

Diamonds Through History

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Diamonds are found in India, Brazil, the United States, Australia, the Soviet Union, and in many parts of Africa, where the world's most important deposits are situated. Large diamond fields are located in The Republic of the Congo; as a source of industrial stones these fields form the most important deposits in the world today, providing some 60 per cent of the total world's industrial diamond output. Ghana, too, has rich diamond fields, and even more productive ones have been discovered in Sierra Leone. But by far the richest source of gem diamonds lies in the Republic of South Africa. The diamond-mining industry there is the largest in the world, and South Africa's diamond exports are of major importance to its economy.

The industry began there in the year 1867, when the children of the Boer farmer, Daniel Jacobs of Hopetown, whose land stretched along the banks of the Orange River, picked up a white pebble and began to play with it. The pebble attracted the attention of a neighbor, and, after it had been examined by several people, it was finally discovered to be a diamond of considerable value.

This accidental discovery was to have a far-reaching influence upon the whole course of South African history. It led to the first "diamond rush" and the so-called river diggings, for the lode of precious diamonds extended to the River Vaal. Prospecting proceeded at a feverish pace. Rivers were diverted into temporary channels and their beds torn up in a frantic search for diamonds. A few lucky men quickly made fortunes, but the majority were less fortunate and barely eked out a living as a reward for their labors. The river diggings were of a type similar to those found in India and Brazil, the diamonds being located in deposits of gravel of limited thickness beneath which was barren rock.

In 1870, more diamonds were discovered in shallow depressions in certain ground on a dry plateau at the farm Jagersfontein, near Faresmith in the Orange Free State. This led to a further diamond rush and to the founding of the now famous town of Kimberley. The mines there were distinguished as dry diggings, and proved to be of an entirely new type. The term was applied to these mines because of their arid surroundings as opposed to the river diggings on the River Vaal.

At first, miners working the surface deposits of the dry diggings thought the yellowish rock underlying them was barren, just as the bed rock of the river gravels had been. Then someone investigated this rock more closely and found to his surprise that it was even richer in diamonds than the surface layer, and, after digging to a depth of some 60 feet, the miners came upon a still harder bluish rock, which they called blue ground. This contained a real wealth of diamonds.

The surface area of these dry diggings varies considerably, but the largest of them in the Transvaal, known as the Premier Mine, is oval shaped and measures about 1,000 by 500 yards. There are, of course, many other smaller ones. Their depth seems unlimited. The well-known workings of the Kimberley Mine now extend to a depth of well over 3,000 feet and are still in diamond-bearing ground.

It is believed that diamonds were first formed some 60 million years ago and that these huge pipes are the necks of ancient volcanoes that may have erupted violently, perhaps under the surface of the earth, bringing up vast masses of materials from the bowels of our planet. One thing that is known certainly reinforces this theory. The formation of diamonds requires enormous pressures and temperatures, and these conditions can only be fulfilled in nature deep in the earth.

The diamond-mining operations as they are carried out in South Africa have changed. In the early days, the broken pieces of the rocky blue ground were spread out for a period of one or two years, when exposure to weather and frequent rolling and turning broke down the substance. Today, the blue ground is no longer left to the influence of the weather. Instead, the rock is passed through heavy rollers provided with special springs in order to avoid breaking any large diamonds. The crushed rocks are then passed to large washing pans so that all mud and lighter materials can be washed away.

Formerly the diamonds had to be picked out by hand from the concentrates. Then, one day, an employee of a large mining company made a remarkable discovery. He found that of all the constituents of the blue ground, the diamond alone adheres to grease more readily than to water.

Now, therefore, the crushed-rock mixture is washed over a series of galvanized-iron trays that are covered with a thick coating of grease. The trays are constantly agitated, and the diamonds adhere to the grease while all other materials are washed away with the waters. At frequent intervals, the grease tables are scraped and the diamonds removed. Certain other gem stones may also adhere to the grease, but these can afterward be separated from the diamonds easily by hand.

Diamond crystals are usually quite small and rarely weigh more than 1/5 gram, or one carat (28.35 grams, or 141.75

carats, is equal to one ounce avoirdupois). Larger stones may be of great value, but much will depend upon their color and freedom from flaws. With the exception of the rare and unusual colors, such as pink and blue, the colorless stones and those with a faint blue tinge are the most sought after. Unfortunately, most diamonds have a yellow or brownish tinge that reduces their value considerably in the eyes of the jeweler. Faulty stones and those that are badly discolored are used as bort in industry where their extreme hardness allows them to perform many useful functions.

Many famous diamonds have been found throughout the ages, but the largest and most famous of all is the Cullinan gem, which was discovered in a mine near Pretoria in the Transvaal in 1905. It weighed 3,106 carats, or slightly over 13 pounds. The mine superintendent who found this colossal stone embedded in the rock of the mine face thought at first it was a chunk of glass. He could not believe that so huge a diamond could exist. It was sold to the Transvaal government for £150,000 and later was presented as a gift to Edward VII (1841-1910) who entrusted it to an Amsterdam firm for cutting. They cleaved and cut the perfectly clear and colorless stone into 9 large and 96 small brilliants. The largest of them, Cullinan I, a drop-shaped stone weighing 530 carats, is the biggest cut diamond in the world. Known as the Star of Africa, it forms part of the British crown jewels and reposes in the Tower of London in the head of the sovereign's scepter. Cullinan II, the second largest of these diamonds, is set in the Imperial State Crown. It is a square-shaped brilliant and weighs 317 carats. Two other large stones, weighing 94 and 63 carats, respectively, and known as Cullinan III and IV, were set in the late Queen Mary's crown for her coronation in 1911. The remaining 5 of the large stones range in weight from 18 carats to 4 carats.

Among other famous diamonds, the Koh-i-Noor deserves special mention. It originated in India and, unlike the Cullman gem, can claim a long and turbulent history. This famous stone first appeared on the scene early in the fourteenth century, but, according to legend, it may have been known some hundreds of years before that. Historians tell us that the Koh-i-Noor weighed some 800 carats when found in the Golconda mines in southern India. It remained the property of a line of Indian princes until early in the sixteenth century when the Moguls conquered India. Then, the stone fell into the hands of the Mogul emperor and remained in Delhi, where it is said to have adorned the great peacock throne. Later, in 1739, when the Persian conqueror Nadir Shah invaded Delhi, the capture of the diamond was one of his prime objectives. When he had achieved this, he took it back with him to Persia, where it remained until his assassination.

The succeeding years brought a number of wars and revolutions, but the stone was always treasured by the ruling princes until, eventually, it found its way to Lahore, the capital of the Punjab. After the end of the second Sikh war in 1849, the East India Company acquired the diamond. A year later, it was presented to Queen Victoria, who allowed it to be shown at the Great Exhibition in London in 1851.

Because of its lack of sparkle, the stone was recut into an improved shape. This action has since been much criticized, for the process reduced the weight of the stone from 191 carats to 109 carats. Although somewhat improved, it still lacked the fire of a correctly proportioned brilliant-cut diamond. It was set in a brooch for Queen Victoria, and, after her death, adorned the crown of Queen Alexandra. Today, it is set in the centerpiece of the queen-consort's crown.

Another stone worthy of mention is the blue Hope diamond, weighing 44 1/2 carats. This magnificently colored stone is said to originate from a much larger one, the "Tavernier Blue," which used to belong to the imperial French collection. It was stolen in 1790 but reappeared mysteriously on the London diamond market some 40 years later as a smaller stone.

There seems little doubt that the Hope diamond was a part of the Tavernier Blue that had been stolen, for its color was identical, and large blue diamonds are extremely rare. It was purchased for the sum of £18,000 by the British banker, H. T. Hope, who eventually sold it to the Sultan of Turkey for £80,000. Later it returned to the United States and became the property of the well-known diamond merchant, Harry Winston, who presented it to the Smithsonian Institution in 1958. Today, its value is estimated at some £300,000 (\$900,000).

Another notable diamond is the Great Mogul. An Indian stone weighing nearly 800 carats, it was first seen in 1665. The diamond is believed to have been among the booty seized by Nadir Shah when he overran Delhi in 1739. Later, it disappeared completely from the scene, and some authorities believe that another stone, the Orloff diamond, is the Great Mogul. The Orloff weighs almost 200 carats and is a diamond of first-class quality, with the faint bluish tint so highly prized among gem diamonds. It now forms part of the national state jewels of Russia.

Finally, a word about a pink diamond discovered by J. T. Williamson in Tanganyika (now Tanzania) in 1940. Pink diamonds are very rare, and this rose-colored jewel, weighing 54 carats in its uncut state, is one of the largest pink diamonds so far discovered. It was cut into a 23-carat brilliant that adorns the center of an alpine-rose brooch belonging to Elizabeth II.

As has been mentioned, because of its extreme hardness the diamond has a great importance in modern industry. Industrial diamonds do not have the glamorous history of the gem diamonds, but they have made a significant contribution to science and technology. Not only does their hardness make them admirably suited to cut metals of various kinds, but they also form one of the most important factors in precision engineering today.

There are two main qualities of industrial stones, each being marketed for specific industrial purposes. Better quality

industrial diamonds are used largely in lathe tools as drilling material and for a great number of high-precision industrial instruments. The lower quality industrial stones, bort, are crushed and graded into so-called mesh sizes to be employed in grinding-wheel stones, cutting saws, and boring tools.

Springing from the great variety of uses for diamond mesh is a recently developed process for smoothing concrete airport runways for high-speed jet aircraft. Crushed bort is also used to grind, polish, and bevel glass, as well as for the polishing of ceramics, plastics, stone, asbestos, cement, and other nonmetallic minerals and materials. Fine diamond powder, a by-product of the crushed bort, is extensively used in all types of lapidary and polishing operations. Large quantities are employed in the watch industry for the boring and shaping of synthetic rubies and sapphires. The mining industry uses diamond drill crowns to drill for oil and many other minerals and for long-hole drilling during shaft sinking and other mining operations.

The demand for the diamond in industry is a comparatively recent development, which received a strong stimulus during the last war when precision instruments of all kinds were urgently needed. To date, the United States is the largest consumer of industrial diamonds, taking about 60 per cent of the total world output. Other large consumers are Great Britain and the other European nations, but an increased demand is developing generally throughout the world.

Because diamonds have, for hundreds of years, been highly prized as gems, it has been the ambition of chemists to produce this magnificent gem artificially. Yet, although the diamond consists of only the element carbon, this has proved to be an extremely difficult task, and it was not until 1955 that General Electric and, more recently, De Beers Mining Corporation of South Africa succeeded in producing diamonds on a commercial scale. The commercially produced stones in no way resemble the gems worn as jewelry. Most of them are quite tiny and measure less than 1/250 inch. But even such tiny diamonds are of great value to industry.

The question of why diamonds are so difficult to produce artificially becomes less puzzling if one remembers how tightly the atoms are packed together in the diamond crystal. In graphite and other forms of carbon, this is not the case, and one of the problems that faces the scientists is how to press the carbon atoms sufficiently tightly together so that they will adhere permanently.

In nature, this process goes on deep in the earth, where enormous temperatures and pressures are developed. It was not until scientists were able to devise pressure chambers that could withstand pressures of similar magnitude at very high temperatures that the first successes in synthetic-diamond production were achieved. Figure 36 shows a 1,000-ton diamond-making press in the General Electric research laboratory that can develop pressures greater than 1,500,000 pounds per square inch at temperatures in excess of 2,700° centigrade.

With the rapid advance of science and technology, the day may not be too distant when it will be possible to produce even large jewel diamonds synthetically, but it is unlikely that scientists will not be able to tell the difference between the natural and synthetic.