-five hundred horses, mules, and oxen, and three hundred and fifty steam engines, shafts, etc., representing four thousand horse-power, are employed in the work. One million pounds sterling are annually expended for labor, and over £1,000,000 for fuel and other supplies. The gross capital of the companies is nearly £10,000,000. Over ten thousand natives, each receiving £1 a week, and twelve hundred European overseers, at an average wage of £5, are employed. It is now proposed to consolidate all the companies into an enormous diamond trust, with a capital of £10,000,000. At the present value of the shares they are worth £14,000,000, and the stocks fluctuate as much as our more active railroad securities.

The De Beers mine is now owned by one company, who also control the Central Diamond Mining Company, of the Kimberley mine. Mr. Gardner F. Williams, of Oakland, Cal., is superintendent of this mine.

In 1878 the importations of uncut diamonds amounted to \$63,270 ; in 1887, to \$262,357 ; while in 1883 there were imported \$443,996 worth, showing that although we are cutting four times as many diamonds as we were in 1878, yet the importations have been falling off. This is partly because in the years from 1882 to 1885 a number of our jewelers opened diamond-cutting establishments, but have either given up the business or sold out to others ; for in spite of the protective duty of ten per cent. on cut stones, cutting can only be profitably carried on here on a scale large enough to enable one of the partners to reside in London, the great market for rough diamonds, to take advantage of every fluctuation of the market, and purchase large parcels which can be cut immediately and converted into cash ; for nothing is bought and sold on a closer margin than rough diamonds.

The recent death of Mr. Henry D. Morse, of Boston, known as the pioneer diamond cutter of the United States, brings to mind many interesting reminiscences. He has scarcely received the

credit he deserves for his work. That he was the first in this country to cut diamonds is well known, and the best cutters in the United States to-day received their training under him. But educating young Americans, both men and women, to the art, was not his greatest work. He showed the world that the art which had so long been a monopoly of the Hollanders, was degenerating in their hands into a mere mechanical trade. His treatment of the diamond gave a great stimulus to the industry both in the United States and abroad, and shops were opened here and in London in consequence of his success. He was one of the few who studied the diamond scientifically, and taught his pupils that mathematical precision in cutting greatly enhances the value as well as the beauty of the gem. His artistic eye, sound judgment and keen perception enabled him to carry the art to a perfection seldom, if ever, attained before.

It was in his shop that a machine for cutting diamonds was invented which did away in great measure with the tediousness and inaccuracy of the old manual process. Thanks to his labors, we now have among us the best cutters in the world, men who can treat the diamond as it should be treated to develop its greatest beauty. The fact that so many fine stones were recut here after he started his wheel led to a great improvement in cutting abroad, especially in the French Jura and Switzerland, where both sexes are now employed at the trade. As a result of this the diamonds sold to-day are decidedly better cut than those of twenty years ago, before Mr. Morse turned his attention to that work, which he, above all others, has shown us is properly an art and not an industry.

There are at present about twelve cutting establishments in this country employing from one to fifty men each, and in all about one hundred, at salaries ranging from twenty to fifty dollars per week. Most of the cutting done here is of a high class, some shops being almost entirely employed in recutting stones that had been cut abroad. Ten years ago nearly all the diamonds used in the United States were purchased through brokers or importers. To-day, owing to the marvelous growth of the diamond business here, and the facilities for transatlantic travel, many of the large retail houses buy their diamonds direct in the European markets; and some have even established branches or agencies abroad.

GEO. F. KUNZ.