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THE DIAMOND

A PRINCE OF INDIA

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THE DIAMOND

BY

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PREFACE

These pages have been written in pursuance of a resolution formed some years ago, to bequeath to the jewelry trade and the public, a comprehensive and intelligible digest of the information extant about precious stones. As nearly as a commercial acquaintance of some years and much patient investigation would enable, misinformation founded on ancient errors, and misstatements of fact, have been discarded or labeled, and in the realm of science, the conclusions in which persons of undoubted reputation agree, are given as authoritative. To the diamond alone, as the most generally known and admired among the permanent things of beauty which Nature has provided for man, this volume is devoted, in the hope that it may prove useful alike to those who traffic in it, or study and enjoy it.

In the conviction that Nature's method of crystallizing carbon will eventually be discovered, accounts of the various experiments made, and hints for future experimenters are included.

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CHAPTER I

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OF many of her beauties, Nature gives us glimpses only. As swaying gossamer momentarily reveals and hides the charms of a dancing fairy, so the quick flashes of brilliancy and color, the changes of tone and atmosphere, the drifts of song and sighing, and the varying perfume of moods, flit about us, in the restless movements with which our mother plays hide and seek with her children. Light and shadow flitting over waters, the interweaving chords of harmonious and exquisite color with which the sun comes and goes, the whisperings of the wind, the ripple and rustle of billowing fields and meadows, the mists of the morning, all become memories as the sight and sound of them sink from eye and ear to heart. Even the glories of her seasons endure not; the flowers fade, the green of the field withers, the fruit falls, and the dazzle and glitter of snow and ice soon melt from the light which glorified them.

There are things in Nature, however, which hold their beauty unscathed by blasting storm, or withering heat, or the changing seasons. These in their proud supremacy defy time. Among them are "precious stones." Ethereal though it seems as a white cloud in a sunny sky, or mist beads on the leaves at early morning, the pearl recks not of rising or setting suns. The emerald remains green when the grass burns, and it lies vivid yet in the frozen heart of winter. The diamond sparkles and flashes whenever and wherever the light finds it, while the generations which successively enjoyed its beauty, fade and are forgotten.

Combined with the qualities that withstand the destructions of time, precious stones possess others which prevent the weariness of monotony growing usually out of changeless existence. These make them as captivating to the senses when the eye dims with age as when they first attracted it in eager youth. To the sun, "soul of surrounding worlds," year after year and age after age, they respond like the stars. "The ruby lights its deepening glow, and with a waving radiance inward flames." From it forever "the sapphire, solid ether, takes its hue cerulean" and all combined, its beams "thick through the whitening opal play." By the play of light and color, precious stones coquette as capriciously after a thousand years as in the beginning, and keep ardor burning by a constant revelation of new tones of beauty and a tantalizing but delicious expectancy of more. In shadow, mysteries of romance and tragedy slumber in the blood-red of the ruby, but sunlight wakes fires in it, ardent and changeful as the glances of love. We say the color of the ruby is red, and of the emerald, green, and of the sapphire, blue, but as they move in the light, or quiescent, the light rays pass over them, a thousand tones of color in harmonious chords emanate from the flashing facets, and the eye watches, as the ear listens when a master hand wanders over the keys of music.

Unseeing eyes sometimes hold in contempt those for whom these precious things of beauty have a charm. To them, the fascination which these "baubles" exercise, is no hint that they are wonderful and worthy; they regard it only as a sign that the fascinated are weak. The sense which caused that prince of orators and thinkers, Henry Ward Beecher, to carry a beautiful stone about in his pocket, that he might at will take it out and feast his eyes upon it, or that leads many men noted in the fields of government, finance, industry and war even, to buy them at great prices, not to show upon their persons, but to cherish for themselves and their familiars in private collections, is beyond them. The appreciation of precious stones marks the rise of the individual from grubbing to a broader outlook; of a nation, from the hard struggle for existence, to the plane of acquirement.

Among these beautiful creations, the diamond, for several reasons is pre-eminent. The hardest, it more successfully resists the abrasions of time, and by the same quality is capable of holding for our delectation more of the fugitive phenomena of that most blessed source of human comfort, light. No other has such universal fascination. In all ages and nations it has been esteemed most highly, and now that all its dazzling beauty has been discovered, though the ruby may be more precious to a few lords of the Orient, and elsewhere, and if the pearl be the jewel of refinement everywhere, the diamond is nevertheless by far the most general favorite. Its enduring and unassailable purity, and the blazing splendor of its reflective and dispersive powers, are universally attractive, and to these the magnificence of exalted and ancient associations add a glamour which predisposes the beholder to yield to it royal honors.

In these days of abundance, when the young woman who earns her living would regard the linen of ancient queens as too coarse for ordinary wear, and the "fine raiment" of the Bible would be regarded with derision; when the sons and daughters of labor bedeck themselves with jewels reserved by the imperial edict of Rome for patricians, and the only reservation which guards them is the price, it is difficult to fully realize the feeling with which people in the old times looked from afar upon the effulgence of the diamond, or to awaken the imaginations which then clustered about the name.

In those old days the diamond was the associate of might. Where it shone, lay the power to kill or make rich. Men trembled at the frowns of one who wore diamonds, for they were a sign that he was the lord of men. To the onlooker there was mystery in the light that shot from under the rough skins of the curious stones. Baubles they were, but fiercer than the tempered blades of the princely swords whose hilts held them. Things of beauty to lie in the soft folds of silken tunic and turban, yet harder than the grim rocks where their princely owners perched their fortresses. Flint, nor steel, nor any other thing could mar their glistening faces, for in the grind with rougher and coarser things, only they came out unharmed. This invincible light of them delighted the dark-eyed rajahs, and when later, more of their innate brilliancy was revealed by grinding them together, the oriental mind gave them such names as "Sea of Light," "Light of the Moon," and the like. In the lands of the Sun, they held imprisoned souls, in the poetic imagination of many. Men saw intelligence in the plan of the shapely crystals, and that give birth to speculations which became the nuclei of many superstitions. To their fortunate possessors they were treasures, not of price but very precious, and peculiarly fitted to adorn the persons of the great. The big diamonds, seldom found, were guarded with jealous care by the lords whose droit they were. Held often at great cost of blood and life, when they did change hands, they passed only to conquerors as the spoils of war.

Now that one may see diamonds in glittering masses, not only in jewelers' windows, but in dry-goods stores, though they attract, they do not have quite the effect upon the mind of the beholder which the mere mention of the name had, when they were seldom seen, and then only in the hands of cautious dealers or upon the persons of the great and powerful. Nevertheless, there remains something of the old regard. The diamond is still a thing of great price and a sign of wealth if not of power; the old stories of diamonds, blazing in the helmets of kingly soldiers and from the folds of princely turbans, gathered there by many devious paths of bloodshed and adventure from dark, mysterious mines, still stir the soul when the light of their flashes ensnares the eye.

India has always been regarded as the natural home of the diamond, for there it was first found. In the old times, when journeys to the Orient could only be made safely by armies, those who came back spread wonderful tales of eastern treasures, so that the lands of the East became the dream of western adventurers. Imagination so rioted over those stories of the wealth and magnificence of dusky princes and their courts, that the barren sands of the Orient were transformed in their dreams to gold, and all the pebbles to precious stones.

Diamonds have existed within the reach of man in India for many ages. Not only are they found in the valleys and beds of streams, but also, separated from the matrix in which they were formed, in strata of detrital matter that have since been covered twelve to sixteen feet deep by the slow accumulations of many later centuries. How long they have been known and used as jewels is uncertain. Nor do we know when they were first distinguished with certainty from similar white transparent stones. Probably general knowledge was the growth of many ages, during which those who knew, profited by the prevailing ignorance. Hindu legend in the Mahabharata tells of a diamond worn by one of the heroes 5,000 years ago. It is possible that if the hero really lived he did wear one. It is also possible that the stone was a rock crystal or a colorless zircon, or white sapphire, or topaz, for all these have at one time or another passed for diamonds, but from the fact that diamonds are specifically mentioned in the Hindu ancient writings, it is certain that, if sometimes confounded with others, the stone was known when men there began to make records.

Not until a few centuries back was the art of cutting and polishing the diamond discovered. Prior to that, but little of its marvelous brilliancy was known. True, for ages the natural stones had been somewhat improved by rubbing them together, but before that, the diamond as found would not have been likely to attract the finder as much as the rock crystal which, in its rough state, is generally much more brilliant. Doubtless many of the diamonds of legend were crystal, especially where they are said to have been engraved, for the Ancients could not engrave the diamond. This native hardness, which now makes the stone pre-eminent among jewels, in the old days rendered it less desirable than others. Even in the sixteenth century it was valued far below rubies and emeralds. Nevertheless Pliny speaks of it as a thing which exceeded all others in value and confined to the use of few kings even. It may be that in his time it was more highly valued than later. It may be that he romanced about this as he did about many other things, though some of Juvenal's stories give evidence that it was very precious in the early days of the Roman Empire. Whatever the facts concerning it in ancient times may be, the diamond, as we know it, is a comparatively late production, and the extreme perfection of beauty attained by the cutting of to-day has been developed in this generation. As Europe taught the Orient what undreamed-of beauty was inherent in its native gem, by the art of cutting and polishing, so did the new empire of the west teach Europe how to reach the acme of beauty by adapting proportion of size and shape to the qualities of reflection and refraction. The diamond, as we know it, is not yet fifty years of age.

Before exact knowledge was acquired of the combination of qualities which constitute a diamond, much confusion doubtless existed. White topaz, sapphire, zircon, and rock crystal might be easily mistaken for diamonds, because, they are brilliant and colorless, and to a very late date, real diamonds were discarded and destroyed by the tests for hardness which ignorance suggested. Peoples among the ancients, unacquainted with the stone, did not understand that the hard pebbles which could not be abraded, would splinter and split easily. Having learned that many of the bright crystals found were not the hard stone which they prized, they tested them, when uncertain, by pounding them and destroyed many noble gems in that way.

In very early times it is probable that the diamond was sought more for its hardness than for use as a jewel. Indications of this exist in several books of the Old Testament. The "shamir" of Ezekiel and Zechariah, translated in our version after the Greek to "adamant" and "adamant stone," in Jeremiah is translated "diamond." The prophet says, "The sin of Judah is written with a pen of iron, and with the point of a diamond." (Jer. XVII, I.) Ancient Jewish writers say of the "shamir," that "it is like a barley corn, so strong as to cut the hardest stones in pieces." They claimed that Moses used it for cutting the stones for the two tables of the law, and for fitting the precious stones in the Ephod. They say also that Solomon cut with it the stones for the temple he built. The word rendered diamond in Exodus, where it is given as one of the stones in the High Priest's breastplate, is "Jahalom," coming from a word which signifies to break. The "point of the diamond" mentioned in Jeremiah, undoubtedly refers to the points of the natural crystal, especially when found as an octahedron, which was a common form in India, and the reference shows that its value for engraving and cutting hard substances was known at that time. It is possible that the "Jahalom" of the breastplate was some other stone of similar appearance, and that the tribe name engraved on it was cut with the point of a real diamond crystal, though, inasmuch as diamond will cut diamond, both the breastplate stone and the cutter may have been diamonds. From these references it is probable that the diamond, at the time they were written (500 to 600 B. C.), was more noted for its hardness than its beauty; nor would the fact that a diamond was chosen as one of the stones in the Jewish High Priest's breastplate a thousand years earlier, oppose the theory, for as stated, with the degree of knowledge about precious stones existing then, other stones, more transparent in the natural crystal, might have been used as diamond jewels, while many of the real diamonds found, on account of their refractory qualities and lack of exterior brilliancy, were adjudged inferior and used for mechanical purposes only. To-day some of the noted diamonds (?) stored in royal treasuries, are under suspicion, and are believed to be rock-crystal or topaz, and strength is given to the supposition by the refusal of the owners to submit them to critical examination by experts. If we consider how very slow and gradual has been the growth of definite knowledge about precious stones even during the last century, it is reasonable to suppose that for ages, colorless shining transparent stones were all classed with the hard diamond, even as red stones were called rubies because they were red. Then came a period of dangerous "little knowledge" which sought to cull out the stones which were not diamonds, by the absurd test of the hammer and the anvil, whereby the hard, but cleavable and easily fractured diamond was destroyed as effectually as the softer rock-crystal and topaz. But out of every chaos, truth finally emerges: the matrix of error and ignorance wears away with time, for only truth endures. And so step by step, men learned to differentiate these similar stones.

There yet remained, however, as an obstacle to the use of the diamond as a jewel of the first class, the dull exterior of the natural crystal, and though there was that about the light of it which fascinated the eye, and suggested beauty imprisoned behind the facets, the hard skin barred all attempts to get more than a glimpse of the beauty it would not fully release or unveil. For centuries that hard exterior was invincible and the flashing brilliancy of the cut diamond was unknown. Then came the idea of rubbing and grinding the stones together, suggested probably by a desire to smooth the surfaces of rough and hackled crystals. This practice led to the discovery that the even facets of the smooth octahedron could be improved by the same process, but, from all we can learn, the ancients got no farther.

Another hindrance to an adequate appreciation of the diamond as a jewel was its lack of color. The ruby, emerald and other stones, attracted the Oriental eye by their color, but the glory of the diamond is its brilliancy and that was partly hidden. For that reason, the ruby and inferior stones were preferred, and even now that the inherent beauty of the diamond is fully revealed, the natives of some eastern countries, by hereditary instinct, rank it, as did their forefathers, below the blood-red stone of Burmah.

Though the diamond and other similar stones supposed to be diamonds, were known and treasured for several thousand years B. C. in India and neighboring countries, it was comparatively unknown in Europe before the invasion of India by Alexander the Great, 327 B. C. Returning Greeks brought knowledge of the diamond to Europe, and their leaders doubtless brought some of the precious stones also. From Greece they were carried to Rome by war and commerce, so that during the first century they are mentioned by Roman poets and historians in their writings.

The English name for the stone and the French "diamant" are synonymous with "adamant" from the Greek "adamas"— untamable — the unconquerable. It is derived from the Greek α —"un" and δαμαω — "tame." The name was Latinized as Rome superseded Greece as a world-governing power, into "diamas," and established with slight variations by medieval writers in the vernacular of the various European nations; originally as "aimant" and "ayment" in France, and "diemant" and "demant" in Germany.

The word is apparently more ancient than a knowledge of the stone in Europe, and was probably attached to the stone because it conveyed an idea of the gem's quality of invincible hardness. In the writings of some of the Ancients, the word signified a hard metal or weapon, and it was also used as a personal name. As the stone, which could rend any other thing and withstood all others, came to be known in Greece and Rome, the word in their language which carried an idea of its prominent quality was doubtless used at first descriptively, and became later by custom established in the nomenclature of gems. There was little use for the name in western Europe until the fourteenth century, as the stone was not generally known, and there were few of any importance in Europe until long after. A Portuguese writer of the sixteenth century claimed that all stones over 30 mangelins (37½ carats) were the droit of the rulers of the countries where they were found. Another writer a century later said that at Golconda the reigning prince claimed all stones of ten carats and over. As late as 1838, John Murray stated there were but 19 diamonds of 36 carats and up, in Europe. It has been asserted that not more than 100 stones over 30 carats each were in existence about the time of the African discoveries, of which perhaps half were in Europe. One old writer mentioned as a thing hard to believe, that he himself had seen one weighing 140 carats and had heard of another which weighed 250 carats. In his time (early part of the 19th century) Mawe said he did not think there were a half a dozen very large diamonds in Europe, and they were in the hands of sovereign princes. He probably had in mind stones over 100 carats, of which there were two each in the crown jewels of Russia and Portugal, the Austrian "Florentine," and the "Regent" of the French crown jewels. Tavernier says that before the Coulour or Kollur mine of India was opened in 1550, the largest found were about ten or twelve carats. This does not tally with some of the ancient histories attached to several of the celebrated diamonds of India. The list of stones published in 1874 at the sale of the Duke of

Brunswick's collection, includes 7 diamonds ranging from 37 to 81 carats each.

It is evident from the remarks of Pliny about the diamond, that from its introduction by the Greeks into Europe until his time, over three hundred years later, but little was learned of the stone, for his accounts of it are absurd fables, and his statement that there were "six varieties," of which the Indian and Arabian were of "unspeakable hardness," indicates that softer stones were yet thought to be diamonds.

By the traffic of Rome, the diamond was gradually carried westward, but owing to the inability to cut and polish it until well on in the fifteenth century, it was not classed as the equal of rubies and emeralds. In the middle of the sixteenth century even, Benvenuto Cellini ranked it third among precious stones, placing the value of it as about one-fourth that of the emerald, and the emerald at half that of the ruby. It may interest some who know little of the value of these colored precious stones, to learn that he estimated a perfect ruby weighing one carat at the equivalent of eight hundred dollars.

Reviewing the information to be had, it appears certain that diamonds were known and appreciated in India at least five thousand years ago. They were brought into Europe twenty-two hundred years ago. During that period, similar stones were thought to be diamonds, the Indian stones, classified as superior on account of their hardness, probably being the real diamonds. By way of Greece and Rome, a few drifted into the hands of the monarchs and powerful nobles of countries farther west during the next fifteen hundred years, then to a greater extent as Spain, Portugal, England and others established direct communication with India. As before stated, there is evidence that the points of the crystals were in use six hundred years B. C. as gravers. After the art of cutting and polishing it was discovered in the fifteenth century, the gem grew in favor as a jewel, slowly, however, and the use of it was still confined to the rich and powerful. In the early part of the seventeenth century, impetus was given towards its establishment in public knowledge and favor, by the discovery of new fields in Brazil. From that time it became a theme for historians and romancers. During the eighteenth century, scientists were attracted to it, and began to acquire exact information about its nature, formation, and various qualities, proceeding to make reasonable speculations regarding its antecedents. This was continued throughout the nineteenth century with the addition of careful experiments and research for the trial of theories and the acquirement of definite knowledge. During the latter part of the nineteenth century, the opening up of new diamond fields in Africa containing unlimited quantities, simultaneous with an unexampled development of industry in all departments throughout the world, and the rapid accumulation of wealth in the United States, combined to place the gem in a position of great prominence, not only as the jewel of fortune's favorites everywhere, but as a great factor in the world's store of enduring wealth, for while the greater items of food supply and manufactures must be constantly replenished, to repair the loss by consumption and wear and tear, the product of the diamond fields simply accumulates.

The opening of the twentieth century sees this superb

MADAME CAVALIERI. Courtesy of Aimé Dupont gem in much more beautiful form than ever the monarchs of old saw it, scattered through every village and hamlet in the United States, and upon the hands and necks of daughters of the plain people, sparkle and flash gems more royal than the royalties of the world for thousands of years ever knew.

CHAPTER II

DIAMONDS COMMERCIALLY

FEW people recognize the influence which the diamond has had in the world's affairs. Generally it is regarded as a bauble simply: a star to shine in the lighter realms of love and pleasure, but outside the plane of rugged forces which are supposed to govern the serious interests of life. Yet a moment's reflection will convince one that love and pleasure are most potent to set in motion the machinery of stern action. The loves of rulers, many of them illicit, have cost nations as much blood and treasure as the establishment of great principles, and the march of armies has often been delayed to wait on the pleasure of a potentate or general. A voluptuous queen of conquered Egypt toyed with the power of Rome; the favorites of the King bent the knees of France's nobles, wasted her substance and enslaved her people. Since the beginning, man has lived for pleasure in some form, and whether good or bad, love has been one of its chief sources, and in the realm of love the diamond has been for centuries very powerful.

But not alone thus indirectly has the diamond been a serious influence in the earth, but as a direct lure to greed, Nature has by it broken down the barriers against progress, and kept in fermentation the life of the world to clarify it. The narrow bounds of Hindu principalities were periodically scattered by one raiding the treasure house of another, thereby weakening in the process ignorance and prejudice, and leveling a racial plane on which to build a greater India. The Persians looted Delhi. The Afghans robbed Persia. Greece and Rome overran them all, the chief incentive in each case plunder, in which the diamond shone most alluringly. Later, England sailed the seas for the fabulous wealth of the Orient; Spain sent her adventurers to the new hemisphere of the West; the world gathered at the mines of Africa, and in all, the diamond was one of the forces that moved them.

It is difficult, in these prosaic times, to realize the feelings of the Ancients in their regard of the diamond. It was held in awesome reverence by the multitude, and by a reflex action, in a lesser degree by those who owned them. Nor did familiarity breed contempt in the minds of the possessor, for his possessions were desired by all his peers, many of whom were ready to barter great things to gain them. A great diamond gave renown to the prince who owned it. It was a lustrous sign of his power and wealth, bruited farther than his deeds. And it was a reserve fund in emergency. With it he could raise troops, win powerful friendships, and wield influence with men who then as now flock close to those who have what they have not. Travelers and traders told of its magnificence, and the hearers vied with each other in swelling its glories and value when they retold the story. Far-off monarchs despatched embassies to negotiate for it, as for something of national importance, and the lives of subjects were not counted if their sacrifice would gain it. How must the people regard a thing which lying in the palm of a hand, was reckoned of more value than their lives by him who commanded them? If he said, "Fill the breach mine enemies have made to get my diamond, with your bodies," they must do so.

His diamonds were to the old-time prince of the Orient and are somewhat so to-day, his fortune. Having no system of usury, valuables were hoarded, and of them the diamond was the most concentrated form of wealth, taking but little space for storage, and easily transported in time of danger. To the rajah, his treasure chest was as lands were to the feudal barons, or as his investments are to the money-king of to-day, except that it bore him neither rents nor interest. He met his current expenses by making levies upon his people; if his people failed him, he had his treasure-chest.

Some of these ancient conditions still surround the diamond to-day. Princes of the Orient by hereditary instinct acquire and hold jewels with old-time tenacity, though many of them are learning the modern method of making investments yield an income. Men and women the world over, yet see diamonds through the mists with which ancient superstitions and reverence hallowed them, but beyond this, they have of late acquired an important place in the commerce of the world as a staple product. When the diamond fields of India and Brazil were the chief sources of supply, there was a constant uncertainty, the fever of an unknown quantity, arising from the irregularity of the yield and instability of price. A definite idea in the public mind of value was impossible, for buyers, like the supply, were limited and spasmodic. The African mines, and the development of the United States, have changed this condition. The supply of diamond-bearing earth apparently is inexhaustible. The yield is so even that the average weight of diamonds that will be found in a given quantity of earth, from the mines individually and collectively, is known beforehand to the fraction of a carat. The output can be regulated with the exactitude of a factory, and as the principal mines have been all under the control of one syndicate, deliveries and price could also be adjusted at will.

With the control practically of the diamond output of the world, the Anglo-African syndicate began to sort and grade the rough closer, until now no staple is more closely sorted than are African diamonds, and the price set on them has been absolute and indisputable. The keen system which governs the present marketing of diamonds is destructive of the sentiment and romance which was once so characteristic of the business. It has robbed it largely of the element of uncertainty which aforetime appealed so strongly to the gambling instinct of the trader. It has also raised the traffic to the dignity of a staple of commerce. The enormous production of these later years, and the wider sale for diamonds which has resulted from the strenuous and successful exertions of the world during the last decade to create and accumulate wealth, have combined to make the diamond an important item in the trade of the world. Twenty-five years ago, few jewelers in the United States carried diamonds in stock; to-day there is scarcely a jeweler in the States, even in remote hamlets, who does not carry some, and jewelers of prominence carry an average of from one hundred thousand to a million dollars worth. Nearly forty million dollars worth of various kinds were imported into the United States during 1906. As many of these were uncut, the value of that portion of them was largely increased after their arrival.

A large proportion of the diamonds sold in the United States, pass, in the beginning, through comparatively few hands. Some by way of cutters, who import rough diamonds and cut them here. As the diamond syndicate sells the rough in large parcels for cash, and will give a " sight," as the opportunity to look at the original lots from Africa on arrival in London is termed, to but few, these firms must be strong financially, and well equipped to handle the rough, and market the finished material. This means that they must not only have considerable capital, but good banking facilities, a large shop, and a connection with large buyers. There are a number of smaller cutters who could neither get a " sight " in London, nor handle the parcels offered, if they could. These depend on the irregular offerings of independent miners, for their supplies, or on the odd stones and small lots thrown on the market by firms who do buy at first hands.

The large cutters sell their product to importers and jobbers usually. Some divide their original parcels, and apportion the division among firms generally supposed to be cutters, but who do not actually own or operate the cutting shops. One firm cuts fine material only, as perfectly as possible, regardless of the loss of weight necessary to secure exact faceting and the proper outline and proportions. A few large retailers who have customers willing to pay very high prices for stones which are unquestionably superior in every way, take the output of this shop.

Importers buy most of the diamonds they handle of foreign cutters in Amsterdam, Antwerp, London, and Paris, and sell what they import, as far as possible, in the original parcels. Some of the lots, they assort for size and perfection to suit small wholesale dealers and retailers. Exceptionally fine stones are often separated and sold singly at an individual rating which accords with the fineness of color, degree of perfection, and size. The buyers for these houses visit the markets of Europe once or twice a year, and a few of them keep an agent most of the time in London, from which city they make occasional excursions to the continent as may be necessary.

During the last ten years, a considerable quantity of diamonds has been imported by retailers. The reputation of making importations direct, the expectation of buying cheaper, and the buyer's desire for a foreign trip, have been the inducements, and the flush times made it possible. Generally, such buyers gain no advantage in the cost of their purchases: oftentimes, after expenses have been included, the goods cost them more than if bought here. With little experience and knowledge of foreign methods, and buying under conditions to which they are unaccustomed, these occasional visitors to European markets, frequently overload themselves with goods unsuited to their trade, and pay prices actually in excess of those demanded here, though apparently less. If they buy original parcels of mixed sizes and a wide range in degree of perfection, they are seldom able to gauge the average value: if they insist on assorted goods, they pay fully as much minus the duty which they pay later, as they would in their home market, and to which must be added the cost of the trip to Europe. As the people they sell to, know less about the goods, they succeed fairly well in marketing them at a profit, and as long as trade is sufficiently good to warrant the expense, such buyers will probably remain convinced that the annual trip to Europe is a good stroke of business.

Importations of this character have been sufficiently large of late years to materially affect the price of goods on the other side. When the markets are full of buyers who do not know inside values, Europeans are not slow to take advantage of the situation. While they are able to sell to men who have cash in hand, at large profits, it is difficult for the dealers who are buying to sell to the same trade, to get bottom prices against such competition. In this way cutters and second-hand dealers in Europe have been enabled to get very profitable prices, of which the syndicate, noting it, took advantage and periodically raised the price of rough to correspond. Of course the tremendous increase in the price of diamonds during the past ten years must be charged primarily to the control of the mines by the syndicate and to the general prosperity of the world and of the United States in particular, for the States use a majority of the African diamonds mined, nevertheless the flood of small and reckless American buyers in Europe, has undoubtedly assisted the diamond syndicate to a large degree in their policy of steadily advancing the price of diamonds.

The importance of the diamonds themselves as an item of commerce is however but a small part of their influence commercially. The influence is much more far-reaching. From 1652, when the Dutch made a settlement at the Cape of Good Hope, re-enforced later by three hundred Huguenot emigrants, until 1814, when by right of conquest and purchase the Cape Colony became a British possession, South Africa was but sparsely settled by Europeans for about a hundred miles inland. In 1820, five thousand British emigrants were added to the settlement. Later, many of the Dutch, to escape British rule, trekked to the north, and by 1854, with indomitable spirit and their guns, shot out of the wilderness a clearing among the savage Zulus for two great States, the Transvaal and the Orange Free State. These and the Cape Colony progressed slowly, but in all the interior, the Boer farmers were thinly scattered over vast tracts of land, and lived a primitive life that knew nothing of the great and busy world beyond their sequestered confines. And all around, Zulus, Basutos, and Hottentots lived in the ungoverned and unknown wilds of savagery. Then came the discovery of diamonds in 1867. Soon the fact was noised abroad; the colonists began to flock to the interior where the discovery was made. Adventurous spirits from the British Isles, from France, Germany, the United States, and remote places of the earth, turned their faces toward that center of attraction. Impoverished sons of noble families, trading Jews of Houndsditch, rough, strong sons of toil, keen, shrewd Yankees, men of all races, types, religions, and politics, gathered to the magic sound of "diamonds." By 1870 there were ten thousand of them searching for the precious pebbles in the Vaal River. They found the diamond-bearing ground of Kimberley in Griqualand,

and a town of 30,000 inhabitants had come into existence there among the wilds two years later. Since then others have been built and now, where wild beasts roamed at will with a few drifting tribes of savages in a country remote from civilization, one can see the most modern equipments for business and the household, and the best and most scientific mining machinery that the world could devise and build. In twenty-five years the diamond did more to build a new empire, than the pioneers of the most vigorous and tenacious races the earth has ever known, had succeeded in doing in over three hundred years.

The lure of the diamond in Africa has raised a new generation of wealthy men, begun a new empire, ground together a number of antagonistic individuals into a coherent nucleus for a new people; it has encouraged scientific research, stimulated engineering skill, developed great natural resources and uncovered others. By its magic, hitherto almost inaccessible stretches of the earth have been added to the habitable world, thousands of savages are brought to a better understanding of life and made amenable to the laws of civilization, and as the precious pebbles pass from one to another until they bring delight to the final possessor, from the Hottentot laborer in the Compound, to the fair hand of plighted troth, they leave in the passing a betterment of conditions to all.

Another commercial phase is their value as a concentrated form of wealth. Somewhat of the Oriental idea of diamonds as a safe and enduring value prevails with most people. Comparatively few of the general public, in buying them, lose sight entirely of their exchange value. Many buy them as a luxury only because they consider them as good for money in case of need. In good times they tell with dazzling emphasis the success of the owner; in times of stress they are a quick asset or unquestioned collateral that requires no search or legal documents, but is always ready to tide him over. This idea often leads to surprise and dissatisfaction. It is no uncommon thing for a person to bring to Maiden Lane a diamond for sale, with the confident expectation of receiving as much money for it as he paid in a retail store. So strong is this idea of it as a thing of staple value, that the items of profit for the various handlers are lost sight of, and these profits are necessarily considerable.

Large as the diamond trade is, the sale of precious stones is comparatively slow. They cannot be turned into money at their market value at will like silver, wheat and other things in constant demand. And being a commodity of slow and irregular sale and of great price, the margins of profit are sometimes greater. If therefore, a diamond bought at retail is brought to a cutter for sale, the profits of the retailer and the jobber must be deducted. The cutter estimates it at what he could produce it for, less a further percentage should the stone be undesirable in any way for his particular stock. This rule applies to any stage of the trade, and it follows therefore, that the retailer can afford to pay more than the jobber, and the latter more than the cutter. Notwithstanding the loss entailed in the disposal of a diamond by sale to a dealer, there is probably no other thing outside of staple commodities which will hold value as securely and long, or can be turned into money as readily as the diamond. At a forced sale it will realize more in proportion to its value, on an average, than real estate even.

Since the diamond syndicate secured such perfect control of the trade, the profits, after the diamonds leave first hands, have been much curtailed. Cutters will sell large parcels to houses of undoubted credit for a net profit of five per cent., after deducting interest on the note given in payment. Importers will sell on time for a profit of eight to fifteen per cent., according to the commercial standing of the buyer and the length of time given. Retailers of the East will not average over twenty-five per cent. profit. As cutters and importers sell on six to ten months' time, and sometimes spread a large bill, by a division of the amount in notes bearing no interest, over a period of from six to eighteen months, it will be seen that quick sales, large amounts, and good judgment in credits, are necessary to successful business.

The frequency with which the syndicate has advanced the price, has been the diamond dealers' good fortune during the past ten years. Never sufficiently large to check trade — the advances have usually been five per cent., occasionally seven and one half per cent.— they have stimulated trade with a money-making public, and encouraged speculation among dealers, who were able to market the goods and make at least part of the advances in addition to regular profits. Curious anomalies have arisen from the conditions. During that period, small dealers, who buy about once a year, have frequently found when the time came to lay in their stocks, that to duplicate what they bought last, they had to pay as much for stones as they were selling them for at retail; in some cases more.

As the retailer does not usually turn his stock of diamonds more than once a year, his profits are, comparatively, less than most staples which are turned more frequently at a smaller profit, and they are actually less than the percentage of profit afforded by many of the necessities, as shoes, scarves, and clothing both for male and female wear, and a large number of foodstuffs.

In ordinary times the diamond trade is not a money-making business. The volume of sales, compared with the stock necessary to do the business, entails an interest account which eats up a large part of the profits. Panics usually find the dealer with a large stock on hand, and notes out for a considerable part of it. As a result, much of the money made during the flush period preceding, melts away before all the notes are paid.

Good-sized fortunes have been made in the States out of diamonds, usually by shrewd importers who have been able to extend large credits to jobbers and retailers who were better able to market the goods than to finance their affairs without the assistance of the firms from whom they bought their stocks. In carrying such accounts, the importer not only makes larger profits, but a constant income from renewals of notes, as he can generally borrow for one or two per cent. less than the six per cent. he charges. The method is about as follows: the importer noting a wholesale or retail jeweler of moderate capital who is doing a good business and whose character is good, approaches him with an offer of large credit and long time, payment to be made by notes, but with a promise of assistance if the buyer is not able to meet them when due. It usually happens that the assistance is needed. The renewal notes are discounted at six per cent., and re-discounted by the importer after he has placed his name on the back, at four to five per cent., and from that time on he has a good customer at profitable prices. Some good salesmen never escape this condition of dependence; others do, but the importer generally has enough such customers to insure an outlet for a considerable amount of goods, and even if the buyer graduates into the class able to pay bills when due, the former relations have begotten a confidence which inclines him to buy, other things being equal, of the man who formerly assisted him to establish himself.

For several reasons the import trade is done principally by Jewish firms. They constitute about eighty per cent. of the number who regularly import diamonds into New York, and have headquarters in that city. The total number of importers is about sixty. Of these about thirty-one are importers whose volume of business entitles them to be reckoned as of the first class, and twenty-nine smaller houses may be termed of the second class. Two-thirds of the first class and over ninety per cent. of the second class are Hebrews. This does not include a number who class themselves as importers though they seldom import direct, but usually buy through a large house, either here, or on the other side, and have the goods forwarded through the Custom House to the importer in New York, who pays the duties and makes an American settlement with the buyer. Nor does it include some who occasionally import small lots, and foreign dealers who visit New York irregularly.

Large retail dealers, some of whom import heavily, are also not included.

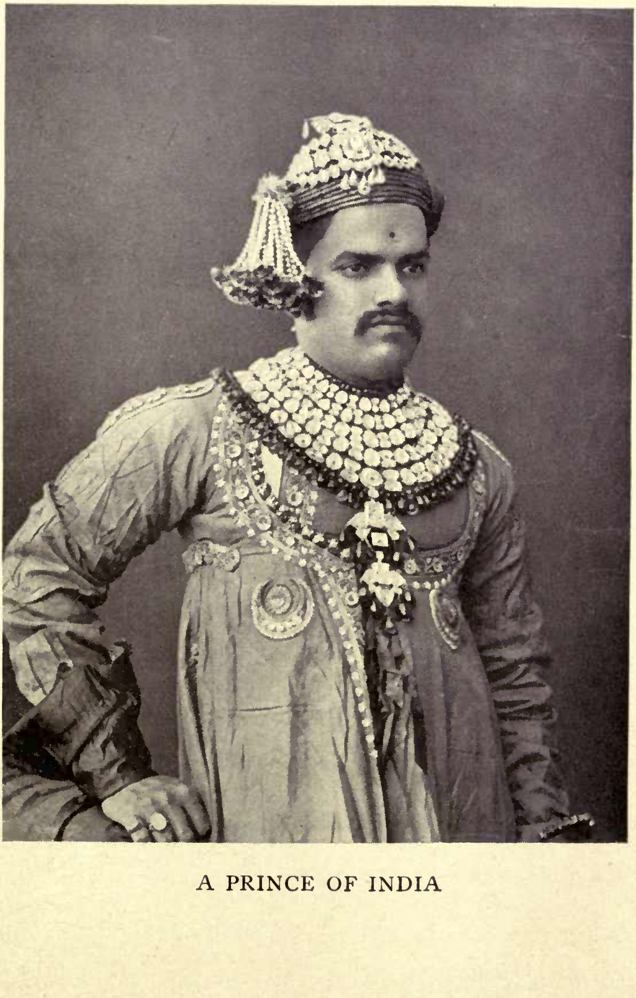
Most of the men of whom the Jewish firms are composed, are of foreign birth, whose home training and connections had familiarized them with the trade and industry at the source of supply. Many of them began business here as importers of Swiss watches, or jobbers of jewelry, and, quick to see the trend of affairs, added diamonds when our flourishing conditions brought an increasing demand for them. As the demand for diamonds increased and Swiss watches were displaced by American, and the manufacturers of jewelry began to sell to the retail trade direct, they discarded the inferior lines, and concentrated their capital and energies upon diamonds alone.

Being in line with the business by their European training and connections, is undoubtedly the chief cause for the preponderance of the Jewish element in the trade here, but there are other reasons. The trade is one that appeals to the Jew. There is an element of uncertainty in it. Every transaction must be fought out individually for profit, and the profit is an unknown quantity until the deal is closed. For centuries, in most countries, many avenues of life, into which the struggle for supremacy among men tempts the adventurous, have been closed to him, and he has been obliged to try his mettle in the more peaceful contests afforded by trade. Into the sale of a bill of diamonds he puts the soul of a duelist. It is not alone for the money in it he seeks to get a good price, but to win in the battle of wits. Like the man of the sword, he feints with wrist and eye; attacks, retreats, allures and uses every artifice he has learned, to gain the advantage of his adversary. If he wins, the stakes are appreciated, but it is upon the conquest he plumes himself. If he loses, he honors the man that withstood him.

Another reason for the success of the Jew in this as in other trades, is his quick recognition of merit in those who serve him, and willingness, when the demand is enforced, to share the profits of the business with those who assist him in making them. Liberal in expenditures, he will allow his subordinates to spend any amount necessary to get business which eventually shows a profit, and though he will drive as hard a bargain with them as with others, he will pay a profit-winner who insists, more than a man of any other class will, to hold his services. Practically the Jews are the most democratic of all people. They gauge a man by what he can do. Name, birth, breeding, learning even, count but little, in their estimation, for the man who cannot himself do things; they count nothing against him if he can. The office boy who demonstrates that he can sell goods is immediately treated with the consideration due to a salesman; his former insignificance is at once forgotten.

In this way the senior members of their firms gradually withdraw to the rear where they hold the reins of finance, while the van of active business is held by a young working force in touch with present conditions and who have learned how to do business, not by school and luxury, but by work and experience. A Jewish firm may last many years, but it seldom grows old or infirm. Add to these qualifications, an unbounded capacity for work, and an almost instinctive understanding of the principles of finance, and the fact that the important end of the diamond business is largely in the hands of the Jews in this country, is explained.

The diamond has been a great commercial influence, not only by opening new territory and thereby largely increasing the demand for other products to supply the needs of new and increasing commodities, but it has become a valuable assistant in the development of important modern staples of commerce. Bort and carbonado, the semi-transparent and crypto-crystalline diamonds, though useless for gem purposes, are used extensively in processes of manufacture where great resistance to wear and tear is requisite. These are used to saw marble, granite, and other hard stones; to drill and bore in mining and similar operations, and from the refuse of gem crystals are made draw-plates for drawing the fine metal wires so necessary for electrical supplies. The supreme hardness of the material enables the manufacturer to draw great lengths of wire without the slightest variation of gauge through the enlargement of the holes, as would be the case with a plate of hard metal. It is a curious fact worthy of attention in passing, that, as needs arise in the evolution of man's mechanical skill, Nature presents some new form of supply adequate. Simultaneous with the tremendous development of mining, tunneling, and the application of scientific discoveries to practical purposes during the past fifty years, the diamond fields of Africa and the carbonado fields of Bahia, containing vast quantities of material suitable for the requirements of those conditions, were discovered and developed. Similarly, the yield of gem stones has been abundant for the demands of an era of unprecedented prosperity. The abundance of Nature is such that no demand of man can arise for which there is not a possible supply. If he needs heat, and the sun's rays are insufficient, he learns to kindle fires and get the needed heat by burning wood; as the wood fails, he discovers coal; before the coal measures are exhausted, he finds there is a full supply to be developed from electricity, and so on. It is not possible for a man to need more than Nature can supply, and in fact most if not all of man's needs, are created by the supplies which surround him. Supply and demand are the working phenomena of the principle in Nature which constantly scatters and re-unites thc elements, making out of heterogeneous masses, homogeneous combinations and vice versa, thereby insuring the continuity of life and progress.



A PRINCE OF INDIA

CHAPTER III

THE GROWTH OF THE DIAMOND TRADE

FOR centuries, probably thousands of years, diamonds were a royal perquisite. They blazoned the regal state of Oriental princes, and were a sign of autocratic power. Ordinary trade in them was confined to small and poor stones and the few fine ones which escaped the requisitions of the rulers where they were found.

Little is known of the ancient traffic in diamonds. It is said the the Arabs and Phœnicians traded in them. They were not only used as jewels, but as cutters and gravers for centuries B. C., therefore they must have been carried far and wide throughout the Orient; but literature had small space for commerce in those days. Though we read of the uses to which they were put, we know little of the channels by which they were gathered and distributed.

As far as we know, they were found only in India, but later discoveries of very ancient mining operations in Rhodesia, suggest that they were also taken from Africa many centuries ago. The diamond fields of India were confined to a comparatively small section of the country in the southern central part of India back from the eastern coast; in the Deccan, near the banks of the Godavari, Krishna and Pannar rivers and the country lying between them; and a section farther north on the banks of the Mahanadi, in the Panna district of the country known as Bundelkhand. The latter are supposed to be the oldest diamond mines of India, though the more southerly diggings which include the Golconda district, are more famous.

From a Dutchman named Van Linschoten, we learn something of the way in which mining was conducted in India late in the sixteenth century. Writing in 1596 of the mines in the kingdom of Bisnager whose capital was at Hampi in the Bellary district, he said, "The diamonds are digged from several hills near the town of Bisnager." The king farmed out rights to mine with the condition that all diamonds weighing above 25 "mangelyn" (between 34 and 35 carats) should be his. The mines were closely watched, and in the language of Van Linschoten, "if anie man bee found that hideth anie such, he looseth both life and goodes." It may be conjectured that in yet earlier times, the rulers of that and other diamond-producing countries were equally vigilant in securing the best of the mines for themselves.

In this way, large stones remained in the possession of princes, some probably passing from the kings of the producing countries to others as bribes for military assistance in times of war, or for other favors. Some were exchanged possibly for rubies, pearls and emeralds found in other kingdoms, but not many important stones were lost to the land of their nativity, except by the fortunes of war. These Hindu princes continued to add all they could to their jewels, and accumulated them until a prince more powerful invaded their strongholds and looted the treasuries. It is estimated that the loot taken by Nadir Shah when he sacked Delhi amounted to seventy million pounds sterling.

Under these conditions, it will be readily understood that the trade in diamonds for many centuries was very limited, and was confined necessarily to those suitable for mechanical purposes only, some inferior gem stones, and a few large pieces stolen from the mines, or obtained by knavery of some kind. One may imagine also the difficulties of trade in important stones under these circumstances. The dealer, conscious perhaps that his diamond came to him by way of robbery, perhaps bloodshed, and that it properly belonged to the ruler of his own or some neighboring country, was careful to hide its antecedents and obliterate as far as possible all records concerning it. Secrecy and deceit attended every sale. To hide more thoroughly the real history of the stone, imagination supplied one innocent of punishable criminality, but ornate. These oriental fables invented by the chapmen of past centuries, drifted through the channels of trade into the literature of later days, and still cling to the diamonds of India, as morning mists hang about the hillsides long after the sun has risen. These methods were in part therefore necessary. One who deals in diamonds now must be watchful. Even when a stone had passed from one to another legitimately, the owner had need then for greater care than now. Diamonds were fully as attractive to thieves then. Laws were very uncertain; magistrates more so, and rulers had a habit of finding methods to obtain things they desired which did not include a *quid pro quo*. If the dealer's title to ownership was open to question, an attempt to sell must be made with extreme caution. Ordinary stones could be trafficked in openly, or carried for sale to the foreigners, who from the fifteenth century visited the seaports to trade in the products of the Orient, and who frequently bought diamonds to use as remittances for their own purchases in the home countries. But if the merchant had a great stone which came into his possession by way of a miner who had been too adroit for the watchful eye of the King's overseer, or from the hand of a freebooter, then he must be cautious. First he must find a likely purchaser; then by skillful aids, rumors must be sent floating to his ear, dropped as lightly and skillfully as the angler drops a fly upon the water to be carried past the hiding place of a wary trout. If he rose to the bait, some one stood near to tell what he had heard of the wonderful beauty and magnificence of the stone. Hints of roguery, danger, the desire of some great rajah to own it, or loot from a far-away temple or royal treasury, were made to stimulate curiosity and whet an appetite for a share by trade in the plunder. In good time the merchant's representative arrives and broaches the subject, contriving while doing so to introduce his own idea of the great value and probable price of the gem. He leaves, and one day, it may be weeks, it may be months later, he returns, and with him the merchant and his great diamond. The jewel is exhibited, the price asked, given and wrangled over. The interview ends, and the wily Orientals leave, carrying the diamond with them. At unexpected times, this would happen again and again until an offer was made. Then the trader sought by every artifice to get an increase until, sure that he had the last rupee possible, he left the stone and carried away the price. Over a year was consumed in the negotiations between Jaurchund the Hindu merchant and Gov. Pitt, over the sale of the "Pitt" diamond. The first price asked was 200,000 pagodas; Pitt's first offer was 30,000 pagodas and he bought it finally for 48,000, or £19,200. He did not sell it until fifteen years later.

In those days the keen competition of to-day for business did not exist. Buyers and diamonds both were few. The great endeavor was to make the profit sufficiently large to pay for long waiting and the risks incurred.

As India came under the control of the English, the diamond industry fell off. The supply was too uncertain to attract capital for organized effort after western methods. The old time power of the native princes to induce their subjects to go into the business of looking for diamonds, no longer existed as a stimulus. As the princes came into subjection to the English, and the English neither forced nor assisted the industry, it languished. About this time, the diamonds of Brazil were discovered, and being thrown on the market in considerable quantities, proved to be invincible competitors. The dealer in Indian diamonds succeeded for a time in discrediting the Brazilian stones by arousing suspicions as to their genuineness, and later, as these were allayed, by claiming that the quality was inferior, but the traders of South America were too sharp for them. Instead of entering into a controversy over the matter, they shipped many of their diamonds by way of Goa, the Portuguese East Indian port, to Europe as Indian stones, until they had established a market.

A large part of the diamonds exported from India, went to Europe as remittances, and were not always profitable. Sir Stephen Evance writing to Pitt in 1702 says, referring to a lot received by the ship *Duchess,* "can't sell them for eight shillings the pagoda." He also says further, that another dealer had been "obliged to sell his remittance for six shillings the pagoda," a loss of twenty-five per cent., as the pagoda was worth eight shillings.

European houses also commissioned merchants and officials stationed in India to buy for them. Europeans living there speculated in them, shipping them to friends at home to sell. Captains and others connected with the East India shipping trade, watched for opportunities to add profit to their voyages by picking up an occasional bargain at the ports they called at. Some notable pearls and diamonds are said to have reached Europe in that way.

Discovery of diamonds in Brazil brought them into more general use in Europe, and thereby developed the trade in them. At that time Brazil was governed by Portugal and everything found there, went to the home country for disposal, whereas in India the finest diamonds were held by the native princes. Up to 1850, it is estimated that the mines of Brazil had yielded over ten million carats. This supply, large for the conditions then existing, naturally created a wider demand for them in Europe, but as there was no attempt to control the output, the business remained purely speculative, and prices were governed by conditions of the moment. When Dom Pedro paid the interest on the Brazilian state debt in diamonds, the price of them in London fell nearly half. In 1838 the price was up again, but fell with the French Revolution ten years later. The Civil War in America, by the creation of new money and suddenly acquired fortunes, raised the price twenty-five per cent., to which the Franco-German War added another ten per cent., and an era of prosperity succeeding, sent it up fifteen or twenty per cent. more. America's panic of 1873 broke the price again, and it fell steadily with the advent of African diamonds until Cecil Rhodes syndicated the mines, since which, with an unprecedented and inexhaustible supply, the prices have been gradually forced up until they are now more than double what they were at that time.

The coalition of the Kimberley and De Beers interests under Cecil Rhodes and Barney Barnato, transformed the diamond trade from an uncertain and speculative industry, liable to sink with unfavorable conditions into insignificance, to one of international importance, ranking with the staples of commerce. The development of the industry will therefore be considered mainly from that point.

When the fact became apparent, that unlike all diamond mining heretofore in India and Brazil and the first discoveries in Africa on the Vaal River conducted in alluvial débris, the diggings about Kimberley and elsewhere were all in huge pipes or chimneys of material in which the diamonds were formed, and that the supply of diamond-bearing earth was practically inexhaustible, the reflection followed, that without some powerful control of the diamond output of Africa, diamonds would soon become so common and plentiful, that however cheaply they could be mined, competition and an oversupply would cheapen them to a profitless price. Cecil Rhodes, with that overlook of present conditions which enabled him to grasp their future outcome, at once planned a combination of interests in the African fields sufficiently strong to control the diamond trade of the world, so strong as to establish a confidence in dealer and consumer alike, that would increase demand, and enable the mines to unload upon the world greater quantities of diamonds than ever before in the world's history, and at prices immensely profitable to the mining industry.

The year 1880 found the diamond-mining industry in South Africa in a precarious condition. Although the mining claims, scattered over the surface of the diamond-bearing pipes, were concentrated into fewer hands, and arrangements had been made for united action in combating the natural difficulties which all had to contend with, as hoisting, pumping, etc., the methods were nevertheless crude and disjointed. The mines together on each of the chimneys, formed a vast hole with an irregular bottom, the various sections representing different ownerships, being higher or lower according to the diligence or ability of the owners to work them. Some parts of the great hole in the Kimberley were over four hundred feet down, and the expense incurred in working the mines became so great as to eat up the profits. A new difficulty presented itself; the reef, as the strata surrounding the pipes are called, began to cave in. Men with good and paying mining claims would wake up to find them covered with thousands of tons of rock and earth. Barney Barnato, who had secured quite a number of valuable claims in the Kimberley pipe, after visiting England and establishing the firm of Barnato Bros. in London as diamond dealers and financiers, returned to Kimberley and floated them into a company of

£115,000 capital, under the title of the "Barnato Diamond Mining Company." In 1881, he floated several other companies. The time and conditions were ripe for consolidation. The working of individual claims was fast becoming impractical; there was an undoubted supply of diamonds, and times were booming in the home countries from which the capital must come for large and united action.

While Barnato was doing this work on the Kimberley, Cecil John Rhodes was similarly at work on the De Beers, three miles away. In the same year he there formed the De Beers Mining Company. There were two other companies on the De Beers chimney: The De Beers Central, and the Oriental. The claims of these companies were in some respects more favorably situated than those of Rhodes' Company; he therefore worked for an amalgamation of the three, and succeeded; first absorbing the Central, and later the Oriental, so that his mine, the De Beers Mining Company, practically controlled the De Beers Chimney.

On the Kimberley, Barnato continued to pursue the policy of amalgamation also, gathering into one company known as the Kimberley Central, every claim except those owned by the French Company.

While these two men were working on parallel lines near together, to concentrate power by the seizure of opportunities which the evolution of natural conditions offered, the one as part of a grand scheme of empire building, the other with the sole business object of money-making, those same evolutions gradually converged their ambitions and brought them in contact, and contact was necessarily, war. As it became necessary to merge individual ownerships into corporate control, and to amalgamate corporations into supreme interests, separately in the Kimberley and De Beers, so also it became inevitable that the two great fields should also be merged, and Rhodes sought to merge the whole diamond-mining industry into the De Beers Consolidated Mines, a company whose franchise permitted almost everything but the functions of national government. Barnato wished to confine the interests he represented, to the mining of diamonds and the profits accruing, without entering into the liabilities which the greater scheme involved. The French Company was the clashing point. The two interests fought long and hard, and finally compromised by passing the French Company into the Kimberley Central, and allowing Rhodes to acquire a large interest in the Central. Rhodes then sought to force the two great companies to merge, and finally succeeded in obliging the Barnato interests to agree to do so. A minority of the stockholders of the Kimberley Central, however, succeeded in getting an injunction restraining the merger, on the grounds that The De Beers Consolidated Mines, on account of its extensive powers beyond that of diamond mining, was not a company for the same or similar purposes as the Central, which was a company formed for diamond mining only, and whose articles of association permitted the company to amalgamate only with another company of the same or similar purposes. This did not deter Rhodes and his associates, who accomplished their object by the liquidation of the Kimberley Central and the purchase of all its property and assets by the De Beers Consolidation.

The De Beers Consolidated Mines, Limited, was organized March 13, 1888, with a nominal capital of £100,000 with power to increase it. In acquiring the control of the two great mines and the various companies which had been operating the claims into which they were subdivided, the capital stock was increased to £3,950,000, and £2,225,000 was borrowed at 5½ per cent. interest. The first step after organization was to amalgamate with the De Beers Mining Company, and the scheme was carried into effect March 31, 1888.

The Kimberley Central Company then passed a resolution, August 7th, to amalgamate, but as stated, a small minority, by securing a decision of the Supreme Court against the legality of such a proceeding, prevented the consummation in that way, so January 29, 1889, a resolution was passed to liquidate, and the De Beers Consolidated bought the assets of the Kimberley Central Company, paying therefor £5,300,000, and secured the property, A paramount interest was also obtained in the Griqualand West Company (Dutoitspan) and the Anglo-African Company. The South African Company was bought for £120,000. The Krauss Bros. property was secured for £36,500, and a perpetual lease of the Bultfontein Consolidated, obtained. Gardner F. Williams, in "The Diamond Mines of South Africa," says that, in all, properties costing upwards of £14,000,000 were acquired.

When the De Beers Consolidated Mines Company was formed, all but twenty-five shares of its stock were held by four men, as follows; Barnett J. Barnato, 6658; Alfred Beit, 4439; Cecil J. Rhodes, 4439; F. S. P. Snow, 4439. By the articles of association they were authorized as shareholders to create "five life governors or permanent directors of the Company, four of whom shall be Cecil John Rhodes, Barnett Isaac Barnato, Frederick Samuel Philipson Snow and Alfred Beit." These four or their survivors had the power by unanimous resolution to appoint the fifth and to fill vacancies. They were the first directors of the Company and had power to appoint others until the shareholders at the first ordinary general meeting should decide how many directors there should be in addition to the life governors, and elect them. In this way four men obtained control practically of the diamond trade of the world and placed themselves in a position to exact toll from the millions who might buy the most popular gem produced by Nature.

The first annual report showed the wisdom of the consolidation, and justified the enormous expense entailed in bringing it about. It has proved to be one of the most ingeniously contrived and strongly intrenched methods of imposing an international tax for private enrichment, ever devised. In the absence of the president, Cecil John Rhodes, the first annual report was presented by Barney Barnato. This showed a profit for the year of £448,000, notwithstanding extraordinary expenses of several hundred thousand pounds sterling, of which thirty thousand pounds was caused by a disastrous fire, and a half-yearly dividend of ten per cent. was declared. The fire also occasioned a loss of the produce of three months' work. £85,435 was made out of the Kimberley mine, and the remainder out of the De Beers. In addition to this the stock of blue on the floors of the Kimberley and the De Beers was increased to 786,000 loads; worth, after deducting the expense of washing, £1,375,000, and there were 100,000 lumps, of an estimated value of £35,000. At that time also, it was stated, there were in sight in two levels in the De Beers and Kimberley mines, twelve million loads of blue, estimated to carry sixteen million carats of diamonds. At twenty-five shillings per carat that would amount to £20,000,000, though it was not the intention of the management to sell them for less than thirty shillings.

Having thus successfully consolidated the paying mines of the Kimberley and adjacent districts, the management declared it to be their policy to secure a controlling interest in all others outside of the consolidation, to prevent an entering wedge being made by a foreign company who might endeavor to form an amalgamation sufficiently strong to be an influence against them, either in the diamond or the stock market.

Another policy was inaugurated. It was founded on the conviction of Mr. Rhodes that diamonds at a high and advancing price would be in greater public favor than low-priced diamonds, and the policy of advancing the price and restricting the output to the demand, was adopted.

Barnato gave it as his opinion that the diamond production of Africa from 1873 to 1880 did not average above one to one and a half million carats per year. From 1883, when official returns began to be kept, the production up to the period of amalgamation was as follows:

1883	2,319,234	carats at 20s. 4¾d.	£2,359,466
1884	2,264,786	carats at 23s. 2¾d.	2,562,623
1885	2,287,261	carats at 19s. 5¾d.	2,228,678
1886	3,047,639¾	carats at 21s. 6d.	3,261,574
1887	3,646,889	carats at 22s. 1½d.	4,033,582
1888	3,565,780¾	carats at 20s. 2½d.	3,608,217

As soon as the consolidation was effected, prices were advanced. By the middle of 1889 the product was selling for 30s. per carat, which, allowing 10s. for the cost of production, left a profit of 66 per cent.

Although in 1889, Barnato strongly opposed the shipment of the diamonds to London for sale, preferring a local market, it was soon thought necessary to have a purchaser for the output who was not only in a position to gauge the public demand, but whose interests were so interwoven with the mines that the buyer would, as well as could, properly advise the seller what the product should be. The management of the De Beers Consolidated therefore formed a diamond syndicate for the purchase of the output of the mines and the sale of it in London. This Syndicate took the product at a stipulated price under contracts for periods ranging from one to five years. This may have been a good arrangement for the De Beers Consolidated; it certainly was a very profitable one for those interested, and afforded a means of squeezing an additional profit out of the public.

In accordance with the policy of Mr. Rhodes, although Mr. Barnato at the first annual meeting of the De Beers Consolidated declared that they did not intend to raise the price above 30s, per carat, it was steadily increased by the diamond Syndicate to the cutters and later at the mines. For the ten years from 1898 to 1907 the price at the mines was as follows:

1898	28s. 6.2d.
1899	29s. 7.2d.
1900	35s. 10.2d.
1901	39s. 7d.
1902	46s. 5.7d.
1903	48s. 6.3d.
1904	48s. 11.8d.
1905	52s. 10d.
1906	61s. 0.11d.
1907	64s. 9.74d.

The yield of carats per load, however, fell steadily. Whereas Barnato in his first annual report after the consolidation, reckoned each load as carrying on an average one and three-eighths carats, the yield of the De Beers and Kimberley in 1907 was 0.37 carats per load. In the first year of the De Beers Consolidated, the average was not as Barnato estimated, 1⅜ carats, but 1.15.

Apparently the Diamond Syndicate advanced the price of rough to the cutters as much and as rapidly as the prosperity of a prospering public would permit, and the mines management charged themselves as the Diamond Syndicate, a sufficient advance to recoup themselves as stockholders, for the decreasing yield per load and consequent increase of cost per carat of production.

During the years of world-wide and marvelous prosperity from 1889 to 1903, the De Beers Consolidated and the Diamond Syndicate controlled the African output and the diamond industry of the world, either by the control of the mines in Africa, or the purchase by the syndicate of the product of such small mines as might be worked under independent management. But in 1904 an infant giant appeared on the scene. The new Premier of the Transvaal, a company organized by T. M. Cullinan with a capital stock of £80,000, began to show that it was a power of no mean order. Nearly 750,000 carats were taken from its surface workings that year, and the diamond-bearing pipe was found to be nearly as large as the four Kimberley mines combined. In 1905 its output increased to nearly 850,000 carats; in 1906 to nearly 900,000 and in 1907 it was only a few carats short of 1,890,000. In this year also another new mine, the Voorspoed, began with 46,340 carats for 6 months. All told, the African mines produced in 1907, 5,002,968 carats, of which not much over half was from the De Beers group. In 1899 the output was 3,025,039 and in 1903, before the Premier came in, it was only 2,607,024.

Five million carats proved to be more than the world could absorb in one year, and besides, with the prospect of uncontrollable production, more than the proud syndicate dare hold for future uses, especially as in the fall of that year, the United States, by far the largest buyer of diamonds, after passing through a panic, ceased buying.

The next contract between the Diamond Syndicate and the De Beers expired June 30, 1906. It had been in force five years. The De Beers management, in their annual report of the same date, stated that a new contract had been signed for a similar period on conditions still more advantageous. The exact terms of these contracts appear never to have transpired, and the stockholders of the De Beers Mines did not know just what terms their directors made with themselves in their capacity as the Diamond Syndicate, for practically they occupied that profitable dual position.

At some time, either when the new five-year contract between the Syndicate and the De Beers was made, or shortly after, the Syndicate must have been convinced that the increasing production of the Premier mine was undermining its ability to maintain prices, and was forced to make an arrangement with its dangerous competitor whereby it agreed to market, under certain conditions, the Premier diamonds also. The Premier Diamond Mining Company announced from its head office in Johannesburg on October 24, 1907, that the company had made definite arrangements for the sale of its production to the Diamond Syndicate, similar to those granted to the De Beers. Immediately thereafter came the panic in the United States and the instantaneous cessation of orders from the world's largest consumer. That the Syndicate at once endeavored to evade or defer some of its responsibilities, appears certain from the tone of a notice sent by the Premier Company to its shareholders January 15, 1908, which said, "The board hope and believe that the depression which affects trade will shortly be replaced by a more normal state of things so as to enable the Diamond Syndicate, which has undertaken to buy until March next the production of the Company, to maintain its dealings with the Company." In the report of the Premier Company dated January 25, 1908, occurs the following, "Certain proposals concerning the quota to be supplied by the De Beers and by your company have been settled, and the first period of the contract dealing with the sale of your output by the

Syndicate from July, 1907, to February, 1908, expires in March next."

It is evident from the facts, that the Syndicate was not as supposed, a bulwark established solely to protect the mines and the trade from the encroachment of variable conditions and the economic principles and action of the laws of supply and demand which might threaten the stability of price, but a Syndicate of private interests formed out of the De Beers management for a very profitable handling of the diamonds after the mines had made one big profit for the stockholders. It is evident also that the trade can expect no support from the Syndicate except when it is profitable to the Syndicate to give it.

On March 31, 1908, the Premier mine, being dissatisfied with the share given it in the sales (30 per cent.), withdrew from the syndicate arrangement, and became a strong competitor with the hitherto invincible dictator of the diamond market.

As the Premier is the largest of all the mines, in order to realize its importance as a factor in the problem now to be solved, of how further to hold a price for a thing which has no relation whatever to the cost of production and the natural adjustments of supply and demand, a few facts regarding it will not be out of place. With an incalculable supply of diamond ground, it is erecting a plant which will be in operation in the early part of 1909, capable of treating 40,000 loads a day. The average yield in 1907 was 0.289 carat per load. Reckoning on that basis, the yield would be nearly three and one-half million carats of diamonds in a year.

In addition to this, the Voorspoed, a new mine not yet in full working order, has a plant about completed, capable of washing 8,000 loads a day. This mine will average probably one-fifth of a carat per load, or about 500,000 carats for the year. With the De Beers group and other independent mines turning out the same as in 1907, these new mines could bring the total output to something over seven million carats, an increase not much greater than that of 1908 over 1907, which was nearly 1½ million carats, although the new plants of the Premier and Voorspoed mines were not yet in operation.

Beyond the undoubted ability of the mines now in operation to produce over seven million carats per annum, or nearly three times the quantity which can be safely thrown upon the market, it is rumored that there are huge quantities of diamond-bearing earth in Rhodesia and German South West Africa, and probably many other rich deposits in Griqualand, the Orange River Colony, and the Transvaal, yet uncovered. The diamond industry has a problem of many difficult factors to solve. An unlimited supply of material which can be marketed in limited quantities only, and which can be produced at a cost so low that it is out of all proportion to the market price of the finished product; an arbitrary value which is a stimulus to new enterprises alien to the combination which established it, and a commodity which loses a large part of its desirability if the price of it is lowered. These apparently irreconcilable elements make a satisfactory solution of the problem extremely difficult, and there seems to be but one finality, viz., a return to the regulation of output and price by the natural law of supply and demand. At this writing it certainly appears impossible for the Diamond Syndicate as it is now constituted, to control either the output or the price of diamonds, and whether or no it can form a new and still greater combination, that will endure, with the new interests now in the field, is questionable, for as long as prices are maintained there will be new developments, any of which could in the beginning, while working in open cuts, produce at less cost than the older mines which must raise the material from underground workings.

A careful estimate made from the official records of exports from Cape Town, from the time when the quantity in carats was first recorded to 1908 inclusive, together with the estimate of men who were familiar with the industry in South Africa prior to that time, show that there have been exported from Africa through legitimate channels, from the discovery of diamonds until the end of 1908, about 90,000,000 carats. If one adds to this the quantity stolen, which in the early years was quite large, and has always been considerable, and the diamonds mined in Brazil and elsewhere during the period, 100,000,000 carats would be a conservative estimate of the quantity produced. Of this, probably 55 per cent. was suitable for cutting to jewels. Reckoning a loss of 60 per cent. in cutting, the addition to the world's stock of diamonds cut as jewels, since the discovery of the African mines, would be about 22 million carats. In the rough, these probably netted to the mines $660,000,000, to which must be added the proceeds of 45,000,000 carats of bort and splinters at an average of $2 per carat, bringing the grand total to

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the mines of $750,000,000. Add to this the cost of cutting, the profits of the Syndicate, cutters, importers, jobbers, and retail jewelers, and by the time the diamond product of the world since the opening of the mines in Africa to the end of 1908 is in the hands of the consumer, the world will have paid not less than $2,000,000,000 to possess them. These are conservative figures, in which the output from sources outside the African mines are reckoned at much less than is generally estimated.

During this period the United States has become the largest buyer of diamonds in the world. With an importation of about one million dollars in 1867, it imported about forty million dollars in 1907, a forty fold increase in forty years. So great has been the consumption in this country, that numerous cutting shops have been established here. Beginning with small shops for repairing and re-cutting stones, the demand for fine work encouraged cutters to cut from the crystal, and the importations of rough at the time of the panic had reached an average of nearly one million dollars per month.

Notwithstanding the depression felt at present in the business world, the importations of diamonds into the United States during the year ending June 30, 1910, exceeded that of any previous year, and the importations of August, 1910, exceed that of any August prior.

CHAPTER IV

CELEBRATED DIAMONDS

THE history of some of the world's celebrated diamonds is founded entirely upon tradition. Eliminate the records in which authorities differ, and the stories which are alike attached by one writer to one stone, and by another to some other stone, and there is little left. Some stones mentioned in old writings have passed out of knowledge: others known to-day cannot be traced back very far with certainty: a point is soon reached where the contradictory accounts given, or the similitude of the story to that attached to another, awaken suspicion. Historians usually insist that the great diamonds of the past served in the beginning of their history as eyes for an idol from which they were plucked by some knave or looter, and started on similar courses of adventures until they arrived at the hands of definite knowledge.

The most ancient and celebrated Indian diamond is known as the Great Mogul. The stone, so named after the Mogul dynasty in India, is said to have been found in the mines of Kollur of India, sometimes spoken of by the Persian name Gani Coulour or Colore, or Gan-i-mine of, Coulour, between 1630 and 1650, and presented to Shah Jehan by Emir Jemla (called "Mirgimola" by Tavernier), about 1655. Another tradition is that a diamond of 320 ratis or 280 carats, was owned by Babur, founder of the Mogul dynasty, and was known and celebrated of old in India before his time (1556). The English mineralogist Maskelyne thought it probable that this was the stone seen by Tavernier at Delhi in 1665 and which he described as the Great Mogul, and that the same is now known as the Koh-i-noor. Hindu tradition says of this stone that it was worn by one of the heroes of the Indian epic poem Mahabharata, four thousand years back, and that it was in the possession of Vikramaditya, rajah of Ujayin, 56 B. C., through whom it passed to his successors, the rajahs of Malwa and to the sultans of Delhi, when Malwa fell into their hands. In 1658, Aurungzebe, third son of Shah Jehan, seized the reins of government, placed his father in confinement and possessed his treasures, the "Great Mogul" among them. In the rough, as it was when presented to Shah Jehan, Tavernier says it weighed 900 ratis or 787½ carats. The Mogul employed a Venetian named Hortensis Borghis to cut it. This he did so unskillfully as to reduce the weight to 319½ ratis or 280 carats. Some writers dispute Tavernier's equivalent of ⅞ carat to one rati, claiming that the rati was lighter and that the cut stone weighed 188 carats only. Instead of rewarding the cutter for his work, the Mogul, angered, charged him with spoiling the stone and threatened to kill him, but finally let him off with a fine of ten thousand rupees. According to Tavernier, from whom comes to us all the definite information we have about it, the stone in the rough had several flaws, and was cut to a round rose, very high on one side, and now thought to be almost identical in shape with the Orloff of the Russian

Crown jewels. In another place Tavernier gives the original rough weight at 967 ratis or 793⅝ carats, and when cut, as he saw it, 319½ ratis or $279^9/_{16}$ carats, and the form of it that of an egg cut in half. The finished stone had a crack or notch in the lower edge, and a little flaw within. The French jeweler saw it at the palace of the king in Delhi on the second of November, 1665. Summoned by 5 or 6 officers to appear at the palace, he was conducted into the royal presence. The chief keeper of jewels, Akel Khan, then at the king's command, ordered four eunuchs to bring the jewels for his inspection. The "Great Mogul," he found to be of good water, and he estimated the value to be in the neighborhood of twelve million francs. Western knowledge of the stone ceases at this point. Many theories have been advanced, but none of them are founded upon evidence sufficient to give reasonable certainty of its present existence. Some think that it is in the possession of one of the Hindu princes; others surmise that it is among the crown jewels of Persia; many think it is identical with the Orloff, or the Koh-i-noor.

Another large stone mentioned by Tavernier which has been lost to general knowledge, is recorded as "The Great Diamond Table." Tavernier saw it in Golconda in 1642, and said it was the largest he saw in private hands while in India. It was offered for sale to him for 500,000 rupees or 750,000 livres. He took a casting of it, and sent that to two friends at Surat, who commissioned him to offer 400,000 rupees for it if the stone was clean and of fine water. The offer was refused, and nothing further is known of it. The weight as given by Tavernier was 176⅛ mangelins or $242^{3}/_{16}$ carats. The mangelin was a weight used in the Kingdom of Golconda and Visapur, and equaled 1⅜ carats. As his instructions to make an offer for it, were on the condition that the stone was flawless and of good color, and he did make the offer, it was probably a fine stone.

The Orloff or Orlow, so named because purchased by Prince or Count Orlow for Empress Catherine II, is the most renowned of the crown jewels of Russia. It is now the chief ornament of the imperial scepter, being placed immediately under the golden eagle and is therefore sometimes called the "Scepter." The weight is given as 193 carats by Louis Dieulefait; Max Bauer says 194¾ carats. Prof. Maskelyne, who carefully examined it, was of the decided opinion that it was an Indian cut stone, being rose-faceted after the Hindu fashion. It is about the size of a pigeon's egg, has the form of half an egg, and has a slightly yellow tinge, Maskelyne says. Bauer says nothing of the color but describes it as of the finest water, greatest luster and perfectly clean. Some writers say it is the "Koh-i-Tur," or "Mount Sinai," which was one of the eyes of the peacock over the Takt-i-Taus or Peacock Throne of Aurungzebe, and that the Koh-i-noor was the other eye. Other writers claim that it was one of the eyes of a statue of Brahma in a temple on the fortified (Engl.) Island of Seringham which is formed by the junction of the river Cavery in Maysur (Mysore) with its branch the Colerine, and is in the neighborhood of Trichinopolis. As the story goes, in the beginning of the eighteenth century, a soldier of the French garrison in India plotted to rob the idol of his precious eyes. Pretending great zeal in seeking a knowledge of the Hindu religion, he succeeded in gaining the confidence of the priests in charge, and though the temple with its lofty towers, gilded cupola, pagoda, seven enclosures, and Brahman dwellings, was jealously guarded, and surrounded by a wall four miles in circumference, he secured one of the stones, and, eluding the vigilant guardians of the temple, fled with it to Madras. The other eye he could not force from the socket. Arrived there, he is said to have sold it for £2,000 to a captain in the British navy (some say an English sea captain), who carried it to London and sold it to a Jewish merchant for £12,000. This is said to have occurred at the commencement of the eighteenth century. Nothing more is recorded of this diamond, but in the latter part of the century, a similar stone was sold to Count Orloff for the Empress Catherine of Russia for 1,400,000 Dutch gulden, or about $560,000. Bauer gives the date of the sale as 1791, and in common with other writers assumes it to be the same stone. Streeter gives the following from Boyle in Museum Britanicum (London, 1791), who quotes from a letter from the Hague under date of January 2, 1776. "We learn from Amsterdam that Prince Orlow made but one day stay in that city, where be bought a very large brilliant for the Empress, his sovereign, for which he paid to a Persian merchant there, the sum of 1,400,000 florins Dutch money." As Orloff was Catherine's lover at the time she became Empress in 1762, and Potemkin, who became her favorite in 1765, did not lose a controlling influence over her until he died in 1791, it is possible that the purchase of what is known as the Orloff diamond occurred in 1775, according to the letter of January 2, 1776, quoted by Boyle. Orloff may, however, have consummated both purchases. There appears to be no positive evidence as to which of the two large stones purchased by Russia in 1775 and 1791 was the Orloff, or to which of them the story of the French soldier rightfully belongs. The early history of these stones is so beclouded by the inventions of thievery and knavery that very little said about them is reliable.

Since then, writers have confused the early histories of these two large stones of the Russian crown jewels, confounding the weights, prices, and stories connected with them, beyond disentanglement. The other stone is said to weigh 120 carats and to be also now among the Russian crown jewels. It was known as the "Moon of the Mountain," and was taken with other loot from Delhi by Nadir Shah. At his murder, this diamond with other jewels was stolen by an Afghan soldier, and sold by him to an Armenian merchant, Shaffras. It is said to have been one of two large stones which ornamented Nadir's throne. One circumstantial account says that the Afghan took it with other jewels to Bassorah, a large town on the Shatt-al-Arab, 70 miles from its mouth in the Persian Gulf, where he offered them for sale to Shaffras, who resided there with two brothers. Shaffras put him off until he could raise the money with which to buy them. This frightened the Afghan, who fled to Bagdad and sold them there for sixty-five thousand piasters (£500), and began a debauch. Shaffras came to Bagdad, and finding the jewels sold, tried unsuccessfully to buy the big diamond of the Jew who had it. He and his brother thereupon murdered the Jew and the Afghan, and putting them in a sack, at night threw them into the Tigris. In a dispute over a division of the booty, Shaffras slew his brother and disposed of him in a similar manner. He then went to Constantinople, and from there traveled through Europe. Catherine II invited him to bring the diamond to Russia, and he was placed in communication with M. Lasaroff, the crown jeweler, who offered an annuity of ten thousand roubles and a patent of nobility. This he refused and asked six hundred thousand roubles cash for it. No sale was made at that time, and ten years later, the Russian Court, learning that he was in Astrakhan, reopened negotiations and a sale was made on the original terms.

Another account published in London, 1812, of "Travels through the southern provinces of the Russian Empire in 1793–4," by P. S. Pallas, says that the traveler during a residence in Astrakhan became acquainted with the heirs of Gregori Safarov Shaffras, who sold the diamond now in the Russian scepter. They told a similar story about the stolen jewels, but said that Shaffras followed the Afghan chief to Bagdad, and bought them direct from him for fifty thousand piasters. After twelve years, Gregori, with the consent of his brother, carried the diamond on his travels west as described, and the Russian Court invited him to bring the diamond to Russia for inspection. Count Panin, the Russian Minister, he who was tutor of Catherine's son Paul and assisted in the overthrow of her husband Peter, offered him five hundred thousand roubles, one-fifth on demand and the balance by regular installments during ten years, a patent of hereditary nobility, and a pension of six thousand roubles. As Shaffras demanded patents for his brothers also, the diamond was returned to him. He absconded to Astrakhan, but later reopened negotiations with Count Gregori Gregorivitch Orloff, and sold it for four hundred and fifty thousand roubles, of which one hundred and twenty thousand went for commissions and expenses, and a patent of nobility.

Bauer says this transaction occurred in 1775 and that the consideration was 450,000 roubles, a pension of 4,000 roubles and a patent of nobility.

Dieulafait says the stone was sent by Shaffras to his brother in Amsterdam who, after twelve years and long negotiations, sold it to Russia for $334,800 and a patent of nobility.

It is evident from these accounts that there is no certain knowledge about either of the transactions. Beyond the facts that Count Orloff bought a large diamond in Amsterdam in 1775 and that Shaffras sold a large diamond to Russia, the stories are open to question throughout.

All we really know about the Great Mogul is that Tavernier saw it in Delhi in 1665. Delhi was sacked in 1739 and the loot carried off by Nadir Shah, the Mogul probably being among it. In 1747 Nadir was assassinated, and a number of his large jewels were stolen by Afghans, who were his favored personal attendants. Some years later two large India cut stones appeared in Europe with confused histories of romance, one of them similar to Tavernier's description of the Great Mogul, and were sold between 1775 and 1791 to the Russian Crown for large prices, the exact amount being unknown, though variously stated in definite figures. One of these is the Orloff, and the Orloff is probably the Great Mogul.

Linked by tradition with the Great Mogul and the Orloff, is the Koh-i-noor of the British Crown jewels. This is one of the diamonds taken from Delhi by Nadir Shah when he destroyed the Kingdom of the Mogul in 1739. It is said that Mohammed Shah, great-grandson of Aurung-zebe, wore it in his turban when Nadir took possession of the Mogul's city, and that the latter with the polite insistence of a conqueror, compelled an exchange of turbans as a mark of his friendly intentions toward the victim's person. Later, Ahmed Shah, founder of the Abdali dynasty at Cabul, took it from Shahrikh, a young son of Nadir. It descended from him to Shah Shujah and was worn by him in the presence of Mr. Elphinstone while he was British envoy to the King of Kabul at Peshawar in 1808. Shah Shujah, when driven from Kabul, became the guest and prisoner of Runjeet Singh, chief of the Sikhs, who in 1813 compelled him to resign the diamond, but in return presented him with a lakh and twenty-five thousand rupees, or about sixty thousand dollars. It is said that while Runjeet Singh lay dying, an attempt was made to have him present it to Jaganath. He assented by a nod, but the treasurer would not give it up on that, and Runjeet Singh died before a written order could be signed by him. It was worn by his successors, Rhurreuk Singh and Shir Singh. After the murder of Shir Singh, it remained in the Lahore treasury until the time of Dhulip Singh and the annexation of the Punjab by the British in 1849. As per stipulation made then, the state property was confiscated to the East India Company in part payment of debt due to it by the Lahore government, with a proviso that the Koh-i-noor should be presented to Queen Victoria. It was taken in charge by Lord Dalhousie, who sent it to England in the custody of two officers. It was taken from Bombay, April 6, 1850, surrendered to the officials of the East India Company in London, July 2, and on the following day presented to Queen Victoria.

The Koh-i-noor weighed at that time 186½ carats. (Various weights are given, varying from $180\,^{1}/_{16}$ to 186½ carats.) It was rose cut above, with a large cleavage plane underneath, and a smaller one on the side. It had several flaws, and when exhibited at the great Exhibition at the Crystal Palace, London, in 1851, was valued at $700,000.

In 1852, the Koh-i-noor was recut to brilliant form. The cutting was entrusted to Costar of Amsterdam, the work being done by Mr. Voorsanger. It took thirty-eight days of twelve hours each, and is said to have cost £8,000. The work was finished September 7. The stone is not of the finest color or quality, having a grayish tinge, and it is too shallow to give the angles of reflection necessary for full interior brilliancy. The weight is now 106¼ carats. A model of it is exhibited among the Crown jewels and regalia in the Tower of London, but the diamond is in Windsor Castle. Both the Prince Consort and the Duke of Wellington are credited by various writers with having placed it upon the wheel in the beginning of the work of re-cutting.

One of the finest and best known of the large Indian stones which have been brought to Europe, is the "Regent" or "Pitt." The first name was given to it because it was bought by the Duke of Orleans while Regent of France during the minority of Louis XV; the latter, because it was bought in India and owned for some years by Gov. Pitt, grandfather of William Pitt, first Earl of Chatham. It is said also that in India it was called "Milliona." The supposition is that the stone was found in the diggings of Parteal or Gani-Parteal on the north bank of the Kistnah about forty-five leagues south of Golconda, in 1701. Some say that it was found in a street of Malacca. There is a story that it was stolen from the mines by one of the diggers, who managed to escape with it. No good evidence exists of the truth of either of these statements. The stone first comes to our knowledge through the statements regarding it, made by Gov. Pitt, and though insinuations were circulated about his veracity, and suspicions aroused at that time as to the methods by which he obtained it, no proof was given that he had acted dishonorably, and he held unchallenged possession for a number of years before it was sold for his account finally to the Duke of Orleans.

At that time diamonds were used largely in India as a means of remittance to England, and Pitt, who was governor of Fort George, sent many to England. It appears also from the researches of Colonel Henry Yule, C. B., who was an Oriental scholar and president of the Hakluyt Society ("Some Famous Diamonds" by Alexander Japp, LL.D., F. R. S. E.), that Gov. Pitt also had a commission from one Sir Stephen Evance of London to find large fine gems, for Pitt wrote him from Madras, October 18, 1701, that there were two or three large diamonds "up in the Countrey" but that "they ask soe excessive Dear for such Stones that 'tis Dangerous medling with 'em." November 6th he wrote the Knight again, enclosing the model of a stone he had lately seen which he described thus:" Itt weighs Mang. 303 and carratts 426. It is of an excellent christaline water without fowles, onely att one end in the flat part there is one or two little flaws which will come out in cutting, they lying on the surface of the stone, the price they ask for it is prodigious, being two hundred thousand pags: tho' I believe less than one (hundred thousand) would buy it." He then speaks of it as superior to any diamond known, asks the Knight to keep the matter private, and to give him his opinion. Under date of August 1, 1702, Sir Stephen Evance acknowledged receipt of the letter and model, but wrote discouragingly, saying that on account of the war, the French King had his hands and heart full and as "There is noe Prince in Europe can buy itt, soe would advise you not to meddle in itt." Pitt bought it however, and later describes the transaction while defending himself against the insinuations made by some of his colleagues and Surapa, a black merchant, that he had obtained possession of it unfairly. According to this account, Jaurchund, an eminent merchant in those parts, brought to him about December, 1701, a large rough diamond about 305 mangelins, and some small ones. Mr. Pitt and others bought the smaller ones, but he was afraid to venture upon the large one, for which he says Jaurchund asked 200,000 pagodas, but for which he was not inclined to offer over 30,000 pagodas. After a few days the merchant took it away. He returned about February and tried again to sell it to him, finally lowering his price to 100,000 pagodas without success.

They then agreed to meet upon a certain day about the end of February or the beginning of March, and settle the matter finally. In the discussion at that time, the dealer dropped to 55,000 pagodas, and the governor raised his offer to 45,000, when they parted. About an hour after, Jaurchund and Vincatee Chittee, who generally accompanied him, returned, and after a further encounter of wits they closed the trade at 48,000 pagodas.

It further appears by a letter of Pitt to Sir Stephen Evance of February 3, 1702, that he sent the diamond to Sir Evance, by the *Loyall Cooke,* to act for him in the cutting and disposal of it, giving as his opinion that it should be made into one stone. The great diamond caused quite a stir in London, and was talked of as one of the wonders of the world, but general conditions were such that a buyer could not be found. Pitt's estimate of the value of it had increased considerably since he acquired it, for writing to Sir Stephen Evance and his son Robert in 1704, at which time, from the tenor of his letter, it must have been in process of cutting, he says he " would not have it sold (unless it be for a trifle) less than fifteen hundred pound a caratt."

These and the years following were troublous times for the Governor. Reports which reflected upon his acquisition of the stone were circulated; he was evidently suspicious of his agents in London, and so much of his private means was invested in it, that he felt the future of himself and family depended upon its disposal. From memoranda left by Philip, second Earl Stanhope, a grandson of Pitt, it was cut by Harris at an expense of £6,000, and the chips were valued at £10,000. The weight is given as 128 carats after cutting, but as in the inventory of the French Jewels made by order of the National Assembly in 1791, the weight is recorded as 136 $^{13}/_{16}$ carats, the weights used must have varied then, as those of different countries do now.

After many negotiations, and by-play which undoubtedly included some fighting over commissions, for nobles were expert chapmen in those days apparently, the Duke of Orleans bought the diamond for the Crown jewels of France, which meant then for Louis XV, against his accession, for two million livres (at that date 1s. 4d. was about the value of a livre). The terms were £40,000 (sterling) to be deposited in England before the stone was sent to France, as part payment, of which £5,000 was to be forfeited if the sale was not consummated on its arrival there. Governor Pitt, accompanied by his two sons, Lord Londonderry and Mr. John Pitt, and his son-in-law, Mr. Cholmondeley, took the diamond over to Calais, and was met there by the King's jeweler appointed to inspect and receive it. As security for the balance of the purchase price, he gave them several boxes of jewels, belonging to the Crown of France, above the £40,000 already deposited, and agreed to pay the remainder in three installments at periods agreed upon. This amount was never paid, though the French government admitted the debt when the children of Governor Pitt claimed it, but pronounced it impossible to assume the past obligations of the Regent. The exact amount realized is therefore unknown, as no evidence exists as to the value of the jewels pledged.

The Regent was prominent with the Mazarins in the circlet of the Crown made by Ronde, jeweler to the King, for the coronation of Louis XV in 1722. At the inventory made by order of the French National Assembly in 1791 and drawn up in August, 1792, the value of the Regent was estimated at 12 million francs. It was deposited with the other jewels at the Garde-Meuble, and the sale of them was ordered by the Legislative Assembly. During the anarchy which followed the September massacres, the bulk of the jewels, including the Regent and the Sancy, disappeared. Many of them were recovered, the Regent being found twelve months later in a cabaret of the Faubourg St. Germain, Voulland for the Committee of Public Security appearing before the Convention on December 10, 1793, to report the fact. It was discovered in a hole made in the timber-work of a garret.

In 1796 the Regent was pledged to German bankers as security for the cost of horse-furniture, and was redeemed in 1797. It was pawned again in 1798 with the banker Vandenberg of Amsterdam, for money to buy more horse-furniture for the army of Italy. First Consul Bonaparte redeemed it in 1802, and in 1804, at his coronation as Emperor, wore it in the pommel of his sword. The French jewels were carried off to Blois in 1814 by Marie Louise, but returned to Louis XVIII by her father, the Emperor Francis. Louis XVIII took them with him on his flight to Ghent on the night of March 20, 1815, but brought them back at the restoration. They were reset on the accession of Charles X, and remounted several times between 1854 and 1870. In August of the latter year they were deposited in a sealed box with the Governor of the Bank of France, and verified in 1875 by a parliamentary commission. In accordance with a resolution of the French Chamber in October, 1886, a number of the jewels were sold, but the Regent remains to this date in the possession of the French Government.

Pope's lines in "Moral Essays,"

> "Asleep and naked as an Indian lay
> An honest factor stole a gem away:
> He pledged it to the Knight, the knight had wit,
> So kept the diamond, and the rogue was bit,"

were thought to be a reflection of the scandals concerning this stone in Pitt's time. It is said the last line in the poet's MSS. ran,

> "So robbed the robber and was rich as P—."

Colonel Yule, from whose writings these accounts are gathered, considered Thomas Pitt's character completely vindicated, and that his very solemn asseverations, that there was nothing unrighteous on his part in the transaction, were entitled to credence.

In an account of the origin and sale of this diamond to the Regent of France, Saint Simon ignores Pitt, intimates that Law solicited his influence in the matter, and credits himself with securing a promise from the Duke of Orleans to buy it. He also attaches the customary story of a thief having stolen it at the mines in India and escaping with it to Europe. A perusal of ancient accounts of diamond transactions awakens a suspicion that all the vulgar tricks of the trade to-day were known and practiced in much coarser form then, among men whose names history has engraved among the great and noble. The Regent is a square cut brilliant.

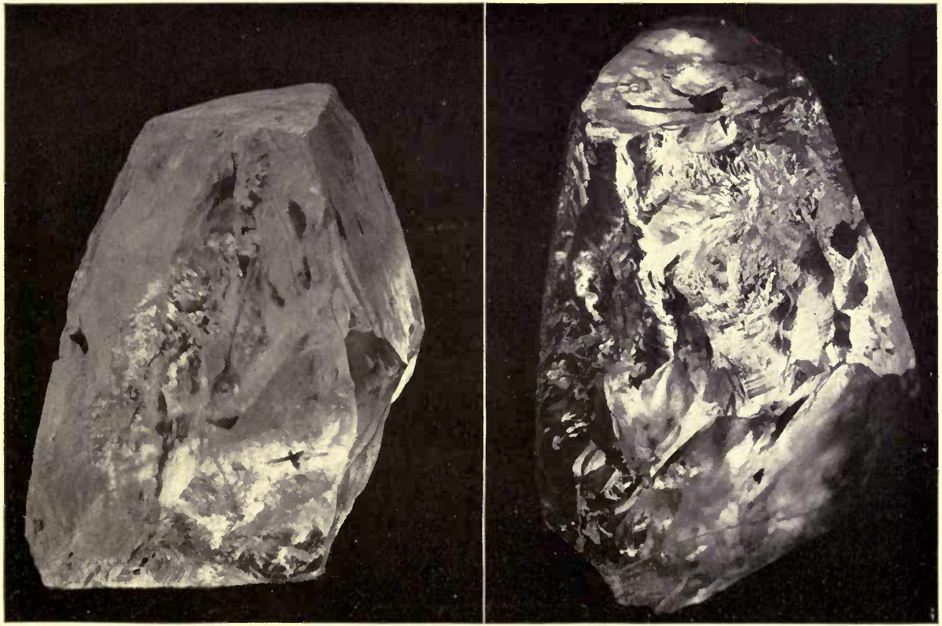
Another diamond which has long been celebrated, and to which has been gathered the legends and adventures of several others that have borne the same name, is the Sancy. It is described as pear-shaped and brilliant cut. Upon attempting to gather from records a true account of this stone, the historian is confronted by such a mass of contradictory statements that the task becomes at once hopeless. The writers have evidently gathered a statement here and another there, often oblivious of the fact, while piecing them together, that those statements, from the nature of them, must have referred to different stones. These patchwork histories have been copied by other writers, sometimes with the addition of a chance item picked up accidentally in some other quarter; sometimes they are shorn of striking inaccuracies and rounded out with new suppositions to make the story readable or more probable. In either case reflection is forced upon the reader, that if the same has occurred in the records we have of men and events, our knowledge of the past is more in the nature of a composite photograph than a series of definite likenesses.

There are but two things about the Sancy upon which writers agree, viz.: that the first known owner was Charles the Bold, Duke of Burgundy, and that later it came into possession of Nicholas de Barly, Baron de Sancy, after whom it was named. This stone is said to have weighed 53½ or 53¾ carats. According to some it was an heirloom in the family of Charles the Bold, and was brought from Constantinople by an ambassador. Its history between Charles and the Baron De Sancy is uncertain. Some say it was lost with his other treasures at the battle of Granson in 1476. The Swiss soldiers who looted his tent had no idea of the value of the things they found. They supposed his vessels of gold and silver were tin and copper, and they parted with his diamonds for trifling sums.

Another account says that he wore the Sancy in his helmet at the battle of Nancy in 1477 and that the Swiss soldier who found it on his dead body two days after the battle, sold the precious stone to a priest for 2 francs. With charming indifference to historical facts, one writer then places it in the hands of a king who never existed and who passes it on to de Sancy nearly a century after that gentleman died, describing in detail the method by which he acquired it and at what cost. Other writers say the Sancy was bought by King John II of Portugal in 1479, but as Alfonso did not die until 1481, he must have bought it either before he became King or acquired it with the Crown jewels at his accession. It is said he sold it to the Baron de Sancy in 1489. At this point the absurdities of history begin. One writer says that de Sancy bought the diamond in 1489, raised an army of Swiss for the service of Henry III in 1589 and in 1604 sold the stone to James I of England. Another writer states that de Sancy sold the diamond to Queen Elizabeth of England in 1600. Another describes how de Sancy sent the diamond by a servant to Henry III that he might pawn it to the Swiss Government. The servant disappeared. Search was made and it was found that the man had been assassinated in the forest of Dole and his body buried by a curé in the village cemetery. Knowing his man, de Sancy ordered his body to be opened and the diamond was found in his stomach. This writer links the 53¾ carats diamond of Charles the Bold, by this story, with the Sancy diamond inventoried among the French jewels in 1791, which weighed 33¾ carats. It is said also that the Sancy was sold by Baron de Sancy to James I in 1604, and that during the Civil War in England, Queen Henrietta Maria, wife of Charles I, carried it to France and pledged it with another to the Duke of Epernon. In 1657 Mazarin, with the Queen's consent, paid the duke and took possession of the stone. He bequeathed it with others to Louis XIV. This writer also thinks this to be the Sancy of the French Crown jewels inventoried in 1791, and which was stolen in 1792, recovered in 1794, and probably disposed of in 1796 to meet the expenses of the great campaign of that year. It was owned in Spain in 1809, and later passed into the possession of the Demidoff family of Russia.

Another account says that it was among the Spanish Crown jewels about 10 years after it left France, and that Prince Demidoff owned it from 1828 to 1865, when he sold it for £20,000. In 1867 it was exhibited at the Paris Exposition and is now owned by the Maharajah of Guttiola.

An English writer says the King of France gave it to James II of England, and that James sold it for $125,000. It then passed into the Crown jewels of France, was stolen as heretofore described, recovered by Fouche for Napoleon, and sold by him to Prince Paul Demidoff. It was next owned by the Earl of Westmeath and is now in the possession of the heirs of the multimillionaire Parsee merchant, Sir Jamsetjee Jejeebhoy. The latest rumor is that the Sancy has been presented by William Waldorf Astor to his daughter-in-law on the



THE CULLINAN. Courtesy of *The African World* occasion of her wedding. It is possible that there are several stones which have been known by the name. It is also possible that the irregular cut stone of Charles the Bold has been at some time since recut without public mention, and that the more perfectly cut pear-shape diamond long among the French jewels is the same as the larger stone which originally bore the name of Sancy. But with all this information, the question yet remains unanswered, Where is *the* Sancy? The stone bought by Mr. Astor is a flattish pear-shaped briolette, rather off-color and with a white feather flaw. It is said to weigh 53¾ carats.

CHAPTER V

CELEBRATED DIAMONDS — CONTINUED

A DIAMOND, included in all lists of the celebrated stones of the world, is variously quoted as the "Mattam," the "Matan" and the "Rajah of Mattan," and is so named because owned by the rajahs of that territory, in whose family it remains. It is an uncut pear-shaped crystal weighing 367 Borneo carats, or about 318 European carats. Some doubts have been raised as to its genuineness. The reigning princes of the country regard it with superstitious reverence, believing that their fortunes are linked with the possession of the stone, a belief shared by the people of Borneo, who also think that the destinies of the empire are in some mysterious way connected with it. They also attribute to it miraculous power, claiming that water in which it is dipped will cure all diseases. Only under very extraordinary circumstances, therefore, are strangers allowed to see it, and then they may not touch it. Mawe says that the captain of an Indiaman to whom it was shown was requested not to touch it. It was exhibited on a salver of gold. The size of it was about that of a walnut, and it had a bluish, metallic luster. Upon examination at Pontianak in 1868, it was pronounced to be rock crystal, but many think that a copy only of the real stone was shown. By some it is said to have been found in 1760, by others in 1787, in the Landak mines on the west coast of Borneo. Landak is in the territory of the Rajah of Matan, north of Pontianak. It is said to have been found by a dyak. It was claimed as a droit of royalty by the Sultan Gurn Laya, but he handed it over to the Pangeran (rajah) of Landak. His brother got possession of it, and gave it as a bribe to the Sultan of Sukadana that he might be placed on the throne of Landak. The lawful prince fled to Bantam, and securing the aid of the prince of that country, and the Dutch, regained his own territory and nearly destroyed Sukadana. It is said that $150,000, 2 large war brigs with guns and ammunition, and other stores were offered for the stone and refused. Some say this offer came from Batavia and others that it was made by Jamieson, governor of Borneo. The diamond is known in Borneo as the " Danan Radschah."

The " Nizam " is a large Indian stone in the possession of the Nizam of Hyderabad. It is said to have been found by a child in the neighborhood of Golconda, and is described as somewhat almond shaped, and in almost native condition. It shows some traces of an attempt to shape it into the mystic Yoni. It is claimed that the stone was broken in the year of the Indian revolt, which may explain the various accounts given of the weight, some placing it at 277 carats; others at 340 and 440 carats, or it may be confounded with the African " Victoria " stone of 1884, weighing 457½ carats in the rough, and 180 carats after cutting, since reported to have been sold to the Nizam, and now sometimes called also " The Nizam." It has been valued at £200,000. It has been reported that the piece broken off was sold for 70,000 rupees.

The "Hope" is a sapphire blue diamond weighing 44⅜ carats, without flaws and cut to a slightly irregular cushion shape. It has been known since 1830, when it was in the hands of Daniel Eliason and without a history. It was bought at that time by the London banker Henry Thomas Hope for £18,000, and passed by the hands of his successor, Lord Hope, to a New York firm who sold it in 1908 to Monsieur Habib. It was advertised for sale at public auction with other large stones under the name "Collection Habib," in Paris, June 24, 1909, and sold for $80,060. Streeter thinks this to be the large part of the irregular-shaped blue diamond bought in India by Tavernier in 1642, and sold to Louis XIV of France in 1668. It weighed 112¼ carats in the rough when that monarch bought it, and was probably cut at once, for it is recorded that the King wore a large blue diamond suspended from a ribbon round the neck, when he decked himself with jewels estimated at £12,000,000, to receive the Persian Ambassador at his court in February, 1715. After cutting, it probably weighed 67⅛ carats, for a blue stone of that weight was among the Crown jewels stolen from the Garde-Meuble in 1792. No similar blue diamond was seen again until that now known as the Hope appeared in the hands of Eliason in 1830. At the disposal of his jewels at Genoa in 1874, after the death of the Duke of Brunswick, a similar blue stone was found in his collection. It was drop-shaped, rose cut, and weighed 13¾ carats. Later, another of the same color weighing one carat was bought by Streeter in London, and he believes, the three stones being of similar color, their weights, shapes, and cleavages corresponding to the probable result of cleaving and recutting the French stone, that they were parts of the Tavernier diamond. The combination of weights, shapes, sizes, and color, certainly appear to be incontrovertible evidence of the truth of his theory. It is more than probable, therefore, that the Hope diamond is identical with that worn by Louis XIV.

The "Piggott" is a shallow stone brought from India to England by Lord Piggott in 1775. It is said to have been sold by lottery in 1801 for £30,000 and later bought by Rundell & Bridge, the London jewelers, for £6,000. Ali Pasha of Egypt bought it for £30,000. The weight is generally given as 81½ carats, though Mawe, who saw the stone before it was sold to Ali, says it weighs 49 carats.

The "Nassac," thought to have come originally from a temple at Nassak on the upper Godavery and therefore so named, is said to have been taken by Warren Hastings from the last independent prince of Peischwa in 1818 and sold to the East India Company. It weighed 89½ carats, but the shape was bad. Jeweler Emanuel of London bought it in 1831 for $7,200 and sold it soon after to the Marquis of Westminster, who had it recut to a three-sided brilliant of 78⅝ carats. It has since been estimated at the unreasonably high value of $148,000. It remains in the Westminster family.

An addition was made to the Crown jewels of Russia in 1813 of considerable interest. The Persian prince Chosroës, younger son of Abbas Mirza, brought as a present to the Emperor Nicholas, a diamond of fine quality in the form of an irregular prism weighing about 95 carats. On three of the edges, which were partly cleavage planes and partly cut facets, the names of three Persian rulers were engraved. Later, it was cut to 86 carats, and the inscriptions were taken out in the process, unfortunately.

Another engraved diamond with ancient oriental associations was the "Akbar Shah." Like most of these relics of India, it was not cut to suit the modern ideas of Europe, or the modernized tastes of the new generation of Hindu princes. As far as known, its first owner was the Great Mogul Akbar, who died in 1605. Later, one of his successors, Shah Jehan, engraved on two sides of it the following inscriptions in Arabic:

Shah Akbar
The Shah of the World
1028 A. H.

and,

To the Lord of two Worlds
1039 A. H.
Shah Jehan

It is difficult to interpret the dates. If founded on the Hejira or Fuselli era, they would correspond to somewhere about 1618 and 1629 of the Christian era. Shah Akbar died in 1605 and Shah Jehan reigned from 1627 to 1658. As there was much confusion in India regarding eras and methods of computing time, it seems possible that the figures upon the stone referred to the date of some event, or at any rate had some connection with a time during the lives of these monarchs, but of exactly what nature, there does not appear to be any evidence. The stone disappeared from public knowledge at the close of the seventeenth century, and was lost until well on in the nineteenth, when it was recognized in Turkey by the inscriptions. It was known there as the "Shepherd's stone." Mr. George Blogg bought it in Constantinople in February, 1866. He brought it to London and had it recut from 120 Arabic to 116 English carats, by Mr. L. M. Auerhaan, to a drop-shape diamond of 71 or 72 carats, and sold it the following year to the Gaikwar of Baroda for 3½ lacs of rupees, or about £35,000. It is now in the treasury of that country. The inscriptions were of course destroyed in recutting. Tradition says that the "Akbar Shah" was one of the eyes in the Peacock throne of the Moguls, destroyed by Nadir Shah when he looted Delhi.

The Shah of Persia is credited with the possession of two large fine diamonds also brought from Delhi, which are worn, some say in two armlets, others, one in an armlet and one at the knee. Sir John Malcolm, in "Sketches of Persia," 1827, says they weigh 186 and 146 carats respectively. The larger one is known as the "Darya-i-nur" (Sea of light) and the other as "Taj-e-mah" (Crown of moon). They are of Indian origin undoubtedly, as they are skillfully rose-cut after the Hindustan fashion. Both are fine stones, but the Taj-e-mah is said to be the finest diamond in the Persian collection of jewels. Streeter says the Shah of Persia obtained the smaller one from Mir Jumma, a diamond merchant, and that it is supposed to have come originally from Sumbhulpore, a district noted for the fine quality of its stones, though large ones were seldom found there. The Darya-i-nur is a large, flat, oval-shaped stone. Together they have been valued at 20,000,000 marks.

Imagination has confused the early history of the "Eugenie," as it has that of many notable stones. It is said to have been found by a peasant, in the Wajra Karur district, who offered it to a blacksmith for repairing a plow. The smith threw it away, but afterwards picked it up again and sold it to Mr. Arathon, a merchant in Madras, for 6,000 rupees. The merchant sold it for a large sum to Napoleon III. That a peasant and a blacksmith in a diamond-mining district, where thousands of poor spend their lives hunting for diamonds among the detrital matter of ancient rivers, did not suspect the value of the stone, is possible but not probable. The finder may have had no right, however, to his find, in which case both he and the smith may have feared to sell it until the convenient merchant who would ask no questions came along. Another account says that it was owned by Catherine II of Russia, who gave it to her favorite Potemkin, in whose family it remained until Napoleon bought it as a wedding gift for his bride Eugenie. After her dethronement she sold it to the Gaikwar of Baroda. It is a fine stone, cut as a brilliant, weighing 51 carats.

The "White Saxon Brilliant" is described as one of the finest diamonds known. It is square cut, and measures $1^1/_{16}$ inches in diameter. August the Strong paid one million thalers for it.

"The Polar Star" is a fine stone of 40 carats, brilliant cut, and variously reported to be among the Crown jewels of Russia and to belong to the Princess Youssoupoff.

There is a large diamond belonging to the house of Austria which has an authentic history back to Maria

Theresa, and a variety beyond. It is variously named "The Florentine," the "Grand Duke of Tuscany" and the "Austrian." It is a briolette having 9 rows of facets cut to represent a star of 9 rays, and weighs 113⅓ Vienna carats or 139½ carats French. The stone, which is clear and very brilliant, is generally said to be a little yellow. Tavernier, who saw it, says it is citron color, but with his usual liberality in estimating values, he places the value of the "Florentine" at 2,608,335 livres or in round figures about $520,000. It came to Maria Theresa and the Austrian house by her husband, Francis Stephen of Lorraine, who, a year after his marriage, exchanged Lorraine for the grand duchy of Tuscany and acquired the "Florentine" with it. Tradition says that this diamond was cut for Charles the Bold by Ludwig Van Berquem, and lost by him at the battle of Granson; that it was found by a Swiss peasant who sold it to a citizen of Berne; a Genoese who bought it from him, sold it to Ludovic Sforza, Duke of Milan, then by way of the Medici treasury it passed on to Francis Stephen. At his coronation, October 4, 1745, as head of the Holy Roman Empire, the "Florentine" adorned the Crown of the House of Austria. Another account says that Pope Julius II presented it to the Emperor of Austria.

The "Braganza," called also the "King of Portugal's diamond," is a large stone said to weigh 1680 carats, and by many believed to be a piece of white topaz. It was found in Brazil, some say at a place called Cay-de-Merin near the river Malhoverde. It is still in the rough and no one is allowed to see it, nevertheless estimates have been made of its value as high as £224,000,000, a sublime figure since the discovery and sale of the Cullinan, nearly twice its size, for one million dollars.

The "Regent of Portugal," a round diamond of 215 carats valued at 396,800 guineas, is said to have been found by a negro in 1775 near or in the River Abaïte, a few miles north of the River Plata.

August the Strong bought a stone of remarkable color for 60,000 thalers which has been in the possession of the Saxon Crown since 1743. It is the "Green diamond of Dresden," a fine quality, flawless, almond-shaped stone of a bright apple-green color, weighing 40 carats. It is in the Green Vaults of Dresden.

The "Dresden," so named after the original owner, Mr. E. Dresden, is a diamond of exceptional color and brilliancy, and faultless, weighing 76½ carats. It weighed in the rough 119½ carats, and was evidently part of the original crystal only. It was found at Bagagem in the western part of Minas Geraes, Brazil, some say July, 1853, but Streeter, who received his information direct from Mr. Dresden, says it was found in 1857, brought shortly after to Rio de Janeiro and sold to the owner's agents, who forwarded it to him in London the same year. It was then cut in Amsterdam to an egg-shape drop. In 1863 a rajah visited London for the purpose of buying it, but would not pay the price asked, viz.: £40,000. A merchant with him said he would pay the price if he could afford it. Later, by a rise in cotton during the Civil War of America, he found himself rich enough to do so, and sent an agent for it. The middleman got it for £32,000, making a profit of £8000 by the transaction. The merchant lost his fortune and dying, the heirs sold it to the Maharajah Sivaji Ras, Gaikwar of Baroda, for £40,000, in whose family it remains.

One of the most important stones from the mines of Brazil, is the "Star of the South." It was picked up by a negress at work in the mines of Bagagem, Minas Geraes, July, 1853. The crystal, which weighed 254½ carats, was an irregular dodecahedron with very obtuse angles, having 24 natural facets. Faint streaks thereon suggested possible octahedric cleavage. Apparently it was one of a group originally, as there was a deep depression in one of the facets which had evidently been occupied formerly by an octahedral crystal, and in other parts of the surface were two similar depressions. On one side also there was a flat place as though other crystals had been twinned with it. There were several inclusions, thought to be small plates of titanic iron. It is said that the negress received her freedom and a pension for life as a reward, and that her master, Casimiro de Tal, sold the crystal for £3,000. The purchaser upon depositing it with the Bank of Rio de Janeiro, got advances of £30,000 on it. Ultimately it was sold in the rough to a syndicate headed by Halphen for, some say 302, some, 430 contos de reis (about £34,000 to £48,000). They named it "Estrella do Sud," and had it cut to an oval brilliant of 125 carats by Voorsanger in the establishment of Coster in Amsterdam at a cost of nearly £500. The size of it is 35x29x19 mm. The quality is fine and it is clean. After cutting, it was exhibited in the Dutch department of the London Exhibition in 1862, and at Paris in 1867. An Indian rajah offered through a merchant £110,000 for it, but the offer was refused. Later Mr. E. Dresden bought it for the

Gaikwar of Baroda for 8 lacs of rupees or about £80,-000. This was the Hindu prince who had a habit of administering powdered glass (some say diamond dust) to obnoxious subjects. He extended the practice to others, and experimented with the British Resident, Colonel Phayre, whereupon he was arraigned, tried, found guilty and deposed.

The first large diamond found in South Africa was a river stone weighing 83½ carats. Van Niekirk got it from a native and sold it in Hopetown for £11,200. It was cut to a pear-shape brilliant of 46½ carats and named "Star of South Africa." It is a stone of very fine color and quality, similar to the Indian stones. The Countess of Dudley bought it for about £25,000, since which it is often mentioned as the "Dudley" diamond.

The "Porter Rhodes," so named after the owner of the mine in which it was found, is one of the finest diamonds of large size taken from the Cape diggings. It was found February 12, 1880, and weighed 150 carats. The color is blue-white; rare in any size and extremely so in large sizes. It was exhibited at Streeter's museum on Bond Street and valued at £200,000. It came from one of Mr. Porter Rhodes' Kimberley claims.

A yellowish crystal from a claim in the River diggings at Waldeck's Plant on the Vaal, was for several years the largest known Cape stone. It was found in 1872, and weighed 288¾ carats. At that time it was mentioned as the "July diamond." Since cutting, it is known as the "Stewart" and is a yellowish brilliant of 120 carats. This stone illustrates the uncertainties of mining, and the finding of it reminds one that it is "the unexpected which happens." It was taken from a claim that was regarded as practically valueless, and the original owner sold it for £30. The buyer did not think enough of it to work it himself, so he turned it over to one Antoine to work on shares. One day, while showing a boy working for him just where and how he wanted him to work, Antoine's pick brought the "July diamond" to light. It is said that he was so excited over the find that he could not eat for two days. The stone so unexpectedly turned up, was sold, it is said, for £6,000, and again for £9,000.

Dr. George F. Kunz says of the Tiffany diamond: "The Tiffany diamond was found in the mines of the French company of the old De Beers mine, in 1877. The crystal was a beautiful octahedron weighing 280 carats. It was cut by a French diamond-cutting company in Paris in 1878 and was bought, through Mr. Charles Reed, the Paris member of the firm, for Messrs. Tiffany & Co. in 1879 and imported into the United States; since then it has been in their possession. It is of a rich canary, almost orange yellow color, and is believed to be the finest yellow diamond known. The diamond has 40 facets on the crown, 44 on the pavilion, 17 on the girdle, a culet and a table; 103 facets in all. It measures 22 millimeters, $^{22}/_{25}$ inches in height; 28.25 millimeters, 1⅛ inches across; 27 millimeters wide, $1^{1}/_{12}$ inches across. It was described in *Science,* Vol. LX, p. 235, August 5, 1887.

"It was exhibited at the World's Fair at Chicago in 1893 and the Pan-American Exhibition held at Buffalo in 1901. It is the one jewel that is not for sale in the house of Tiffany & Co. and has been shown by them to more people than possibly any other large diamond known. The stone is wonderfully brilliant and rich in color, and as faultless as any large stone of that kind has ever been."

The "Pasha of Egypt," a fine octagonal brilliant of 40 carats, was bought by Ibraham, Viceroy of Egypt, for £28,000.

The "Cumberland" was bought by the City of London for £10,000 and presented to the Duke of Cumberland after the battle of Culloden. The House of Hanover claimed it, and about thirty-five years ago Queen Victoria restored it to them. Its weight is 32 carats.

The name "Victoria" has been given to two stones found in the Cape. One, taken from the De Beers, March 28, 1880, weighing 428½ carats in the rough, and variously reported as weighing 228½ and 288½ carats when cut to a brilliant. It is said to have been sold to an East Indian prince. This stone was yellowish and a quite regular octahedron. The other came to Europe in 1884, from what mine is not known. It was colorless and in form an irregular octahedron weighing 457½ carats, which was reduced to 180 carats by cutting to an oval brilliant. It was exhibited in the French jewelry section on the Champs du Mars at the Paris Exposition of 1889, and sold finally to the Nizam of Hyderabad for £400,000. It has since been known as the "Nizam," though an older stone in the Hyderabad treasury has long borne the name.

Many large stones have been found in the Cape mines which for various reasons have not come to public notice. In the early days of diamond mining, few records were kept. Knowledge of large stones found, was often of the character which comes of rumor. Men who had such stones, frequently had also serious reasons for wishing to hide the fact from public knowledge. Some who had them, stole them; others bought them knowing that they were stolen. It is told that one fine diamond crystal of upwards of 200 carats was bought by a dealer of a Kaffir for £15. The early history of many noble gems is enshrouded to hide the knavery which escorted them from the mine to the cutting wheel. Those who knew, would not tell of the interval between the disappearance of Louis XIV's blue diamond from the Garde-Meuble and the appearance of the blue diamond called the "Hope." Nor would those who know, dare to let it be publicly known, whence some of the great African diamonds came, and how from hand to hand they passed to the cutter. There are enough large diamonds known to have come from the Cape, however, from the early working of the mines onward, to show how prolific of large stones those fields are. The climax was thought to have been reached when on June 30, 1893, a Kaffir picked up a crystal, while loading a truck in the Jagersfontein mine, weighing 971¾ carats. The man contrived to secrete it without being observed by the white overseer standing near by, but delivered it to the manager himself later. Immediately the whole civilized world was informed of the great discovery. After five centuries, the boast of India was eclipsed, and the "Great Mogul," to which every writer on the subject had referred as the greatest diamond of the world, was relegated to second place in the history of gems. The enormous and precious crystal, at once estimated to be worth fabulous sums of money, was named the "Excelsior." The finder was rewarded by a gift of, some say £500, others £150, a horse, saddle and bridle, and the diamond fields and the diamond dealers of the world boiled with excitement. The color was reported to be fine, and the only difficulty which confronted the owner was to get a purchaser who could find use and pay for such a monster gem. Later developments obviated the impediment of size considerably, for there were internal flaws so placed that a material reduction must result from their elimination. The shapé also made it impossible to cut a single brilliant from it without unusual and wasteful loss of material. The crystal measured 3 inches in length by 1½ inches thick, and its breadth varied from 1½ to 2½ inches. As no purchaser appeared, it was finally decided to cut it. After much study, it was planned to cleave it into ten pieces, and cut them into drop and marquise shape brilliants. The work was very successfully done at Amsterdam in 1904.

According to the United States Geological Survey report of 1904, the three largest cleavages weighed, 158, 147, and 130 carats respectively, and the cut gems produced were as follows:

No. 1	68 carats	Drop (pear shape).
2	45 30/32	Drop (pear shape).
3	45 26/32	Drop (pear shape).
4	39 10/32	Marquise (oval Brilliant).
5	34 2/32	Drop.
6	27 30/32	Marquise.
7	25 22/32	Marquise.
8	23 24/32	Marquise.
9	16 12/32	Drop.
10	13 17/32	Drop.
	340 13/32 in all.	

Another large crystal found in the same mine in 1895 is often confounded with the Excelsior. It weighed 640 carats. It is now one of the most perfectly cut oval brilliants in existence and weighs 239 carats. It is said to be the finest large diamond in the world, faultless in color, luster, brilliancy and purity. It was exhibited in the Paris Exposition in 1900 under the name of the "Jubilee," in honor of Queen Victoria's jubilee of 1897. The diamond measures 1⅝x1⅜ inches and is one inch thick.

As another striking illustration of the uncertainties of mining, it is reported that a man had contracted for all the stones taken from the claim in which the Excelsior was found, up to June 30, inclusive. The big stone was one of the last found on that day.

It is reported that the diamond seal of Charles I of England is now among the Crown jewels of Persia. The royal arms of England are cut in this stone. King Charles gave this at the last moment before his execution, to his faithful attendant, Herbert, with orders to convey it to his son, the Prince of Wales. It is probable that this was done, and that Charles II, who during his exile was in constant need of money, sold it to Tavernier, with whom he was acquainted. Tavernier made several journeys to the East to buy and sell jewels, and King Charles' seal probably journeyed with him.

There are many stones of some celebrity to which histories of an apocryphal character are attached. For instance, the "Agra" diamond, sold at Christie's in London, February 22, 1905, for $25,000. This is the stone of which it is said, that when the King of Delhi's jewels were looted in 1857, a young English officer got

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possession of it and attempted to smuggle it away by putting it in a horse ball and making a horse swallow it. The horse died, but the diamond was taken from the stomach and afterwards sold to the Duke of Brunswick. It was a brilliant rose pink stone with some black spots in it which were taken out by a cutter of Paris, who thereby reduced the weight of the diamond from 46 to 31½ carats. An American who was in Paris in 1889, believes it to be the same stone which he had in his possession there for some time, and which he says was recut there from 70 to $31^{13}/_{32}$ carats. In common with many other Indian stones, it was connected with the Mogul Baber, founder of the Mogul dynasty in India, the favorite story being that the Emperor wore it in his turban.

In an immense belt, owned by the rajahs of Panembohan and Pongerons, studded with diamonds from the neighborhood of Landak, Borneo, is one stone which weighs 67 carats.

The Crown jewels of Portugal are credited with a diamond of 215 carats and another somewhat smaller, which are said to have been found by three men who were banished to the province of Minas Geraes, and purchased their freedom with them. The large one is probably the "Regent of Portugal," mentioned heretofore.

A 10 carat red diamond in the Russian Crown jewels cost the Emperor Paul 100,000 rubles.

Since the opening of the African mines, the many large stones found, larger than those of the old times made famous by romance and associations, and many too, as beautiful, have passed quietly through the channels of commerce to private collections without attracting public comment. Now that by changes of conditions, men gather riches by finance instead of by violence, and are able to loot treasuries without danger or fatigue, the excitements of mystery and murder are withdrawn from the products of the diamond mines. Gems of greater worth and beauty than those that sparkled from the heads of idols and Peacock thrones, or upon the persons of the lords of rapine, untrumpeted by legendary rumor, are disenchanted and reduced to the ranks of prosaic commerce. No longer do picturesque freebooters gather hordes of fighting men to swoop down upon the treasure chests of potentates; but their descendants, in broadcloth and starched linen, by the battle of wits, enrich themselves, and buy jewels more wonderful than those which glitter in legend and romance.

Time was when few of the large diamonds of the world were to be found outside the lands of the Orient. While India was the chief source of supply, her powerful princes let few escape them. Occasionally, Persia by violence acquired some of them, and a few were stolen. Then as the adventurers of Europe pushed their way east and made settlements in India, there came opportunities to dispose of loot, and an odd stone of size was now and then smuggled away and sold to some crowned head of Europe. Then came the discovery of diamonds in Brazil. The intimate relations of that country as an old-time colony of Spain and Portugal, opened a new avenue between diamond mines and Europe, unhampered by the jealous desire to own the best of the product which characterized the ruling element of India, so that although Brazil produced few large stones, the export of those that were found, was not restricted as in India.

Not until the discovery of diamonds in Africa, however, did Europe acquire freely stones of a size sufficiently large to have them recorded among the celebrated. Now the monster gems of the Orient that have long ranked among the world's wonders are fast becoming insignificant among the numerous larger ones furnished by the empire of Britain in Africa, and the last of the great diamonds found, taken from the New Premier mine, is now the world's greatest diamond. Here is the story of the discovery.

Out in the Transvaal, one evening late in January, 1905, where the faith and energy of Tom Cullinan, as his familiars called him in those days, had transformed an old-fashioned Boer farm in the wilds, into a mining camp, and broken the calm and silence of a solitude by the click of picks, the whiz and whir of machinery, the stir and bustle of many workmen, and the constant tremor of expectation, a bluff, genial-faced man might have been seen leisurely picking his way down the rough broken surface of an open working in the Premier diamond mine. He was the mine manager, Cap. Frederick Wells. His eye roved as he walked, for the rugged, desolate-looking waste, though devoid of the green things which cover the earth's nakedness and grow to the pleasure of the eye, was not altogether barren. That rough hole in the ground was the hiding place of gems, and from the habit of years he looked always that perchance he might discover one. Suddenly a gleam from the rough face of the jagged slope he was descending, caught his eye. He turned, and stooping down, picked from its bed in the rock, a huge crystal. It looked like a piece of ice; it was a diamond. After turning it over in his hand for a few seconds, he walked on toward the office of the company near by and entering, handed the stone to General Manager McHardy who, with the president, Mr. T. M. Cullinan, sat at a table inspecting the day's yield of diamonds. For a few minutes the men stared at it and each other in silence. Familiar as they were with diamonds, they did not realize at once the importance of that fist-size lump of glitter. In that stone lay the whole capital stock of the company three times over. It meant fortunes to them and to the men in London who had backed the enterprise with their money, for it would give stimulus to the venture and raise the mine in the estimation of the world to the level of the De Beers and Kimberley. That unexpected stone was to teach the lords of the diamond world that another had arisen who would surely enter the cabinet that ruled.

Soon, to all parts of the world the message went, that back in the heart of Africa in the new mine of the Transvaal, a diamond had been found four times as large as the boast of ancient India; more than three times the size of Excelsior, the wonder of the modern world. Newspapers all over the world told the facts and filled out the columns with imagination. Writers vied with each other in estimating the value of the colossal gem. Four million dollars was the lowest figure; one hundred million, said some.

The diamond was found to weigh 3025¾ carats, or nearly twenty ounces troy and measured 4x2½x1½ inches. It was taken to Pretoria and from there to Johannesburg, where it was deposited in the Standard Bank. While there it was submitted to the examination of scientists and exhibited to the public for some days.

It was then sealed in a tin box and sent registered as "postal packet" to the London office of the Company.

Dr. Molengraff pronounced it a portion only of a much larger crystal. Four cleavage planes showed where as many pieces had been broken off. Only a small part of the exterior showed the natural skin or "nyf" of a crystal, the greater part of the surface consisting of the four cleavage planes. The remainder showed one octahedral face and a curved irregular surface roughly corresponding to six faces of the dodecahedron, while one very irregular face of the hexahedron was indicated by quadrilateral impressions characteristic of those faces in minerals, such as the diamond, which have the octahedral form of crystallization.

With the exception of a few glessen or grain marks, and minor flaws, which could be eradicated in the cutting, the stone appeared to be perfect and it so proved later when it was cut.

Sir William Crookes thought that it was probably less than half of a distorted octahedral crystal. Some experts were of the opinion that originally it was in the form of a dodecahedron. All pronounced it the purest of all the very large stones known. A beam of polarized light passed through it in various directions showed colors in all cases; brightest when passed along the greatest diameter, but no regular figure was to be seen. Sir Wm. Crookes was reported as saying that these observations denoted internal strain.

When it was sent to London in March by registered mail, it was insured for two hundred and fifty thousand pounds sterling, and upon being deposited in the London & Westminster Bank, arrangements were made to insure it for about $2,500,000 by special premiums against loss each time it was taken out to show prospective purchasers. It was named the Cullinan, after T. M. Cullinan, the chairman of the Premier Company.

For a long time the great diamond lay there, as completely hidden from the light as it had been for ages in its volcanic birthplace in Africa, its enormous value and the size which rendered it unfit for most gem purposes, making a sale impossible. There was much talk of starting a popular subscription in England to buy it for King Edward as a present from the people of the whole British Empire, but nothing was done, probably because the advocates of that course put such a high valuation on the stone (ten million pounds sterling was the general figure), possibly because many saw in the suggestion a good business stroke for the owners at the expense of the public. Finally, at the instance of President Botha, the Transvaal Assembly voted to buy it and present it to King Edward as a recognition of His Majesty's grant of a constitution to the colony. There was considerable opposition to the scheme on account of the finances of the colony, but the motion was carried by a vote of 149 to 119 and the price fixed upon was about $1,000,000. The actual outlay was but forty per cent. of the amount, as the Transvaal government exacts as a tax, sixty per cent. upon all diamonds mined within its jurisdiction.

On November 9, 1907, nearly three years after the diamond was picked out of the "blue" of the Premier mine in Africa, Sir Richard Solomon, formerly lieutenant governor of the Transvaal, on behalf of the people of the colony, accompanied by Sir Francis Hopwood, permanent Under-Secretary of the Colonial Office, presented the diamond to the King at Sandringham. They were attended by Inspectors Drew and Gough, and from the time they took the diamond from the vaults of the London and Westminster Bank until it was returned to its place of security, the party was in charge of Scotland Yard and surrounded by detectives. Arrived at Wolferton, the two knights entered a royal carriage awaiting them and preceded by an outrider, drove to Sandringham. Upon reaching the royal abode they were conducted to the drawing-room, where they were shortly joined by the King and Queen, the Queens of Spain and Norway, the Princess of Wales, the Princess Victoria, the Princess Henry of Battenberg and others. Sir Richard Solomon at once presented the diamond to the King. He examined it with interest, and expressing his admiration, handed it to the Queen, who in turn with the other ladies present, inspected it. At the invitation of the King, Sir Richard Solomon and Sir Francis Hopwood lunched with members of the royal family and returned to London by the 2:55 P. M. train, taking the diamond with them.

Now came the important matter of cutting the great diamond. After much deliberation, it was decided to entrust the work to the firm of J. Asscher & Co. of Amsterdam. A replica in clay was made and experimented upon. The crystal was studied in every aspect to find how the flaws could be lost in the cutting; into what shapes and sizes of cut gems the crystal could be transformed with the minimum loss of weight, and to that end, where and how it should be cleaved. A decision was finally reached, to make one large cleavage which would pass through the interior flaw. Of the resulting two pieces, if the cleaving was successful, one should be cut as a large pendeloque or drop shape, and the other cleaved again for a large brilliant and other smaller gems of various sizes and shapes. The preliminary work of making a V-shaped incision, with a diamond sharp, in the grain of the great crystal where it was to be split, was accomplished, and the moment arrived when the blow must be struck which would make or mar the greatest diamond in the world. The nick in the edge of the crystal was about half an inch deep. Into this incision, in the presence of his two brothers of the firm, and three representatives of the British Government, Mr. J. Asscher placed a specially constructed knife blade and making ready, struck it a heavy blow. There was a splitting, breaking sound, but on opening the hand which covered the diamond, that was found intact — the blade had broken. Another blade and another blow, and the crystal parted in twain, the facets of the two parts smooth as glass, except where the cleavage passing through the flaw, left a little icing to show where it had been and which would soon disappear with the cutting.

For the cutting, special tools had been prepared. The drop, 6 inches across and weighing twenty pounds, was attached to a lever so that the stone could be raised from or lowered to the wheel by foot power. The mill, of cast iron, measured 16½ inches across and made 2400 revolutions per minute. The cutting was placed in charge of Mr. Henri Koe.

Great precautions were taken for the safety of the stone. No one was allowed to leave or enter the cutting room, where the three men employed in the cutting were employed from 7 A. M. to 9 P. M., without a member of the firm. At night the diamond was kept in the strong room and guarded by four policemen. It was taken back and forth to the cutting room by the head of the firm and ten men. A night watchman made a certain mark at the strong room every half hour during the night to show that everything was properly guarded. The walls of the strong room, of iron and cement, were ¾ of a yard thick, and the door was opened by a combination known only to the three heads of the firm. Within, the safe was hidden behind a mahogany cupboard with two handles but no locks visible. There were nine locks, however, behind a sliding panel, and two safes, in one of which was the diamond, and the door of the safe was of eight-inch steel. On account of the great size, it was decided to increase the number of facets usual in the brilliant cut, to 74 for the largest stone and 66 for the second largest. The latter is a square cut brilliant. The greatest of all diamonds was finished September 12, 1908, in time for Christmas.

The final result of the cutting up of the crystal was as follows:

		Carats.
1	Pendeloque or drop shape	516 1/2
1	Square Brilliant	309 3/16
1	Pendeloque	92
1	Square Brilliant	62
1	Heart shape Brilliant	18 3/8
1	Marquise Brilliant	11 1/4
1	Marquise Brilliant	8 9/16
1	Square Brilliant	6 5/8
1	Pendeloque	4 9/32
96	Brilliants	7 3/8
	Unpolished ends	9

and the marvel of it is that they are absolutely without flaw and of a fine blue-white color. The largest stone measures 2.322x1.791 inches, and the next important, 1.771x1.594 inches.

King Edward, who followed the process of cutting with much interest, as a token of his appreciation of the eminently successful results, presented the firm of cutters with a silver bowl, and the Queen of Holland conferred the Knighthood of Orange Nassau on Joseph Asscher. The knife and hammer with which the cleaving was done were presented to the King.

Thus has been added to the Crown jewels of England, magnificent symbols of her power, and coming as a gift from a colony which was but a short time since a desperately inimical government, they are glowing testimonials to the general policy of a nation which has become the most successful colonizer of the world.

For comparison, the weights of the great cut diamonds of the world at present known to be in existence are appended:

	Carats.
Cullinan I	516 1/2
Cullinan II	309 3/16
Nizam	277
Jubilee	239
Victoria (?)	228 1/2
Regent of Portugal	217
Orloff	194 3/4
Darya-i-nur	186
Victoria (?)	180
Porter Rhodes	150
Taj-e-mah	146
Regent (Pitt)	136 7/8
Florentine	133 1/8
Star of the South	125 1/2

	Carats.
Tiffany	125 1/2
Stewart	120
Koh-i-noor	106 1/4

The great diamond was received by the King and Queen at Windsor Castle from Mr. Asscher on November 21, 1908.

The "Prince Edward of York Diamond," a fine white pear-shape African stone weighing 60¼ carats, was imported in 1901 by Alfred H. Smith & Co., the New York diamond merchants, and sold to an American banker.

THE PRINCE EDWARD OF YORK DIAMOND; 60 1/4 Carats

CHAPTER VI

INHERENT QUALITIES OF THE DIAMOND AND DIAMOND CUTTING

THE qualities which make a diamond so supremely beautiful are those which husband and coquette with light. As trembling dewdrops, restless waters, or the windows of a far-off cottage, receive the sun's rays and signal his glory far and wide with their flashlights, so the diamond makes an altar for the light of the atmosphere. But the water is unstable and the light of the window is evanescent; the diamond is everywhere and always ready for a single ray or the flood of noon. If a nimble ray glides over its surface, yet more swiftly does the diamond catch it in the passing, and breaking it into many, sends them on, a sparkling shower. Harder than all else, its glistening walls nevertheless give cheerful entry to the light, but exit, if properly cut, only where it entered. Once within, the adamantine faces smile and smile and pass it on, to cast it forth finally, effulgent. It is very wonderful that a thing can be at once so pervious and so impervious.

Light falling vertically upon the surface of a diamond, enters and passes on in a straight line, but of that which strikes it in a slanting direction, part is reflected and part enters. That which enters is refracted or bent. This is a power peculiar to mediums more dense than air. All precious stones possess it, but it is greater in the diamond than in any other. For instance, the indices of refraction for spinel and garnet, which are also, like the diamond, singly refractive stones, are 1.71 and 1.77; that of the diamond is 2.43.

To obtain the index of this refraction, draw a line perpendicular to the surface of the body through the point of entry of the ray, and a circle around with this point as a center. A straight horizontal line from the point where the circle intersects the ray, to the perpendicular line, is the sine of the angle of incidence, and the sides of the angle follow the ray and the perpendicular line to the impinging point as a vertex, thereby forming the angle of incidence. The ray on entering the body is bent or refracted toward the perpendicular line. The point in the circle, therefore, within the body, where it is intersected by the refracted ray, would be nearer the perpendicular line, on the other side of it. A line drawn between these two points would be the sine of the angle of refraction and with the sides forming a vertex at the central point with the vertex of the angle of incidence, would be the angle of refraction. It is the comparative lengths of these sines which give the index of refraction. In water it is as 1.33 to 1; in spinel 1.71, in garnet 1.77, and in diamond it is as 2.43 to 1.

The light, which falling upon the surface of the diamond is sent flashing on, constitutes the surface brilliancy, and that which finds entry, by the gem's power to hold and return it, forms the internal brilliancy.

The light which has entered the stone is now in the grip of more exacting laws. It has lost the full freedom of the air. The denser medium sets bounds, and the artisan knowing these, so cuts the diamond as to leave no avenue of escape for the entrapped light but the front of the gem where it entered. Jumping from wall to wall of the transparent enclosure, the rays try them all with points of light in vain, until they reach again the gate of entry, and even this must be properly approached if they would pass through.

The reason of it is this: that ray of light traversing a denser medium, in its efforts to escape back into the rarer medium, air, meets with an obstacle called "total reflection." Though light may in some degree enter from the rarer to the denser medium at any angle, it can return only within certain bounds.

Inside the limits of freedom, light passing from the diamond in a slanting direction into the air is also refracted as it passes the surface of the stone, but in a contrary direction. It is then bent or refracted from instead of toward the perpendicular, and the sine of the angle of incidence is less than that of the angle of refraction. The direction of the ray is a simple reversal of that taken on entering the stone. The angle of total reflection is variously given as 24° 13′ to 24° 24′. A ray of light impinging on the inner surface of a diamond slightly within or less than this angle, will on passing through to the air be refracted so that it will pass along the stone near the outer surface, as a brilliant shot of light. But if the ray falls upon the inner surface at a greater angle or more obliquely, it will be totally reflected; no part of it can escape into the air. It is for this reason a diamond is shaped and proportioned as it is now. Light entering the face of a properly-cut diamond reaches the back facets at angles of total reflection. Sent on according to the laws of light at the same angle as that of the incidence, they pass through the body of the stone to meet again angles of total reflection, and are again carried on until they emerge finally from the front of it. Look into the face of a diamond and you will see the imprisoned light scintillating on the burnished facets at the back. Turn it as you will and wherever you look, there is the sheen of light playing over transparent walls, adamantine to it; an imprisoned star beneath a covering of limpid dew.

High refractive power is accompanied by a corresponding power of dispersion, consequently the dispersive power of the diamond is much greater than that of most mediums. It is as .058 to .021 in glass. In the refraction of a ray of white light, it is really broken into its constituent color rays, which are spread out spectroscopically. The index of refraction given is the mean of the color band. To this high power of dispersion is due the effect of color coming to the eye with the emission of flashlights of white light which has traversed the stone and been split up into its constituent colors, by refraction. Many expect to see this color play from the diamond under any light but sunlight and some artificial lights only are the source of it. Nor is the eye always sufficiently quick to catch it, though an illustration can be made, by holding a diamond to receive the sun's rays, and a sheet of paper at the proper angle to catch them as they are reflected by the stone. Then the brilliant rainbow colors will appear.

As the diamond crystallizes in the isometric system, in which the axes are equal, the refraction is normally single, though occasional stones, from extraordinary causes, are found to be doubly refractive. This means that a ray of light on entering the stone is split and refracted at two different angles.

What might be termed the reënforcement of the diamond's brilliancy is its hardness. It is brilliant because it is hard, and it remains brilliant for the same reason. Other stones by the wear and tear of contact become scratched, and their corners are roughened, but the diamond, year after year and generation after generation, remains undimmed. The hardest of all things, wearing does not mar its smooth facets and sharp corners. It laughs at the rough hand of time. Some years ago a German mineralogist named Moh arranged a scale, since known as Moh's scale, giving the relative hardness of various minerals, from talc, the softest, to diamond, the hardest. He made ten divisions as follows:

1. Talc, common foliated variety.
2. Gypsum, or rock salt.
3. Calcite, transparent variety.
4. Fluorspar, crystallized variety.
5. Apatite, transparent crystal.
6. Feldspar, cleavable variety.
7. Quartz, transparent variety.
8. Topaz, transparent crystal.
9. Sapphire, cleavable variety.
10. Diamond.

These minerals were selected because they are constant in the quality of hardness and reach in steps, from the softest to the hardest; but the difference of degree between them does not correspond with the ratio of the numbers. For instance, the hardness of emerald is given as 7.5 to 7.8. That means that its hardness is half way or more between quartz and topaz, but the difference between 7 and 8 is not nearly as great as between 9 and 10. It is said that the difference between 9 and 10 is greater than it is between 9 and 1. The scale therefore does not represent exact and absolute degrees of hardness, but is an arrangement of minerals of different degrees in that quality, numbered for convenient reference.

Nor is the diamond always of the same degree of hardness. Stones from wet diggings are usually harder than those from dry diggings. African diamonds are softer than Brazilians; Indian are harder, and those of Borneo and Australia are said to be hardest of all. The "nyf" or skin of a crystal is harder than the interior, and frequently there are knots in the grain, so much harder that it is difficult to cut them. Cut with or against the grain of a diamond, and the wheel makes little impression; it must be cut across the grain. Sir William Crookes is reported to have said of the Koh-i-noor, that in cutting one of the facets near a yellow flaw, the crystal became so much harder the further it was cut, that after working the mill for six hours at the usual speed, little impression was made, and that the work proceeded very slowly even when the speed was increased to 3,000 revolutions per minute. Other portions of the stone were comparatively soft, but became harder as the outside was cut away.

The only rival of the diamond in hardness is the metal tantalum, of which it is said that in the effort to bore a hole through a plate of it, a diamond drill driven at the rate of 5,000 revolutions per minute for three days and nights, made a depression ¼ mm. deep.

It has long been known that some diamonds absorb light. Robert Boyle in 1664 described this property of shining or phosphorescing in the dark, after being exposed to the sunlight. Late experiments have again demonstrated this peculiar power. The same result is obtained by exposing diamonds to a high-tension current of electricity in a vacuum, the light produced being of different colors, though South African stones emit in a majority of cases, a bluish light. Exposed to radium, diamonds glow with varying degrees of light and in various colors. Colorless crystals which Sir William Crookes kept embedded in radium bromide for a period of 12 months, were found to have assumed a bluish tint which resisted both fire and acids. They had also become radio-active, and heating to dull redness did not destroy the acquired power. Diamond is transparent to the X-rays, while glass is practically opaque.

The somewhat general idea that this quality of shining in the dark is common to all diamonds is an error founded on the statement by careless educators, of the truth that some do so. Isolated cases have been mentioned in such a way that they have been understood as typical, and some descriptions of phosphorescent stones have been quite imaginative. Reading in a dark room by the light of a phosphorescent diamond is so rare that no person other than the narrator would be likely to meet with a similar case. Experiments show that very few diamonds, either by exposure to sunlight or rubbing, will show any light in a dark room.

The diamond is ranked as a non-conductor of electricity and though, on rubbing, it becomes positively electrified, it retains the charge for a very short time only; never more than half an hour.

The diamond is infusible, and is unaffected by acids and alkalies, but it burns in oxygen under intense heat to carbon dioxide and leaves no residue.

Though very hard, it is also very brittle and can be easily crushed to powder. It has a very perfect cleavage, separating readily parallel to the faces of the octahedra. The fracture is conchoidal or curved.

Hardness, 10 Moh's scale.
Specific gravity, 3.52.
Singly refractive (index, 2.439).
Reflective. Total reflection from inner facets at 24° 13′ to 24° 24′.
Dispersive (dispersive power, 0.058).
Burns in oxygen at 4,000°.

Because of its hardness, the art of cutting the diamond as it is now cut, was acquired only after centuries of experiment. The ancients wore their diamonds uncut. Not as a matter of choice, for they knew them only in that form. They did not cut them because they could find nothing hard enough to make any impression upon the obdurate though beautiful stones. With Oriental philosophy they accepted the crystals as Nature made them and were satisfied. To-day even, well-formed crystals, or "Naifes," as they are called, are prized in India. Some thousands of years ago, however, it probably occurred to an observant Oriental that the stone might be turned against itself to smooth the rough places which marred the symmetry and brilliancy of many of the crystals. From that time hackl'd stones were improved by rubbing or grinding one against the other, and smooth places were made in lieu of natural facets. This was called "bruting," and the process was continued for centuries, even till long after the art of cutting them was established, in the grinding down of the crystal in preparation for the wheel, at the point where the main front facets would be.

The exterior of a diamond crystal is not brilliant like that of a cut diamond, but though hard looking and luminous, it has somewhat the appearance of a piece of alum. The "nyf," as it is called, looks like a dull skin over a brilliant body, so that if it has not always the luster of a quartz crystal even, there is something about it which attracts the eye and unmistakably differentiates it from all other stones. It is sometimes rough, but one sees at once that the roughness covers peerless qualities.

It is curiously illustrative of the Oriental character that with a knowledge of the diamond extending over many centuries, they got no farther in the art of improving the diamond than bruting. The art of cutting and polishing diamonds was discovered in Europe and perfected in the United States of America. It was a Venetian who cut the Great Mogul for the Hindu Prince, after whom, as the head of a dynasty, it was named. It is said there were diamond polishers in Nüremberg in the latter part of the fourteenth century, but the method of cutting them by grinding with their own powder is generally credited to Ludwig van Berquem or Berghem, also known as Louis de Bequem, of Bruges, who is said to have first done so in 1456. Bruges at that time was at the height of its prosperity under the dukes of Burgundy, and the industry continued there until, in the days of the city's misfortune and decadence, it was transferred with others to Antwerp. It flourished there until the Duke of Parma took the city in 1585. This was the ruin of Antwerp. Her commerce declined; her inhabitants were scattered, and the Dutch, profiting by her misfortunes, did what they could to prevent her recovery. Diamond cutting was driven largely with other industries to Amsterdam, which has since become the chief center of the industry. The cutters of Antwerp nevertheless maintained a good reputation, and some of the Crown jewels of France were cut there during the eighteenth century. With Napoleon in the beginning of the nineteenth century, the fortunes of the city began to mend, and the diamond-cutting industry there improved, until the beginning of the twentieth century found it more flourishing than in the former palmy days.

There were 75 diamond cutters in Paris in 1700, but most of them were driven later by political troubles to Antwerp, and comparatively little cutting has been done there since.

Diamond cutting as an industry of importance in Amsterdam was founded by Jewish cutters from Lisbon. Their forefathers are said to have come originally from Alexandria. In Lisbon they brought the art to a high state of perfection for those days, but religious persecution, by driving them out of that city in the latter part of the sixteenth century, transferred the industry to Holland.

In the first step toward our modern cut brilliant, the paramount idea of the cutter was, to polish the surface of the crystal with a loss of weight only that was necessary to secure a smooth surface. To get more of the reflective power of the stone on the face of it, as a further improvement, he ground off the apex of the octahedron to a flat facet, making what we now call the "table," and took the tip off the corresponding point. This gave a square jewel with a large and a small flat facet parallel to each other, and from each of which four sloping facets spread to meet at the edges of the square, ten in all. To yet further increase the surface reflections of the stones, the corners of these sloping facets were ground off, thereby forming on top, four equal pentagonal facets extending from the central flat facet to the corners of the square, and four shaped like a keystone between them, extending to the sides. This arrangement changed the shape of the flat facet from a square to an octagon. The under side facets were cut to correspond, so that with the two flat facets there were eighteen in all. The large flat one on top was called the "table," the smaller one underneath, the "culet," and the others the "side facets." The space between the table and the girdle came to be known as "bizel," and that between the girdle and the culet, the "pavilion" or "collet side."

From these primitive forms there was a gradual addition, in the effort to increase dispersion of the light rays, to the number of facets, and a tendency toward the rounding of the finished stone. Material improvement was slow, however. Large stones were scarce in those days, and the aim of the cutter was to produce as large a finished diamond from the crystal as possible. The added brilliancy arising from an increase in the number of facets, gradually forced the necessary sacrifice of material, and they were increased to thirty-four, variously arranged. Some of the old square cut brilliants had as many as fifty. Then came the English round-cut brilliant, having a triple row of star, main and corner facets between the table and the girdle, and a double row of corner and main facets from the girdle to the culet; thirty-two and the table above, and twenty-four and the culet below the girdle, in all fifty-eight facets. This arrangement remains in the perfect modern cut, for though further experiments have been made, nothing more excellent has been devised.

During all these years and stages of improvement, the cutter did not get beyond the idea of surface brilliancy and size. Some even then thought the small sacrifice of material necessary to obtain the facets, a foolish fad. They deplored it as a tendency to sacrifice magnificence to mere glitter. Yet the cut stones were thick and lumpy and good in shape only when the crystals favored them. But as the "brilliant" faceting prevailed, so also the round shape met with public approval, and the old square-cut stones became things of the past.

The cutting of the diamond had now reached a stage wherein full advantage was taken, by the number and arrangement of the facets, of the surface power of the stone to reflect and disperse the light rays falling upon it, and incidentally, to return part of the light entering the stone, to the eye, but the amount of the gem's internal brilliancy depended largely upon the shape of the rough. Although the surface brilliancy of a polished diamond is very great and beautiful, many of its dazzling flash-lights come from the interior. By taking advantage of the angle of total reflection, light coming into the stone and striking the interior back facets, cannot pass through, but is sent on at the angle of incidence, and finally returned in full measure through the face of the diamond to the eye of the beholder. It is these rays which are so preëminently beautiful in the diamond, and which fill the whole body of the stone with light. The surface sparkles; the interior emits flashes. It remained for an American cutter, Mr. Henry D. Morse, of Boston, to make the daring sacrifice of weight to proportion necessary to attain the perfection of the modern brilliant. Disregarding the European method of cutting for weight, he did not hesitate to sacrifice material to make the finished stone as perfect and beautiful as possible. His work was appreciated. The public seeing the superiority of diamonds cut after his method, demanded them, and as the United States became the greatest buyer of diamonds in the world, the cutters of Europe were obliged to conform more and more to the American standard, until it was adopted everywhere, and though naturally all diamonds are not cut on absolutely correct lines, they must now, to be salable, be cut to proportions which will secure the internal angles of total reflection. These proportions are within certain limits variable, but will approximate a depth from table to culet of $^{6}/_{10}$ of the diameter, of which about one-third should be above the girdle and two-thirds below. A little less than one-third of the depth on top, if well cut, gives a sharper brilliancy with less weight.

Patterns

The "brilliant-cut" diamond resembles two cones united at their bases, the upper one truncated or cut off a short distance from the base, and the lower one having the apex only cut off. It has fifty-eight facets altogether; an eight-sided flat facet on top, from which spread eight triangular star facets, called top corner

brilliant.

facets. The points of these meet the points of sixteen split triangular facets whose bases rest on the girdle. Between these "lower corner facets" and the top corner or star facets, are eight lozenge or main facets whose points reach from the table to the girdle; altogether thirty-two side facets and the table, thirty-three in all on top. Below the girdle are sixteen split triangular, or "upper corner on bottom" facets, whose bases join the corresponding ones on top to form the girdle, and eight pentagonal main facets extending from the girdle to the culet, making with the culet, twenty-five facets on the bottom. A diamond cut thus, if it is properly proportioned, shows an equal distribution of light and brilliancy at all distances from the eye. The center under the table is as full of light as the edge facets, because the back facets are holding the light which has entered from the front. If the stone were cut too deep or too shallow, part of the light would pass through the back facets and leave a dark center, called a "well" in a deep stone, or a "fish-eye" in a shallow stone.

Diamonds that are too deep to be at their best, are called thick or lumpy stones, and those that are too shallow are termed "spread" stones if they show weakness in the center at some distances only, and fish-eyes if it is everywhere observable. Mr. O. M. Farrand discovered a method of remedying over-spread stones, by elongating the bottom corner facets, carrying the points down ¾ to ⅞ of the distance from the girdle to the culet.

Some stones are naturally more brilliant than others, but many diamonds would be more brilliant if cut better. As very many crystals are quite irregular in shape, absolutely correct cutting would often entail too much cost. Very many more persons recognize the beauty of a perfectly cut stone when they see it, than the number of those who are willing to pay the extra cost in time and material necessary to secure it. For that reason, though the average cutting to-day is very good, and conforms generally to the proportions of excellence, a large number are not mathematically exact, and when they are so, the price appears to many unreasonably high.

Although a knife-edge girdle requires care in setting the stone, and renders it liable to chip and splinter from contact with others if it is set in an open or clamp setting, it is ideal cutting. Mr. Ernest G. H. Schenck patented a process for forming the stone with a continuous polished curved facet running around it at the girdle, thereby eliminating the unfinished appearance of a rough edge and the liability of a knife-edge to chip. Some cutters cover thickness at the girdle by polishing the edge. As the price of rough went up, many cutters, in order to get as much weight in the finished stone as possible, and therefore more money for it without adding to the price per carat, made the girdle very thick. In that way considerable weight was added without attracting attention, as the extra thickness lay through the body of the stone at its greatest dimension. These were called bicycle-tire stones. This kind of cutting makes a diamond cost less per carat, but the stone costs as much as one of the same size with a fine edge which weighs less and is more brilliant. There was a time, not long ago, when the public commonly demanded a thick or deep stone, because they thought the thicker it was, the better.

Now many go to the other extreme and want them over-spread. The finely cut stone lies between.

Rough diamonds suitable for cutting to gems are of two classes: "close" goods and "cleavage." The former are shaped naturally for immediate preparation for cutting, as octahedrons. Formerly these were prepared by setting two stones in handles and grinding them together, or bruting, until a place was rounded on both where the tables should be, but of late these points are sawed off and utilized. This is done by charging the thin edge of a wheel with diamond dust and cutting through the stone by rapid revolutions, as the facets are cut by pressing the stone against the flat side of a wheel similarly charged. As soon as this practice was established by the cutters, the Diamond Syndicate raised the price of such rough to correspond with the value of the pieces of diamond saved by the process.

The polishing of a diamond is really the grinding of the stone away by contact with the flat surface of a rapidly revolving horizontal wheel charged with diamond dust and oil. These wheels are hackled or grooved to hold the abrasive and the diamond being polished is pressed down upon it, at different angles for the various facets, until the polishing is consummated.

The "cutting" of a diamond consists in the preparation of the stone for the wheel, and takes the place of the old-fashioned bruting. It is done by setting one rough stone in a turning wheel and another in a stick. The one in the stick is then held against the other revolving in the wheel, and they grind each other down to a girdle, from which the stones are rounded up to a low dome for the table side, and a higher dome for the culet side. The turning wheel can be thrown off the center so as to take certain parts of the crystal out of the grind in case of dangerous flaws. The process consists really in roughing out the outlines of the stone as it is to be, and cuts to dust about fifteen per cent. of the weight lost in the entire process. Some cutters saw the octahedrons through the center and then cut a shallow bizel side, round off the corners for the pavilion and send it to the wheel for the faceting or polishing. By this method they get over fifty per cent. in cut goods out of the rough material. The temptation is to cut the top side of the girdle too shallow for perfect brilliancy, in order to save weight. This was done frequently in Antwerp, and those shallow top stones are often called "Antwerp cut."

By new methods now in vogue, the loss of material in cutting has been reduced from sixty per cent. to fifty and in some cases forty per cent., and the work can be done in very much less time. Health conditions have also been greatly improved by the new methods. In the old way, setters were menaced with lead poisoning through the continued handling of lead in the frequent resetting of stones in the dop.

Not very long ago the setting of stones for the wheel was done in a very crude way and consumed much time. The diamond was set in a mixture of lead and tin in a metal cup. A small part of the stone was left exposed and a mark indicating the grain of the stone made on the solder. This method required frequent resetting. During the entire process, the direction of the grain was noted and a mark made for the guidance of the polisher. Each facet had a name by which the grain and how to polish it was known. Since diamond cutting has been done largely in this country, many improvements have been made. A dop, as the holder of diamonds on the cutting wheel is named, is now made, which holds the stone in claws, doing away with the troublesome use of fusible metal, and is so constructed with mechanical devices that the whole set of facets can be accurately gauged for the presentation of the stone on the cutting wheel. The wheel makes about 2,000 revolutions per minute and it has been calculated that to polish a diamond weighing 100 carats in the rough, a wheel would revolve over 52,000,000 times.

As Europe did more to advance the art of cutting diamonds in a few centuries than the Orient did in several thousands of years, so the United States has done more in the last decade than Europe did in the centuries. As in other matters, they have taken advantage of the old world's many years' experience to develop the knowledge gained into practical appliances. Precious stones have been long sawed by the Chinese, with a string charged with oil and emery, spun over a bow. It is said that sawing was done on the Regent with lead strips charged with diamond dust, a process possible only where time and labor counted for practically nothing. When the United States took hold of the industry, machines were soon perfected to rip a diamond in any direction at a minimum expense of both time and labor. To-day there are numerous patents for sawing, convenient dops, and devices for sawing and splitting the crystal, whereby time, labor and costly material is saved.

Cleavages are crystals of a shape out of proportion to a cut stone. These are split into suitable pieces before going into the cutter's hands. Imperceptible as it is to an inexperienced eye, diamonds have a grain along which they can be split as wood is split, only much more evenly and exactly. This grain is parallel with the faces of the octahedra. Advantage is taken of this to save material and the labor which would otherwise be expended in grinding away superfluous parts, to eliminate interior flaws, and also to improve the color, for by judicious cleaving a number of parts of a crystal may be made to yield a finer color than that of the crystal in its entirety.

To be a good cleaver one must be familiar with rough diamonds and have good judgment; the operation itself is simple. Having studied a crystal and decided just where and how to cleave it, the cleaver takes the edge of another rough diamond fastened in a convenient handle, and grinds it across the edge at the point where the stone is to be split, until there is an incision proportionate to the size of the crystal being operated on. He then uses other "sharps," as the cutting edges are called, until the incision has the appearance of a V-shaped nick. Placing the blunt edge of a flat piece of steel like a short ruler, in the incision, he strikes the other edge a smart blow with a small hammer, and the crystal divides, the two planes of the cleft smooth and shining as glass. After examining the pieces, he places them in the little lock-box always before him, lights a fresh cigarette, and picks up another crystal for examination. About twenty-five per cent. of the diamonds found require cleaving.

Another form of cutting is the "rose cut," used principally for cheap cluster work in countries where the people are not as critical and have less money to spend than those of the United States. Rose cut diamonds are high or low faceted domes over a flat base. They are cut usually from the odds and ends of crystals, small flat crystals, and pieces which cannot be used for brilliants. Most of them are cut in small sizes, though some large ones are cut from flat crystals which will not afford a brilliant. The "Dutch" rose has twenty-four facets in two rows of equal depth. The "Brabant" rose has one deep row below, surmounted by a shallow row. This is cut also with twelve facets or less. The "Rose recoupée" has two rows of high facets, twenty-six in number. The "marquise" and "pendeloque," each have twenty-four facets, and the "double" rose, which is like two ordinary roses joined at their bases, has forty-eight facets. "Briolettes" are pear-shaped or oval stones faceted all over with triangular facets. The "Pendeloque" is a brilliant-cut, pear-shaped stone. The "Rondelle" is a flat, circular stone with faceted edges, usually pierced in the center for stringing between other stones of bead shape; they are seldom cut in diamond. "India-cut" is a clumsy form of the single brilliant-cut, adopted by East India cutters to preserve weight, and is rarely seen in western markets. "Point-cut" is only found in antique jewels. It is produced by polishing the faces of a regular octahedron.

Great care is not exercised usually in the cutting of roses. Theoretically the facets are even and regularly placed, but usually the stones are simply covered with uneven flat facets to catch the light and glitter. They make very unsatisfactory jewels, for set them as carefully as possible, dirt will collect under the flat backs and produce a dark, unclean effect. Most of them are cut in very small sizes, many as small as several hundred to the carat.

This seems incredible, but a more marvelous fact is that full-cut brilliants with their beautiful arrangement of numerous facets are also cut to such sizes, one hundred to the carat being not uncommon. The thicker roses of twenty-four facets are also called "roses couronees" and the six and twelve facet roses, cut chiefly in Antwerp, are known as "roses d'Anvers."

Single or eight-cut brilliants are used to some extent in the United States in small sizes for cheap work. These are shaped like the brilliant, but have eight side facets on top and eight on the bottom, running from the girdle to the table and from the girdle to the culet. In a paper of melee, the cut is not always observed, and though they are much less sparkling when mounted in clusters than the full-cut, many do not learn it until, after buying the jewel, it comes in comparison with the more expensive jewel made of the full cut brilliant stones.

Of late, in response to a demand for novel effects, many diamonds of the finer qualities have been cut square, marquise, pear-shape and heart-shape. Most of them are cut after the brilliant order of faceting, but some of the square stones are cut with straight parallel facets or "table-cut," similar to the usual cutting of emeralds. These are not used for popular-priced jewels, but are confined to expensive pieces for a class who do not regard cost. Among the novelties in cutting introduced during the last decade, one only attracted wide attention. It was patented by a New York importer and for a time it appeared possible that the form might become permanent. It is known as the "twentieth-century" cut. The diamond is cut round, but the side outline shows a shoulder above the girdle and the pavilion is somewhat bellied. The shape of the facets also differs from those of the brilliant-cut and there are eighty of them. The table is replaced by a low pyramid of facets meeting at a point in the center. It has not proved popular.

A process of grooving diamonds has been patented. Parallel grooves around stones having 8, 10, 12, or 18 sides are sometimes cut and regular facets are cut concave. Diamonds cut thus have not yet appeared on the market.

In Amsterdam there are 64 factories with an aggregate of 7,000 mills and employing about 9,000 persons. Wages of setters, cutters, and polishers, range from about ten to fourteen dollars per week. Cleavers are paid from fourteen to twenty dollars per week. Ten hours is the working day. Antwerp employs from 4,000 to 5,000, of whom 70 are women. Sorters get six to ten dollars per week and the other workers are paid about the same as those of Amsterdam. In Paris there are a number of cutting shops, but very few of them are for cutting diamonds only. It is so also in London, therefore neither city is regarded as an important center of the cutting industry.

Cutting in the United States was first begun about 1866. Mr. Henry D. Morse of Boston, who soon had a good reputation for fine cutting, operated up to fifteen or twenty mills. A few later followed his lead, mostly as repairers only, however, but about 1881 the old New York diamond importing house, Randel & Baremore, afterwards Randel, Baremore & Billings, opened a cutting shop in connection with their importing business, under the management of John B. Humphrey, the diamond cutter of Boston. Later the shop was in the charge of Mr. Charles H. Bent, who learned the trade with Mr. Morse. They operated about twenty mills. At that time there was but one other shop of the size in New York. Although numerous small shops were opened from time to time, it was not until early in the nineties that any large cutting establishments, operating simply as cutters after the European manner, were started in New York. There are now eight or nine which keep twenty to seventy-five mills going, and there are four to five hundred persons employed in the industry. The polishers earn from $24 to $60 per week. Many of the cutters, saw men and cleavers, work by the piece, some of them, especially the latter, earning very large wages when employed.

By 1897 our imports of rough were considerably over one million dollars per annum. In 1899 they were nearly five millions, and though they fell below four millions the following year, they went to over six and a half millions in 1901 and to about eight and a quarter millions in 1902.

The imports of rough have been as follows:

to June 30, 1873	$176,426
1874	144,629
1875	211,920
1876	186,404
1877	78,033
1878	63,270
1879	104,158
1880	129,207
1881	233,596
1882	449,513
1883	441,996
1884	367,816
1885	371,679

to Dec. 31, 1886	302,822
1887	262,357
1888	244,876
1889	196,294
1890	340,915

From 1891 to 1896 inclusive, rough in government statistics was either included with all other uncut precious stones, or with unset diamonds and other precious stones.

1897	$ 1,386,726
1898	2,513,800
1899	4,896,324
1900	3,658,645
1901	6,592,469
1902	8,221,589
1903	10,275,800
1904	10,234,587
1905	10,281,111
1906	11,676,529
1907	8,311,912
1908	2,287,440

From 1873 to 1883 inclusive, these figures include glaziers' diamonds and other diamonds, except those for jewels and diamond dust.

From 1884 to 1890 inclusive, they are for rough or uncut diamonds alone.

From 1891 to 1896 inclusive, rough was included with other items so that definite figures cannot be given. From that time the figures stand for rough only.

The amount for 1908 includes all uncut diamonds except bort, which amounted to $180,389.

Import statistics as published from time to time are misleading, as they are sometimes given for the year ending June 30 and at other times for the year ending

December 31. The figures also cover at times one or all of the various kinds of uncut diamonds, i. e., miners, glaziers, engravers, bort and dust. In some cases other rough precious stones are also included under the one heading of "diamonds uncut." As nearly as possible the foregoing figures represent the amount in value of rough diamonds imported to be cut to jewels.

CHAPTER VII

COLOR AND FLAWS

COLOR is one of the most important qualities of the diamond. Generally, fine color means the absence of color, or a pure, clean, colorless transparency. As tints appear in it, the stone is called off-color, which means that the color is not good. Tints of pink and blue, however, are considered extra fine. So also fine color sometimes means a rich or rare color as the term is usually applied, as pink, green, blue, yellow, etc., for the diamond occurs in these and other colors in various tints and shades.

Color in diamonds is the opportunity of many dealers, and the despair of others, for it is very deceptive, and the public is so confident about what it thinks it sees. What it really does see is not always inherent, but is reflected into the stone from the gold in which it is set, or by conditions of the light under which it is seen.

Usually the diamond is white with a tint of yellow, brown, or green. The yellow-tinted are by far the most common, the brown are abundant, but the green are comparatively few and come mostly from one district, i. e., Bahia in Brazil. Absolutely colorless, or white stones, are rare; so also are those having a bluish tint. All these are included in the general term "white," to distinguish them from the "fancies," which are stones of such decided depth of color as to make them desirable on that account.

Diamonds not distinguished by a color prefix are graded and quoted by dealers as follows:

"Jagers" are white stones with a bluish tint. They are popularly supposed to be from the Jagersfontein mine of the Orange River Colony in South Africa, as many of the stones from this mine are of that character, but all diamonds of similar quality except "Rivers," after they leave the cutter, are now included under the name.

Next to these and preferred by many are the "Rivers." These are white stones of extreme purity and extraordinary hardness, found in river beds. The brilliancy is peculiarly sharp and the color by comparison with other white stones reminds one of snow. The perfection of these qualities distinguish stones taken from wet diggings, and though all "Rivers" have not the color requisite for this classification and some have a bluish tint like the Jagers, it is generally conceded that they are all harder and therefore more brilliant than those from dry diggings. The fine white stones of Brazil and India, unless old-cut, are now included under this head. Old-cut stones of this character are termed "Old Mine."

The next grade is called Wesselton, after a mine in South Africa of that name. The color is very nearly equal to the Rivers, though it lacks somewhat of the purity and snow-whiteness of the latter and the brilliancy is not quite as sharp.

"Crystals," which are subdivided into "top crystals" and "crystals," are white stones showing a trace of yellow when compared with the higher grades. These are the white stones of the high-class jewelers. Diamonds of the color known to the general public as white, are called in the trade, "silver capes." They also are graded as "silver capes" and "top silver capes." "Capes," also subdivided in the same way, are tinted still deeper and are sold to the public often as "commercial white." "By-water" are quite yellow, though the color is not deep enough to place them among the fancies, and is sufficiently lost to the eye when mounted to warrant their retention in the list of white stones.

Browns are all included under the one classification. Those having an almost imperceptible shade of brown are separated and sold as steel-white, pink, etc. Fancy browns are not included in this grade.

The green-tinted diamonds, being little known by the public and many dealers, are used by manufacturers and sold when mounted, as white. As those who look for color have only yellow in mind, the greenish hue is seldom detected, especially as stones of this character rarely weigh much over ½ carat and are usually smaller. A few are of sufficiently deep color to be classed as fancies. They are a light apple-green similar to the Willemite.

In the list of fancies which have been found, are the following, given in the order of their rarity, the first being most rare. Emerald green, red, sapphire blue (invariably of poor color), pink (seldom more than a tint), black, orange, canary, coffee-brown, reddish-brown, golden-brown, and tints of violet and blue which are the more rare as they become deeper.

There is another class of stones the color of which varies materially according to the light in which they are viewed. These are classified as "false colors." As the new Premier mine of South Africa produces many of this character, they are now becoming known as "Premiers." Generally they are more or less cloudy or milky, with a bluish tint which changes in some lights to a yellowish or brownish shade. They are very deceptive, and are often sold under favorable conditions for better than they are. Many dealers as well as the public are deceived by them.

These are the classifications which have grown out of the close methods of the London Diamond Syndicate, but notwithstanding the sharp lines of difference which have been drawn, in the determination to extract the last penny from the public for every item of quality, there yet remain differences of tint, and quality of color, in individual stones, sufficient to puzzle the judgment even of the dealer, and it is often found difficult to match perfectly a pair of stones from a parcel, closely graded as they are. There is reason too for the fact that experts sometimes differ in their judgment when comparing two particular stones.

To understand the condition, it should be remembered that color is not a thing of itself or an exact quantity or quality of a thing, but an optical phenomenon. It is a sensation conveyed through the eye to the brain by vibrations or waves of certain lengths and rapidities of motion, which in the transmission become to us what we know as color, some waves producing the sensation of one color, some another, as sound varies to the ear in the notes of an octave. The white light of the sun is the sum of these variations. This white light may be decomposed, and the constituent rays shown in the spectroscope, as the primary colors from red to violet, together with others which result, in their effect upon the eye, from modifications by combination with each other. These colors appear in the spectroscope to the eye, in horizontal bands of variable width according to the media through which the light passes, as violet, indigo, blue, green, yellow, orange and red. Now the different elements of the various objects we see, when white light falls upon them, absorb some of its constituent rays and return some to the eye separated from the others, thereby producing the various sensations of color. There are several reasons, however, why persons differ in their judgment of them. Practically every stone has qualities which would produce a definite degree of color to the eye under the same conditions. But exactly the same conditions always are almost impossible, for the variation of position when the stones are placed side by side is sometimes sufficient to affect the light vibrations and therefore the color appearance to the eye, in favor of one of them.

Again, the eyes which see, vary. A ray of pure white light passed through a prism divides, on the screen, into the spectroscopic bands, which merge one into the other in a definite unvarying gradation, but no two persons would draw the dividing lines between them in the same places. One sees more yellow and less green and the others vice versa. Beyond this, it is being found that many people are absolutely blind to some colors. There is of course a normal average perception, but many are not up to that average, and of those above it, few have trained the faculty, under the distractions of a broken surface of sharply reflective and refractive material, sufficiently to see clearly the exact color of it. The sensation of the yellow ray which reaches the brains of some, could not be conducted by the optic nerve of others.

Experts are slow to pass judgment on the high grades of diamonds in a poor light or unfamiliar surroundings and for one to say positively that the color of a very fine stone, is better or poorer than that of a similar one, without comparison, is rash, and good evidence that he is not familiar with that kind of material. One's physical condition also influences the perception of color. Experience teaches many dealers that there are days when they are not in good condition to buy diamonds. There are few but wonder at times, as they become better acquainted with their purchases, how they could have paid as much as they did for certain lots.

Surrounding buildings, the color of the walls and ceilings of a room, association, the kind of mounting it is in, all affect the apparent color of a diamond. Jewelers frequently hurt their diamond trade by papering the walls and ceilings of their stores with yellow, brown, or crushed strawberry, for which many seem to have a predilection, or are damaged by a neighbor across the street painting the front of his building with some vivid tint. The light is thereby tainted and the adulteration is reflected in the diamond.

The quality of the light under which a stone is viewed has much to do with the apparent color. A cloudy day will darken the color of some and neutralize that of others. Dealers sometimes take advantage of such conditions; they are frequently embarrassed and lose sales by them. The best light in which to judge fine shades of color is an unimpeded north light.

It will be understood by the foregoing that for a person who has not had sufficient experience to instinctively estimate and balance the various influences by which he may be surrounded, it is quite difficult to grade a stone at sight.

Looking intently or for a considerable period at some decided color just prior to looking at a diamond, will influence the judgment. Some effect of the accidental or complementary color thereby produced, undoubtedly remains, and becoming mixed with the new impression, produces a sensation of color which is not true to the last thing brought under observation. For instance, if one, after working for some time over a paper of emeralds, were suddenly called upon to judge a fine white diamond, he would probably see a tinge of brown in it. The brown would not be in the stone; it would be a left-over impression, or the ocular spectra produced by gazing at the green emeralds. In a like manner amethysts or blue sapphires would prejudice against white stones by creating an impression of yellow. On the other hand, the blue of a bluish white stone would be intensified to a purplish or violet tint by first fixing the eye for a short time upon yellow sapphires or topaz, or a canary diamond. The off-hand adverse criticism by a buyer, or the buyer's adviser, of a stone which is really white, often tempts the dealer to allow his customer to deceive himself and sometimes obliges him to sell a poorer stone at a higher price than that he would have preferred to sell.

Color is often unequally distributed through the stone, or the elements which cause the sensation of color are so placed that position modifies it. There are stones which show more color when viewed from the back than when faced up to the eye. In others it appears deeper when viewed edgewise than in any other direction. Occasionally the poorest color appears in the face of the stone, but this is seldom the case, as cutters and cleavers naturally try to arrange their work so that the best will come to the front in the finished product.

The cutting of a stone has its influence on the apparent color. One that is cut shallow will not appear to have as much as it really has. A thickly cut stone makes it more perceptible. If the body of a stone is white and the culet is cut in a bit of color, that will appear throughout the stone when it is faced up. Oriental cutters take advantage of this in the cutting of rubies and sapphires especially, by placing the culet in a stratum of good color, even if they must spoil the shape of the stone to do so. Diamonds are not affected thus to the same degree, because they seldom have strata of decided color and when they do, the tints are so weak that the differences are not easily distinguished, though the result is noticeable as an uncertain color which varies with the changes of light and position in which it is seen. These are the false color stones. Most of them appear blue with a tendency to violet under a strong natural light, the tint becoming stronger and therefore better as the stone approaches the eye. Uusually the blue shows to best advantage under a loup with an inch focus, though one experienced, by moving the stone to different angles, will catch fugitive glimpses of the deteriorating hues included. These are generally yellow, sometimes brown. Upon removing these stones from the clear sunlight to a mixed or artificial light, the inferior colors become dominant.

There is another item of importance, though it escapes general observation. It is the quality of color. In fancies, the hues being deep, it is more noticeable and therefore regarded. A fine canary is of a clean bright yellow like the feathers of the bird after which it is named. Frequently the yellow is tainted by a greenish cast; many have a dark, murky quality, and are really very deep by-waters. Inferior browns are of an ashen or blackish character. Of the other colors in which the diamond occurs, greens and orange are generally good, as the apple-green, if less rare and desirable than the emerald-green, is nevertheless very beautiful, and orange is always so. Absinthe-green diamonds are sometimes very pleasing, though stones of this color are apt to have an oily appearance like some zircons, in which case the center is dark. Occasionally these show wide variations of color under different lights; one in New York being absinthe-green, golden, brown, and red, according to the light in which it is seen. In red, the diamond never approaches the magnificence of the ruby, and in sapphire blue it is seldom equal to a good Ceylon sapphire even. The famous Hope diamond would be considered quite inferior as a sapphire.

In the variously tinted white stones, and the untinted white, quality of color is more elusive. The white will be found by comparison to be blackish, steely, or snowy. The latter is characteristic of river stones, especially the Indian when they are white, and is in the opinion of some, the superior of all, because it is the cleanest and purest. There is something intensely fascinating about one of these pure white stones, and it is worthy of remark, that members of families which have for generations owned fine gems, if they are interested in precious stones, instinctively prefer them. They are almost invariably the choice of persons to "the manner born." Most of the white stones marketed are of the steel white variety, and they are finer than the blackish, which are few and undesirable.

The quality of yellow-white stones varies from a clean bright yellow to a dark and somewhat muddy shade, in gradations so fine that only an experienced eye can detect them by comparison. The more clean the yellow of the tint, the better it is. Brown-white range from ashen to red-brown and are all undesirable, as they look dark when mounted.

It should be remembered that in writing of quality of color no reference is made to its depth, but its character only. In a general way the quality of color is better, as in fancies, when it is clean and bright, and poorer as it becomes dark or muddy.

Color is affected by the mounting in which the diamond is set. Usually platinum neutralizes yellow tints to some extent, and is helpful to most white diamonds. To some, however, it imparts a leaden appearance. Polished gold is more apt to give an appearance of color to a white stone than the dull yellow of roman gold. Nothing marks more the individuality which diamonds possess than a study of them in different mountings. They will appear smaller or larger, whiter or more off-color, brilliant or leaden, according to the mounting in which they are placed. As an illustration of this fact, the writer remembers a sample ring made by a manufacturer of mountings some years ago. It was a peculiar style and was universally decried by the trade. As he could not sell it and it was odd — a merit to him — he put a diamond in it and wore the ring himself. Immediately the diamond was admired and sold. the buyer stipulating only that he would not buy the setting. Another was put in its place and at once met with the same fate. He repeated this until the ring could not be used further, and the dealers upon whom he called had all become familiar with the ring and probably with its salesmanship. A diamond in it looked whiter, larger, and more brilliant than it did out of it, though the manufacturer found in his experiments that occasionally a stone would not appear to good advantage in it. Great care should be exercised in the choice of a setting for a diamond, especially if it is a very fine stone. Many fine gems are made to appear mediocre by the whims of inexperience, or the ignorance of an inartistic jeweler.

There have been many attempts to improve or change the color of diamonds. If one remembers that color in a one carat stone may make a difference of several thousand dollars in the price of it, one will realize the incentive. At this writing a blue-white stone weighing one and one quarter carats is held by the importer at twenty-five hundred dollars; a perfect brilliant by-water of the same size can be bought for one hundred and twenty-five dollars.

In old times some charlatan periodically claimed the ability to remove the coloring matter from diamonds. Some men of reputation made the same claim, among them one who styled himself the "Inventor of the process for the decoloration of diamond rough." The result was said to be accomplished by heat and chemicals.

De Boot asserted that Rudolf II could take not only color, but flaws from diamonds. If the statement was true, the secret died with him. It has been stated of late that the emanations of radium permanently improve the color of diamonds, changing the yellow to a bluish tint, but time for proof is yet wanting, and the cost and scarcity of radium debars thorough investigation at present. That radium has a great influence on some diamonds has been demonstrated. Under its influence some stones will become brilliantly phosphorescent, and the color of the light varies with different stones. Two large diamonds, one blue, the other black, as the radium was brought near them, glowed brilliantly, retaining the light for some little time after they were removed from the influence of the radium, the black stone holding the light somewhat longer than the blue. This was reversed when the stones were subjected to the ultra violet ray, as the black stone showed a red light for 15 seconds and the blue stone shed light for five seconds after the black stone had lost its brilliancy. Actual contact of the two substances is not necessary to produce the result, as a mixture of radium and willemite held ten inches under the board on which the diamonds lay, caused them to glow in the same manner. Willemite, a zinc silicate, it was found, in combination greatly increased the power of the radium.

Some twenty years ago it was discovered that dishonest persons were "painting" diamonds. This was done by applying a purple dye or ink to the under side of the stone on and around the culet. When dry this was rubbed down until the paint became imperceptible to the casual glance, but leaving enough on withal to neutralize the yellow of the stone, or if the diamond was white, to give a bluish tint to it when faced up. Not only was this done with individual stones, but importers found that some of the dealers in Europe from whom they bought parcels of diamonds, were open to suspicion. At one time there was considerable and general alarm. Importers and dealers everywhere resorted to the alcohol and acid bottles and there was a great cleaning of diamonds. Importers found they had paid more for some stones in Europe than their customers were selling the like for here. The bargains of bargain buyers disappeared. Pawnbrokers discovered that they had loaned more than the market value on some of their pledges.

Before suspicion was aroused there were men who habitually bought off-color stones in rings and after painting, pawned them at a profit. For some time a reputable manufacturer painted yellow diamonds and mounted them for his customers with the paint on, in closed English set rings. When he found that the device was being used to deceive patrons instead of improving the appearance of stones sold for what they really were, he discontinued the practice.

The fraud did not last long, as the trade soon became too watchful, and those who offered such stones acquired at once a reputation which deterred knaves and caused honest men to watch closely all stones which passed through their hands. A painted stone is rarely seen now.

If well done it is difficult to find evidence of the paint with the naked eye, but on turning the collet side about at different angles, a metallic iridescence on the facets will often betray it. When in doubt, the safest plan is to wash the stone thoroughly in alcohol.

Another fraud has succeeded the painted diamond. Many diamond doublets have been made and sold lately. This is not a new thing but an old imposition revived. They are made of diamond from the table to the girdle and joined there by invisible cement to a collet side of white topaz, but they are not good. The topaz back fails to give the proper reflections and the stones look dead.

These practices are very old, and become epidemic as they are forgotten, or a new generation of unwary buyers succeed those who have had experience.

Price is not always indicative of beautiful color. Sometimes it corresponds with the rarity of the stone only. A black diamond is odd, unique, rare, but not beautiful, yet it will bring a larger price than others of exquisite color. This is true also of some oily absinthe greens, cloudy blues and sapphire blues. Many of the pinks which command very high figures, look weak and washed out when compared with a fine golden brown of half the cost. Frequently the blue-white stones appear dark and less attractive when placed side by side with the snow white gems of India or Brazil. Absolutely pure white diamonds are probably more scarce in the market to-day than blue white, yet the latter bring a higher price because the public has been educated to regard them as the finest of all. This education was made when they were also more rare than white. It is true that a blue-white stone will make any but a snow-white appear off-color by comparison, but the snow-white has a quality which makes even the bluish tint look off-color. The term, "off-color," means that the ideal purity of the stone is destroyed by a taint of color. As generally applied, it means by a tinge of yellow or brown. As popularly understood, it refers to yellow only.

To judge the color of a diamond, endeavor to get an unobstructed light, a north light if possible. Do not hold it in the fingers, but by diamond tweezers, or in the crease of a diamond paper, as to put the breath on it properly, it must be cold. Then breathe quickly with a slight puff upon the face of it. This casts a mist on the stone for a second or two, and enables one to see the front color without the confusion which arises from its reflective and dispersive powers. Having noted this, turn the stone in the paper edge-wise to the eye, and partially close the paper over it to ward off outside influences. The body color of the stone can then be seen. If it is a blue-white stone, try it in various positions and lights and under a loup, watching closely all parts of the stone for a tinge of color other than blue. If there, it will be seen at some angle and will be prominent in some light. If found, the color is false.

Under artificial light, diamonds with a tinge of brown appear dark; yellow is much less perceptible than by daylight; gem canaries even cannot then be distinguished from ordinary stones. Some fancy mixed color stones become strangely transformed. There are specimens, green to gold in daylight, which change to brown and red by artificial lights. Under an arc light, some blue stones lose color, and others not so blue assume a deep violet hue, very beautiful.

Other things being equal the relative market values of color in the diamond are about as follows:

Fancies: Emerald-green, red, sapphire-blue, pink, orange, tints of violet-blue and blue, canary, black, and brown.

In what are termed white stones: Blue, snow-white rivers, jagers, wesseltons, crystals, silver-capes, very light brown, very light green, capes, yellow (by-waters) according to depth of tint, and browns.

The flaws which occur in the diamond consist mainly of so-called carbon spots, and fissures or "glasses" (glessen) as they are sometimes termed in the trade. There are comparatively few stones which are absolutely flawless, though many of the faults are almost imperceptible to the naked eye and are of such a character that they do not hurt the brilliancy or beauty of the stone. Formerly, absolute perfection was not demanded to the same extent as now. Then, diamonds were used almost entirely by a class of wealth and leisure in whom the keen trading instinct was not developed. Accustomed to jewels, if one pleased the eye, they did not enter into a close inquisition of details. This class appreciated observable qualities. If the ruby was a fine red, the sapphire a beautiful blue, and the deep rich green of the grass distinguished the emerald, offered to them, they did not stop to consider the effect of flaws upon a possible sale later. So also with the diamond. If it was brilliant and the color was good, that sufficed. But as people unaccustomed to diamonds became large purchasers, the trading instinct of generations manifested itself. These in buying, never lost sight of market value and anything which might affect it. They could not reach in a lifetime or a generation or two, the careless prodigality which bought with no regard whatever to turning the jewel into cash again. The diamond was to them more an article of merchandise than a jewel. Every detail which might hinder a ready sale, was noted, either to be avoided, or used as an argument to whittle down the cost. Not educated by familiarity to the more subtle shades of life and color, their criticisms fell upon the one thing they could detect, the flaw. As with a man of noble parts his one fault will be decried by those who fail to appreciate the otherwise divine beauty of his character, so the new buyers of diamonds refused many a noble stone because of flaws which could not hide nor mar the magnificence of worth and beauty. And this general condition was fostered by the many new dealers. When a jeweler first adds diamonds to his stock, his one demand is, perfection; his one claim when he offers them for sale, perfection. He learns the value of other qualities later.

This critical demand for perfection grew rapidly when the people of the United States began to buy diamonds. Jewels to many of them and their forebears had existed only in their dreams of romance and royalty on the other side of an impassable barrier. When these persons awoke to the fact that fortune had enabled them at will to possess these old-time splendors of their dreams, they brought to the buying a hypercritical taste which knew little beyond flaws. Nor could they as a class be deceived in a matter to which they had given attention, for the people of the United States are both sharp and inquisitive. They soon learned to back their demand for perfection with the ability to discover for themselves any imperfection, and to-day it is common for a would-be purchaser, to subject the diamond he has under consideration to careful inspection through a jeweler's loup or magnifying eyeglass.

This general insistence on perfection finally affected the better educated class of buyers, so that they also demanded freedom from flaws in addition to the positive qualities of color and life. The tremendous demand for diamonds in the United States developed in the last decade, coupled with the control of the world's supply held by the Anglo-African Diamond Syndicate, has finally enabled that powerful corporation to check this unreasonable demand for absolute perfection. The Syndicate has of late forced upon the American public, imperfect stones, not only by marking the price of perfect stones much higher relatively, but also by reducing the proportionate quantity of them in the diamonds they market. Since the price of diamonds has been raised to the present high figure, there has been a noticeable willingness in the trade to overlook minor flaws. Dealers have been driven to the endeavor to show goods at a price which would appear reasonable compared with stones bought ten years ago. This effort to hide the wide difference of price for the same goods, that exists between now and then, has forced many dealers to accept imperfections which they would have refused formerly, in order to get stones at somewhere near old prices. Original parcels of perfect stones are rare now, nor will the importer allow the perfect ones to be taken from mixed lots, except at a very considerable advance. When the imperfections are slight, the parcel is quoted as "clean." If the buyer is persistent, he will learn that the lot contains a certain percentage of perfect stones and the balance is slightly piquè (which means they they have small specks or glasses in them), or perhaps that the entire parcel is slightly piquè. Other lots are said to "run clean," when a fair proportion are perfect or nearly so and some are quite imperfect. If a lot is admittedly imperfect, the imperfections will surely be quite noticeable. "Rejections" are the stones so badly imperfect as to endanger the sale of the lots from which they are culled. These are sold at a low figure to dealers in "bargains."

There are two kinds of imperfections or flaws: those which are inherent, and others arising from imperfect cutting.

Of the former, black, or carbon spots are the most discernible. They range from specks so small that it is difficult sometimes to discover them with a magnifying glass, to spots and broken, ragged clusters, quite plain to the naked eye. They are formed often of uncrystallized carbon or portions of the original element which did not crystallize with the rest but took one of the other forms of carbon, i. e. graphite or carbonado, probably the latter, and were included in that which did crystallize. Others are inclusions of foreign matter, titanic iron, etc. They are considered bad imperfections because they are so easily detected by the naked eye. It is worthy of observation, however, that the blackest and most abrupt carbon spots are usually found in the whitest and finest stones. They remind one of human nature, in which the flaws of great talent are more than ordinarily bad. Not only do black spots look blacker when set in material of peerless color and splendor, but they are blacker. Where carbon appears in the lower grade diamonds of Africa, it is often not only somewhat scattered, but cloudy and less distinct. In the pure white brilliant stones of India, it is decidedly black, and abruptly distinct in formation. Why the carbon inclusions failed to crystallize with the surrounding diamond, has not been satisfactorily explained. As they must have been subjected to the same heat and pressure as the remainder of the crystal, some other agency whose power was not equally distributed during the process of crystallization probably failed; again it may be necessary for the crystallization of carbon that it should be in a certain specific condition when the heat and pressure assumed to be requisite are applied. Rapid chemical action whereby carbon in solution is thrown down in transparent crystals, might surround particles which had escaped the solvent; on the other hand, the same result might be attained by the slow accretion of crystallized carbon atoms from a surrounding composite, to a nucleus of the element.

Sometimes these inclusions look like rough jagged pieces of carbonado, frequently surrounded by smaller detached pieces, but more often they resemble ink spots. Occasionally they appear like a thin cloud, as if a black powder were sprinkled over the face of a small fissure in the grain of the crystal. Some of them are fuzzy looking clusters, like little bunches of black dust. In other cases they appear as sharp hair lines, usually very short, occasionally broken at right angles, T shape, or like a check mark.

Small diamonds have been found in larger crystals. This fact, and the statement that the bursting of crystals is due to inclusions of compressed gas, led Mr. Williams to question the igneous theory of the genesis of the diamond and to favor the idea of the slow growth of large crystals by accretion, instead of a sudden solidification in a fused mass. One large diamond of 228 carats, found several years ago, was formed around a small red diamond crystal. In another case the smaller enclosed crystal was coated with apophylite.

White specks and bubbles are common flaws. These vary in size and appearance, some of them glistening in the interior with a vitreous luster, others ranging from an icy to snowy whiteness. Some of these, apparently, are hollow or gas-filled bubbles, while others are solid but imperfectly crystallized sections. Glessen or glasses, are flat sectional streaks of a similar nature, having an icy appearance. When large or abundant in a crystal, they constitute a very bad imperfection, as they destroy all but the surface brilliance of the stone. Diamonds of this character are sometimes termed "shivery" and in this country are difficult to sell at any price.

"Clouds" are dark flat patches in the grain of the stone similar to the glasses, but brownish or blackish. Unlike glasses they are seldom large or numerous in a single stone, nor do they so completely destroy the internal brilliancy. They consist apparently of inclusions of foreign matter, or a fine dusting in the grain, of uncrystallized carbon. Some scientists claim that all black and brown spots and clouds are inclusions of foreign matter, probably titanic iron.

When clouds or glasses reach the surface of a cut diamond they appear as cracks, and if near the girdle are dangerous, the stone being liable to split there under heat or a smart blow. Usually the break will not extend throughout the stone but result in the loss of a sliver or a wedge-shaped piece out of the edge.

Many other inclusions have been noted by scientists, hematite being frequent. As the exact nature of these inclusions is of more interest from a scientific standpoint, they will not be discussed in this chapter, which considers them only as they affect the appearance of the cut stone to the eye, and the consequent effect on their desirability and value.

Surface flaws consist of nicks in the edge of the stone, or cavities in the face of one or more of the facets. It sometimes happens that irregularities in the surface of the crystal can be eliminated only by a considerable reduction of size in the finished stone. If a depression exists where the edge or girdle will be, the cutter endeavors to cut it so that it will appear in the gem as an irregularity, which, though an imperfection of shape, would not constitute a flaw, but if the cavity extends too far into the stone, the diamond leaves the polisher's hands with a more or less observable nick in the edge. As the faces of many of these nicks are rough unpolished crystal, they not only spoil the perfection of outline, but detract materially from the beauty of the stone, and are in some cases reflected into the interior to its further detriment. In setting such stones, the jeweler is careful to hide these flaws as far as possible, by covering them with the gold prongs with which the stone is held. The prongs of a jewel often hide the reason why one stone costs less than another apparently no better.

Occasionally, uneven places in the crystal are where the face or back of the finished stone will be, and some of the cavities are so deep, that to cut all the material away necessary to reach the bottom of them, would entail a sacrifice of value by loss of weight greater than by the reduction of price per carat on account of the imperfections. They are therefore left, and become bad and deceptive flaws. While the stone is perfectly clean, they are not easily seen, but as soon as the jewel is worn, dust and grease get into the cavities and they appear as large ragged black flaws to mar the brilliancy of the stone. A stone of this character must be constantly washed, as rubbing over the surface, while it cleans the stone otherwise, at the same time deposits whatever dirt may be there, in the cavities, the edges of which act as scrapers every time the cloth or finger passes over them.

As a matter of sentiment, absolute perfection is desirable. To illustrate: a young man of means some years ago, wished to buy a pair of diamonds for the lady soon to be his wife. The retail jeweler to whom he applied, having nothing sufficiently fine in his stock, introduced him to a New York importer who chanced to be calling upon him. A certain engaging ingenuousness of manner enlisted the sympathies of the importer in the quest of his young customer which in turn begat confidence. In the New Yorker's stock was a pair of blue Jagers diamonds of exquisite color and brilliancy, and perfectly cut. Taking them from his wallet, he showed them with the pleased anticipation of being able to satisfy fully a customer in whom he already felt a personal interest. The young man's eyes sparkled at the sight of them, "Ah! That is what I want," he exclaimed. Looking them over with smiling delight, he said further, "They are just what I have been looking for." Still toying with them, he asked casually, "Are they perfect?"

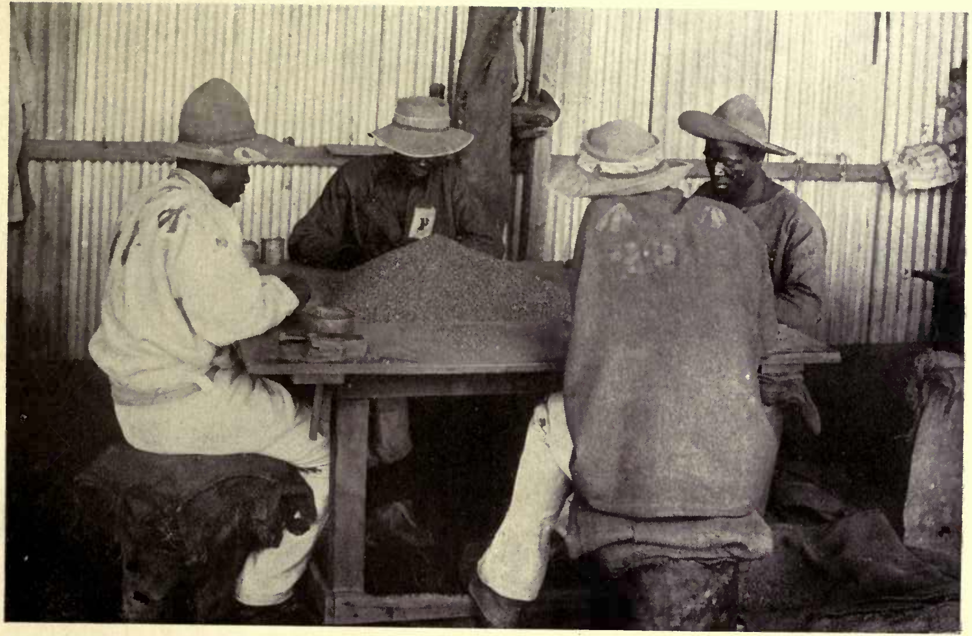
"One is, and the other is practically so," said the dealer. "There is in the edge of one, a small speck, so small indeed and so placed that it is almost impossible to find it with the loup," he explained.

The young man's smile faded. "Too bad," he sighed, "I want a perfect pair." Observing the dealer's surprise, he said with a smile of excuse for his own unreasonably critical fancy, "You see, I want them for the dearest girl on earth and I would never feel quite satisfied if I gave her anything which was not like herself, quite perfect. I do not mind the cost but they must be perpect."

A similar sentiment only, justifies one in demanding absolute perfection where all other good qualities are so preëminent. Ordinarily, flaws which do not detract from the brilliancy of the stone and are not apparent to the eye, while they may be properly estimated in the valuation, should not be made to over-balance other and intrinsically valuable qualities. There are diamonds of such beauty that a few minor flaws are not an absolute bar to the favor of those who recognize their otherwise superior character. It is well to remember that an inexpert buyer is apt to give undue weight to faults which one who knows nothing of gems can discover. Flaws do not grow, but the inferior qualities of a poor stone do grow upon one by familiarity and comparison. Many people learn after they have purchased a stone because it had no flaws, that it ranks far below others which have, and become dissatisfied accordingly.

There are flawless stones which nevertheless appear to be flawed. This condition arises from faults of proportion whereby the rough edge or skin of the stone around the girdle is reflected into the interior of the diamond. It is usually found in stones which are cut too shallow on the culet side. If a diamond is not sufficiently deep from the girdle to the culet, a reflection of all rough places on the girdle will appear in the body of the stone. These reflections are not distinctly visible to the naked eye though they destroy to some extent the brilliancy of the jewel. Under the loup they become so prominent that one unaccustomed to them would think they existed in the stone. They are indisputable evidence that the stone is not cut so as to give the proper brilliancy, and diamonds of this character should be used only where a large surface effect at a minimum cost is wanted.

To find flaws, use a jeweler's double loup with an inch focus; if that is not at hand, blow the breath quickly on the stone while it is cold, and search for them while the resulting mist lasts.



DE BEERS CONVICTS SORTING

CHAPTER VIII

THE DIAMOND MINES OF INDIA

IT is not known when diamonds were first mined in India. As far as we know, all the diamonds of ancient times came from that country. It is possible, however, that some came from Africa. All discoveries of diamonds throughout the world in alluvial deposits, of which we have cognizance, were made by men while washing the sands and gravels for gold. There have been found in Rhodesia of late, in a section in which the alluvial deposits contain gold and diamonds, evidences of mining operations, ancient beyond record. Some of the six kinds of diamonds of which Pliny wrote two thousand years ago may therefore have been African stones. Of these six kinds, he said that the Arabian and Indian were superior, being of "unspeakable hardness." There is no evidence that Arabia ever produced any diamonds. Topaz occurred there, and white topaz was probably thought by the ancients to be a kind of diamond, but it could not have been the stone he coupled with the Indian diamond as equally hard, therefore the Arabian diamond must have been obtained by trade from some other source, either from India further east, or possibly from Africa to the southwest. It is quite possible that the Phœnicians in their day tricked the world as the Portuguese did later with the diamonds from Brazil. The diamonds of India and the East were known to be harder and better than all other so-called diamonds, and those wily traders, having obtained diamonds from Africa, may have sold them as Arabian stones in order to conceal the source of supply, and to secure the advantage of the reputation which diamonds from the East had already attained. The operations of the Phœnicians were widespread. They went after the tin of Cornwall, the silver of the Guadalquiver, and away to the north for amber. If rumor brought news of anything anywhere that could be traded in profitably, they went after it. They circumnavigated Africa 600 years B. C. They probably knew that there was gold and other minerals in that country; they knew what diamonds were, for they traded in Indian stones. It is possible, and even quite probable, that they brought gold from Africa, and equally probable that diamonds were found with the gold. If so, they would not escape the observation of such keen traders, and the Indian and Arabian stones having the reputation of being much superior to all other stones called diamond, the African diamonds would undoubtedly be marketed with those from the East and under the same classification.

Whether the Phœnicians obtained stones from Africa or not, they not only bought and sold Indian stones, but those stones had evidently been known and used for some time and therefore had been regularly mined then in India.

The diamonds of India occur in alluvial deposits which carry gold also. From before records, gold was always sought, and it is probable that in the remote past, men there, as elsewhere later, while mining for gold, attracted by the crystals glistening in the sands, saved them at first as curios. Learning in course of time how very hard they were, they were put in use as cutters and gravers, and attention was drawn to them by their preëminence over all other known substances in the quality of hardness. Writers enlarged upon the theme and invented such fabulous stories about them, that eventually the diamonds of India became a world's wonder. The larger and more perfect crystals would naturally attract the attention of rulers and be used as jewels. Once established in favor with a potentate, they would be desired by others.

The high estimation to which the stone attained was undoubtedly of very slow growth, but as its use for mechanical purposes or as an ornament grew, the search for them would naturally grow with it until, as in later instances, instead of being regarded as a by-product of the gold mines, diamonds would become the chief incentive for mining, and gold the by-product.

Tradition tells that the diamond was worn as a jewel in India, 5000 years ago. The Bible establishes its existence as a graver nearly three thousand years back. The poets and historians of Greece and Rome over two thousand years ago, inform us that India was the source of it. The diamond-mining industry in India is therefore certainly three thousand years old, and one may reasonably think that it is twice that age.

Notwithstanding Pliny's statement that diamonds were so precious that kings only, and but few of them, could afford to own them, there is no evidence that they were considered a jewel of the first rank in India until comparatively late times. If they had been so regarded, more would have been brought back by the Greeks and

Romans when they looted India. Little mention is made of them in the literature of that day. The writers of the New Testament, some of whom used other precious stones freely to typify beauty, magnificence, and worth, ignore the diamond. Pliny probably got his idea of value from the fact that only a small number of the kings of the Orient possessed any. They were found in a few districts in India only, and as the rulers of those districts claimed all the best stones found, and Oriental princes seldom parted with their jewels of any kind, they could not be dispersed to any great extent, nor have any definite value. The diamond was a local jewel. Its wider field was as a cutter and graver.

The reports of early European travelers do not indicate that diamonds were preëminent among the jewels of India. It is said of Sighelmus of Sherborne, that having been sent by King Alfred in 883 to Rome with presents for the Pope, he went on from there to visit the tomb of St. Thomas at Mylapore (Mailapur or St. Thome, a suburb of Madras) and brought back with him jewels and spices. No specific mention is made of diamonds. From the reports of later European travelers into India, it may be inferred that the Indian mines of old, as within the last four or five centuries, yielded few large stones. In those days they could not shape a diamond to the requirements of the jeweler's art. It was mounted as a natural crystal, and when mounted, though a wonderful stone, it was a clumsy jewel.

But rumor spread a knowledge of the stone; imagination endowed it with marvels, and desire for it spread and grew stronger. A world-wide interest was created, and diamond mining in India became an important industry.

It is said that Akbar of the Mogul dynasty derived a revenue of £80,000 per annum from the diamond mines in his kingdom. They were the Panna mines, situated in Panna or Punna, Bundelkhand, Central India. This prince reigned from 1560 to 1605.

The celebrated Golconda mines received the name from an ancient town and fort of that name, now in ruins, near the city of Hyderabad, where the stones were collected and polished. The diamonds were really obtained throughout an extensive region watered by the Kistna or Krishna, and Godavari rivers, and included the modern districts of Krishna, Godavari, Bellary, Cuddapah and Kurnul. Until 1687, when Aurungzebe annexed it to the Delhi empire, Golconda was a large and powerful kingdom of the Deccan, a name given to the central part of India lying south of the Nerbudda or Nabada river, which separated it from Hindustan proper. The Deccan extended south as far as the Krishna river, and in this territory many of the Indian diamond mines were situated.

The most southerly group of mines are on the banks of the Pannar river in the Madras Presidency where it cuts through the Eastern Ghats north of Madras. These must not be confounded with the Panna or Punna mines of the Bundelkhand further north. The diamonds occur in the Banaganpilly, a stratum, two or three feet thick, of water-worn pebbles and clay, lying under several feet of sand and rubble, and a tough clay similar to that which binds the pebbles of the diamondiferous stratum. This is now known as the Cuddapah district. It formerly yielded some very fine stones, but has apparently been long since exhausted.

Some work was done in these mines in 1869, but the results did not warrant a continuance of operations. West of Cuddapah, the diamondiferous layers lie somewhat deeper, in places fifteen or sixteen feet, and the diamonds and accompanying minerals are very much waterworn, being sometimes nearly round. As is usually the case with diamonds of this character, they were particularly hard and brilliant. The color ranged from deep yellow to white. The minerals accompanying the diamonds are, various kinds of quartz, corundum, etc., and the stones are fragments of the same kind of rock of which the mountains rising from the river valley are composed.

A little north and west of the Cuddapah district mines, are those of the Bellary district, also situated in what is known as the Madras Presidency. Most of them lie south of the Kistna and about one of its tributaries. Among them are the famous mines of Wajrah Karur. A number of the exceptional stones of the past are said to have come from these mines, and of late years the "Gordon Orr," weighing 62 carats, was found in 1883, and another of 68 carats later. The Gordon Orr changed hands at 5,000 and 15,000 rupees and was cut to a brilliant of 24⅞ carats. These stones were taken from a section of the Bellary district newly apportioned and called the Anantapur district.

Early in the sixteenth century Bellary was in the Kingdom of Bisnager or Vijayanagar, having Hampi as its capital. The mines were a source of great revenue to the ruler. The kingdom was overthrown by the Mohammedan powers in 1565 after the battle of Telikota.

The diamonds of this district are found chiefly in a surface deposit, and it was evidently the custom to search for them after heavy rains, which would wash them out of the ground. In the modern operations, pits separated by narrow walls, some of them cut to steps leading to the bottom, are dug down into the diamondiferous deposit, the earth being carried up on the heads of natives, in bowls similar to the carimbé of Brazil, for washing. A substratum of rock similar to the Kimberlite of Africa was reached under the deposit of diamond-bearing earth, but nothing has been developed to warrant an expectation that the African chimneys will be duplicated. A scientist thought he had discovered the matrix of the Indian diamonds in numerous veins of eruptive material which channel the underlying gneiss of this district, but the claim was not substantiated. About thirty to fifty miles east of Wajrah Karur, are a number of deserted mines which yielded at one time many diamonds and were worked with good success through the first quarter of the nineteenth century. At Banaganpilly, in this neighborhood, are mines; also at Nandial a little to the northeast, and at Karnul or Kurnul about due north. The diamond-bearing stratum of this section of India is named after Banaganpilly.

West of half way between Banaganpilly and Karnul are mines supposed to be identical with the mines of Raolconda, which in Tavernier's time were celebrated for their richness. They had been worked then for several centuries, but later passed out of knowledge. Of late years the deposit, which lies deep but is quite extensive, has been worked again spasmodically. They are known now as the Ramulkota mines.

It should be remembered as a qualification of all accounts given of the past history of Indian mines, that there is little absolutely reliable information. India is commonly regarded as one country. To a certain extent it is so geographically, but for many centuries it was not only divided into many principalities, but the boundaries of the divisions and their rulers were constantly changed. The various States preyed upon each other, and outside powers at different times swooped down upon them, looting their treasuries, and establishing foreign dynasties. Lines of demarcation were obliterated, and with them diamond mines were in the centuries sometimes lost and forgotten. Spread over many miles of territory in small patches, as the diamondiferous deposits are; oftentimes concealed by overlying strata of nondiamond-bearing material, if circumstances forced a cessation of work, a few generations of interrupted authority and record would be sufficient to obliterate knowledge of a digging. Eminent and careful men have sought without success to locate mines which travelers of the sixteenth and seventeenth centuries mentioned as being renowned in their day. Ancient workings have been located and traditions hooked to them which may properly belong to others that in some unknown quarter await rediscovery. Much of our knowledge of the diamond mines of India is guess-work with the stamp of authority. All that we can say of the celebrated diamonds of India is that they are "said to have been found," in this or that mine. While a dynasty had control of territory in which there were diamond mines, it seized all the large, valuable stones, and imposed a tax so rigorous upon the others found, that diamond mining was an occupation for the most poverty-stricken people only. When the yield of a deposit became poor, the miners naturally melted away, and unless by chance a new rich strike was made, they were soon neglected and sometimes forgotten.

Diamond mines were simply diggings here and there in a gravelly deposit which to the initiated had the earmarks of the diamonds. Sometimes it lay on the surface, sometimes in the beds of streams, and at others, under a valueless covering of some other kind of earth anywhere from two to twenty feet thick.

Among those included in the ancient term " Golconda " mines, which probably embraced all those to the south and east of Golconda from which the rough was brought to that place as a center of the industry, were the famous mines of Kollur. From these some of the most celebrated historical stones are supposed to have been taken, among them the Koh-i-noor and the Great Mogul. These mines were on the south bank of the Kistna, directly north of Madras and a little west of the Parteal mines. Tavernier referred to them as the Gani Coulour. V. Ball says Gani should be written Gan-i or " the mines of " Coulour. Hugh Murray, 1834, says: " The mines are in a plain along the foot of some high mountains and yielded Shah Jehan the famous stone of upwards of 700 carats (Great Mogul)." They are said to have been accidentally discovered by the finding of a 25 carat stone, followed soon after by others of good size, about 1560. When Tavernier was in India in 1669 he says there were about 60,000 people employed in connection with the mines.

A governor of Madras visited them in 1679, and describing his visit said he went to the mines upon a hill to see them dig and look for "Dimonds." The ground, he says, "is loose, of a red fat sand and gravel." It contained black, red, and white stones. Some of the miners picked it, while others with iron spades threw it into a heap, where it was winnowed with baskets whereby the dust was driven out. The remaining gravel was carried to a trough in which was water brought thither from above a mile away, on men's heads. There it was washed, the earth melting like sugar and running off with the water through a hole. The gravel was then spread on a smooth place, where the men in ranks, their faces to the sun, under the eye of an overseer, picked it for diamonds. Most of these mines are now deserted.

The Parteal mines, some of which were worked as late as 1850, are situated on the north bank of the Kistna to the east of the Kollur mines, a little east of the junction of the Munyeru river with the Kistna. Some of these are said to have been very rich, tradition with its usual liberality crediting them with "wagon loads" of diamonds. The stones are in an alluvium of a decomposed diamondiferous stratum, which is probably not yet exhausted, though it is abandoned.

There is a sandstone conglomerate further east, at some distance from the Kistna, resting on gneiss, which was worked with some success in the early part of the nineteenth century. Pits fifteen feet or more deep were dug in the deposit, and it was also worked in spots where the decomposed material had been washed to the surface.

About as far directly north of the Kollur mines as the latter are north of Madras, is a diamondiferous deposit of yellow sandy earth of unknown origin, which some scientists believe is much more extensive than it is generally thought to be. Many years ago it was worked near Wairagahr on the banks of the Wainganga river, in the Chanda district southeast of Nagpur. These mines were called Beiragahr by Tavernier. They are said to have been rich, but have been abandoned for nearly a century.

Following a direct line north from Wairagahr, at a distance about the same as that between Wairagahr and Kollur, and from Kollur to Madras, the Panna or Punna mines of the Bundelkhand are reached. These lie between the tributaries of the Jumna and Sone rivers, which are tributaries of the sacred Ganges river. This group of mines is about 250 miles due north of Madras. The mines form two spurs from the neighborhood of Panna on the Khan river; one extending due east to Rewah, and the other in a northeasterly direction to the Jumna river a few miles west of Allahabad.

The diamonds occur in the Rewah strata of the upper Vindyan formation. The diamondiferous stratum lies at varying depths down to twenty or twenty-five feet. It is not thick, sometimes only a few inches, but extends over a considerable area. In some parts of the district it is found on the surface as a weathered or alluvial deposit. Near Panna it is extremely difficult to work, as it is overlaid by a thick stratum of clay containing fragments of sandstone and other pebbles, with a quantity of broken, spongy, ferruginous rock called laterite, at the base. This necessitates the digging of pits to reach the diamonds. These excavations, fifty feet or more in diameter and thirty or forty feet deep, make very wet and uncomfortable diggings, as the water constantly seeps in and covers the stratum of diamondiferous material at the bottom. The water is carried up by a chain pump of bowls operated by hand, and the diamond-bearing earth is hoisted in baskets by a pulley to the surface. A hole in the wall of the pit near the bottom affords shelter for the overseers set to watch the miners. When prase is found in abundance it is regarded as a sure indication that the yield of diamonds will be more than ordinarily good.

A few miles northeast of Panna, the geological conditions are more favorable for mining. The overlying stratum is a firm rock of Rewah sandstone which permits considerable tunneling in the underlying diamond-bearing stratum, from the bottom of the pits.

These mines of the northern spur of the Panna group reaching toward Allahabad are all at some depth, except those at the extreme eastern end of it, where the diamond-bearing stratum is a sandstone conglomerate which crops out to the surface. To the south are two waterfalls which carry diamondiferous material from the stratum situated above, to the valley of the Baghin river below, where the diamonds are collected from the sands.

There is a mine southwest of Panna, abandoned some years ago, though it is believed to contain many diamonds yet, which illustrates the first idea the African diamond miners had of the chimneys there, before they understood their volcanic nature. It lies in a great conical basin in the sandstone, several hundred feet in diameter and about 100 feet deep. The basin is partially filled with a green mud covered by a deposit of calcareous tufa. It has been worked to about half the depth, and it is claimed that the yield increases with the depth.

The mines of the southern spur consist of deposits carried down from the diamondiferous stratum. It lies on the surface in some places and under a stratum of yellow clay in others.

The Panna fields are supposed to be among the oldest of the Indian diamond mines. As far as known, the district has never yielded as fine stones as the others, but it has been prolific, and operations have been carried on with more or less vigor constantly to the present time. The entire output of India to-day is insignificant. The returns for 1900 of the Bundelkhand district were but 169 carats. The production of India for 1905 was 172.4 carats and for 1906, 305.9 carats, the increase being chiefly from the Panna mines. For the States of Panna, Charkhari and Ajaigarh it was 628 carats, valued at £2,784 in 1907, and 140.75 carats valued at £940 in 1908. The exactions of the native princes are so great there that they leave little inducement for the miners, yet many of the natives continue to spend their lives in the wretched occupation, probably from lack of better opportunities and an hereditary habit. All stones over about 5½ carats, and one-quarter of the value of all under, is the toll exacted.

The diamond mines of Sumbulpur are situated on the north bank of the Mahanadi, where tributaries rising in the Baraphar hills join it, and where the flow of the Mahanadi is due east, presenting a trap for washings from the north. They are about 250 miles south and a little east of Benares, in the Bengal province of Chutia Nagpur. Hugh Murray in his Encyclopedia 1834 says of the diamonds of "Sumbulpoor," that they were found mixed with sand of the "Gouel river which falls into the Mahanuddy" and were very fine but small. Later writers think the river Gouel, of which Tavernier also wrote, to be identical with the North Koel river, a tributary of the Sone, which in turn empties into the Ganges to the north. Diamonds are found near Sumbulpur in a mixture of red mud, sand and gravel, but the best yield is obtained from the north branch of the Mahanadi where it is divided by Hira Khund, an island four miles long. This branch of the river, in the dry season about the end of March, is dammed up when the water is low, and when it is as nearly dry as may be, the sands of the river bed are dug out, by men who flock there in great numbers, and carried up onto the banks, where the women wash them for diamonds. Some think that the southern branch must also carry diamonds, but the greater volume of water and a swifter current deter experiments. It appears also to be a settled conviction of the natives that diamonds are only to be found on the north side of the river.

There are traditions of ancient diamond workings to the north and a little east of Sumbulpur among the tributaries of the Brahmani river flowing south, and the North Koel river running north to the Sone, and attempts have been made to verify them, but a new set of suppositions only resulted.

The diamonds of the northern groups of mines occur in the Rewah group of the Upper Vindyan series, and of the southern groups, in the Banaganpilly of the Lower Vindyan section. Quartz, epidote, jasper, limonite, chert and corundum are associated with the diamonds in the Cuddapah and neighboring mines; epidote, ruby and sapphire in the Bellary district; quartz, epidote, limonite, corundum, chert, chalcedony and carnelian in the mines of the Parteal district; quartz, jasper, hornstone and prase in the Panna mines, and quartz, carnelian, beryl, topaz and garnet in the Mahanadi washings, derived probably in this last case from the disintegrated rocks over which the diamondiferous material has been washed.

The entire product of the Indian diamond mines is now undoubtedly very small, yet it is probably larger than is supposed. The most productive, those of the Panna district and the so-called Golconda mines, are controlled by native princes who take and hold the most valuable part of the diamonds found, and practically debar any effort by Europeans to develop the industry. English capitalists have made experiments at various times of late years, but have not been rewarded with much success, and in some cases have met flat failure.

It has been generally supposed that the octahedron was the distinctive form of the diamond crystals of India, whereas in Brazil it usually occurs as a rhombic dodecahedron. Dr. Max Bauer in his Edelsteinkunde punctures this belief by referring to specimens from the various Indian mines in the museum of the Geological Survey of India at Calcutta and in the mineralogical collection in Dresden. He says a majority show the form of the tetrakis-hexadedron and the hexakis-octahedron, and a few, that of the rhombic dodecahedron.

At the present time, India, the land of gems, which for centuries has glistened in the imagination of the world as a bit of the earth where the rocks are studded with jewels, and the sands become starred with diamonds as the miner turns them to the tropical sun, imports more diamonds in a year and of greater value than all the gems of every kind which she produces. Until Mohammedan invasions about the first part of the eleventh century, the native princes of India held all the best of the yield of the diamond mines, but from that time they were periodically plundered by foreign powers, and a large part of the store of centuries was carried off, until the invaders established dynasties within the country, when they began to accumulate precious stones for themselves, as their despoiled predecessors had done before them. Muhammed Ghori commenced to pillage India in 1176. He founded the Mohammedan rule there, and it is said, had accumulated about 400 lbs. of diamonds by the time he was assassinated in 1206.

It is a curious fact that all the great historic plunderings were made at Delhi and Lahore, two cities outside the known diamond fields, considerably north of the Punna mines, which, as far as we know, were the most northerly of all the Indian diamond mines. There is an Indian tradition that diamonds have been found in the Himalayas. In 1870 it was reported that some diamonds were found after a great storm at Simla on the lower ranges of the Himalayas. Either mines of great importance existed in ancient times far north of those known now, or the princes of that country made incursions far to the south to obtain them. This was certainly done later, for while Shah Jehan reigned in Delhi, his son Aurungzebe, at his command, made war upon his enemies at Allhabahad and as far south as the Deccan. As he was successful in the battles fought, and the Panna and Golconda mines lay in those territories, it is not unreasonable to suppose that a large part of the stored product of the mines went back with him to Delhi. In those days, "to the victor belong the spoils" was an axiom.

The diamond region of India lies within an elevated triangle broken into hills and valleys. It is bounded on the north by the Vindyan mountains, and on the east and west by the Eastern and Western Ghats. The land in the northern part of this triangle consists of what is called the Upper Vindyan series, consisting of various groups of which the second, called the Rewah group, carries the diamonds. This Upper Vindyan series is absent in the south, where the Lower Vindyan series comes to the surface, and in this the Banaganpilly group is diamondiferous. Imagine it. All over this wide territory, thousands of years ago, the mother-rock of the diamonds was bared to the weather and little by little broken up and scattered, the waters carrying it as particles, with the precious enclosures freed from its embrace, far and wide. During the centuries, the matrix changed and became altered beyond recognition, but the diamond remained the same except for the rounding of its corners where the journey was long and the ages of its travels very many. More centuries, and the wash of mountain torrents spread the débris of the hills and highlands grain by grain over the thin stratum of diamonds which covered the earth, until they were buried again by the accumulations of ages. More centuries, and new streams cut their paths in the face of this new earth, uncovering here and there the tombs of the diamonds of long ago, rolling the crystals once more along the deep grooves of their sunlit beds, and leaving the diamond stratum exposed again along their banks, or high up on the hillsides where they cut deep into the earth. Who can tell where the wash of ages has carried them, and how many yet lie sleeping under the rocks and hills worn down to grains and deposited by the water upon them as a new stratum. A few small holes in thousands of square miles mark the discoveries of man in thousands of years. Now, few diamonds are found in India except where the rivers wash them from their places of concealment and carry them to light and the eye of man. Nor is it strange, for the diamondiferous strata are thin deposits and scattered. A few inches to a few feet thick at the most; sometimes near the surface, sometimes twenty or thirty feet under it; nothing to betray them except where they themselves appear on the surface, thousands might look long and far and not find them. As the ancient mines became exhausted, India as the land of diamonds was eclipsed by Brazil, and now fades to a memory before the rising sun of Africa.

MINING FOR DIAMONDS IN BRAZIL

CHAPTER IX

DIAMOND MINES OF BRAZIL

DIAMONDS were first discovered in Brazil by natives while washing the sands for gold, in the early part of the eighteenth century. The year 1725 is given as the date, but they were not recognized until 1727 and may have been found even earlier. There is a tradition that the stones afterwards found to be diamonds, were known in the gold washings as early as 1670. Inasmuch as the streams in which the gold washings were conducted proved later to be very rich in diamonds, it is quite probable that they had attracted attention for many years before their value was known. It is said that the gold miners used them as counters in their games of chance, and that a man who had seen rough diamonds in India, observing them in the hands of the miners and noting the similarity, secured a number of them and took them to Lisbon the following year, where their identity was established. He sold them, and in doing so drew attention to the new fields.

The discovery was made in the neighborhood of Tejuco, a town in the district of Serra do Frio, province of Minas Geraes, about 300 miles north of Rio de Janeiro and about 250 miles west of the Atlantic coast. Tejuco is now called Diamantina and is the center of the diamond industry of the Minas Geraes district. The district is an exceedingly rough plateau at an elevation of about 4,000 feet above sea level, cut up by gorges and deep valleys, enclosed by abrupt, mountainous walls. Throughout, numerous streams rise, joining later to form tributaries of the Jequetinhonha flowing to the north and east, of the Sao Francisco going north, and of the Doce, running south and east. The mountains divide the drainage of the Sao Francisco on the west, and the Jequetinhonha and Doce on the east. The Diamantina district lies between the Rio das Valhas on the west, and the headwaters of the Jequetinhonha and Doce on the east.

When it became known that diamonds were to be picked up thereabouts, people flocked to the neighborhood and found them in all directions, in and near the streams. A few were found also between the headwaters of two tributaries of the Rio Doce, about half way between Diamantina and Rio de Janeiro, near the town of Cocaes.

Brazil was at this time a Portuguese dependency, and when the home government learned that diamonds were being found in the colony, it laid claim to all diamond-bearing lands and streams, but in the beginning gave permission to anyone to mine on payment of toll for each slave employed, the number of them being prescribed by contract. This tax was constantly raised until it became so onerous that nobody would mine under the conditions. But the diamondiferous gravels lay scattered in every direction, and the hills held also many natives and escaped slaves who were expert miners. These smugglers, or "Garimpeiros" as they were called, undoubtedly continued to wash the sands surreptitiously for diamonds, adding many to the world's stock of precious stones which have never been entered up on statistic's ledgers.

To revive the industry, the government in 1740 granted concessions, and the fields were worked in that way, but with poor results for the government, until 1772, when the authorities decided to work the mines for government account, and did so until Brazil threw off the Portuguese yoke in 1834. During that period all the best stones found were sent to the Crown jewels at Lisbon. The others were sold to dealers and shipped from Rio and Bahia city to Europe.

After Brazil established her own government, mining privileges could be had anywhere by anyone on payment of a small tax to the government, and a proprietary tax of 25 per cent. on the gross receipts. In addition ½ per cent. was charged on exports. Although the laws have been modified at various times, this general plan has been adhered to from that time until now.

In those early days, and until the prejudice excited by the dealers in Indian diamonds against the Brazilian had been overcome, the diamonds were shipped first to Goa, a Portuguese possession in India, and then sent from there as Indian stones. The Hollanders used the prejudice existing against Brazilian diamonds, in an effort to get control of the entire output, but they failed to gain it, and most of the diamonds were sent to London. Later, many of them went to Paris also.

The early method of working the fields was about the same as now except that slave labor was employed. Gangs of slaves gathered and washed the cascalho under the eye of an overseer who sat among them on a shaded elevation, armed with a long-lashed whip. When one found a diamond, he gave a signal to the overseer, who took it from him and deposited it in a bowl of water at his side. At the end of the day's labor the stones were counted, weighed, recorded, and deposited in a safe place. Many of the slaves were adept thieves. Some were so expert and had so many tricks of concealment, that the most suspicious watchfulness failed to detect them, and the stones they concealed were undoubtedly of the best. If discovered they were punished unmercifully. As an offset to the barbarous inflictions for dishonesty, a system of rewards for honesty was established. Small presents of cotton cloth, tobacco and the like, were distributed to the successful, and while slaves were cheap, the finder of a stone weighing one oitava (17½ carats) or over, received his freedom. Nevertheless diamonds were stolen constantly and many slaves escaped to the interior, thereby extending the fields, for many of the diamondiferous deposits were discovered by garimpeiros, who could prospect only where the hand of the government did not reach.

In 1785, garimpeiros discovered diamonds about one hundred miles west of Diamantina between the streams which form the head waters of the Sao Francisco running north and the tributaries of the Paranahiba flowing south. This district is also in the province of Minas Geraes, though the western part of it is very close to the borders of Goyaz. Bagagem is to these fields what Tejuco or Diamantina was to its district. For some time the garimpeiros worked these fields without concessions, and unhampered by the authorities. The district became prominent because several large stones were found in it. The first discoveries were on the eastern side, one of the largest of all Brazilian diamonds being found in the Rio Abaété. Later, as the miners extended their operations westward, large stones were found there also, the "Star of the South" being discovered near Bagagem.

In 1827 diamonds were found in the neighborhood of Grao Mogol, about 150 miles north and a little east of Diamantina. The neighborhood had been prospected some fourteen or fifteen years earlier. The diamondiferous deposits lie about several tributaries of the Jequetinhonha having their rise in a chain of hills which follow the river on the northwest side. The crystals are found there in a solid sandstone conglomerate which the miners named "Pigeons' Eggs." As with all new fields, a great many gathered at these diggings, so that in 1839 it was estimated there were 2,000 persons working in the district. The number soon after dwindled rapidly and has since become unimportant.

In January, 1867, a garimpeiro found a diamond in the gorgulho near the Agua Suja brook, about 12 miles south of Bagagem, and a rush in that direction ensued. A majority of the claims were worked on a percentage. The garimpeiros rented parts of claims and hired slave labor. Bullock skins were used to carry the dirt down from the gorgulho to stream level. For a time they made money fast. Then came the African discoveries and prices broke. Buyers refused to pay as much as they had been paying, and the miners, suspicious of them, refused to sell at lower figures. They borrowed money to carry their expenses and held their diamonds, until eventually most of them lost all they had.

The discoveries of diamonds in Minas Geraes naturally excited interest throughout Brazil, and the tales of fortunes picked out of the sands of the hills and rivers, caused the natives everywhere to look for them. They were found in and about the streams near the western borders of Minas Geraes in the province of Goyaz. Up to 1850 it is said that 252,000 carats were taken from the Paranahiba, the Rio Claro and tributary streams.

Many streams in Matto Grosso, up to the Bolivian frontier proved to be diamondiferous. The source of the Paraguay river and its tributaries near Diamantina, particularly the right side of Rio Cuyabá, yielded many diamonds. They were all small stones and very many were colored, but some were very good. Unlike most of the Brazilian diamonds, the crystals were distinguished by very brilliant exteriors. Considerably over one million carats were reported from this district by 1850.

In the province of S. Paolo, south of Minas Geraes, diamonds were taken from the Rio Paraná and its tributaries, and some were found in the Rio Tibagy and its tributaries the Yapo and the Pitangru, in the province of Paraná. They were also found in deposits on the neighboring heights. The stones were found chiefly in a Devonian sandstone through which the streams run. The crystals were small, and the quantity found too meager to encourage persistent work, so that regular mining was given up.

Equally important with the fields of Minas Geraes are those of Bahia. Though divided into a number of districts there are two natural divisions only, viz.: the section about the Paraguassu river and its tributaries and the tributaries of the Rio Sao Francisco, and another and smaller area along the valley of the Pardo river near the coast south and east of the Paraguassu fields. This is called the Cannavieiras district, from the port of that name by which entry to it is made. At present the diamond-mining industry is practically confined to the States of Minas Geraes and Bahia, the fields of the latter being more important because carbon is found in them with the diamonds.

It is said that diamonds were known to exist in the State of Bahia as far back as 1755, but the government, thinking that mining would be hurtful to the agricultural interests, refused to allow any mining to be done. The date of the discovery of diamonds in Bahia is therefore given usually as 1821, when they were found in the Serra do Sincorá, but in common with many other discoveries it was not followed immediately by the development of an industry. To find an occasional diamond in a wide territory of wild country difficult of access, may indicate that it contains great treasures, but the hiding places are usually discovered by accident long after the fact of their existence is known. It was so in this instance. In 1844, 23 years after the discovery, Jose Persira do Prado, journeying to Bahia city, camped on the bank of the Mocuge, a small tributary of the Paraguassu river, and quite accidentally found a quantity. This becoming known, many went there. S. Joao do Paraguassu, or Santa Isabel, was founded on the site of the discovery, and has remained a center of the district, which from that time grew in area and importance.

The State divides the Bahia diamond region into 14 districts: Lencoes, Andarahy, Chique-Chique, Santa Isabel, Cravada, Lavinha, Campestre, Morro do Chapeo, Bom Jesus, S. Ignacio, Chapeda Velha, Paraguassu, Sincorá and Cannavieiras, all but the latter being on the Paraguassu river and its tributaries and the tributaries of the Rio Sao Francisco. Not only are the Paraguassu fields much more extensive, but they are also more productive. The diamonds from that section are also finer, but not as perfect usually as those of the Cannavieiras district. The most productive part of the Paraguassu fields is about four days journey from Bahia city. The route is by small steamer across the bay and up the Paraguassu river about 45 miles to Cachoeira, a journey of six to eight hours, then by train next day 155 miles to Bandeira de Mello, consuming ten to twelve hours, from which point there is a two days' journey of 64 miles by mule to Andarahy.

Another way to the Bahia fields, is to go by the Bahia and Sao Francisco Railway north to Queimadas or Villa Nova, and from either of those points to the interior by mule-back, or to continue on to Joazeiro by rail and then by boat up the Sao Francisco, going south from there by mule-back. This route taps the diamondiferous district lying between Rio Jacaré and Rio do Salitre, or at Chique-Chique brings one near to the fields extending south to the mountain between the Rio Paramirim on the west and the Lencoes district on the east. The Bandeira de Mello route reaches the fields which extend from Morro do Chapeo in the north through Lencoes and Mocuge to Sincorá in the south.

Diamonds are found at Joao Amaro, 103 miles from Cachoeira, in the bed of the river, but very few are found between there and Andarahy. The Paraguassu fields extend from the village of Sincorá in the south to the Serra do Tombador in the north, and from east of

Morro do Chapeo to Chique-Chique and the Rio Paramirim in the west. The most productive district so far lies between Sincorá in the south and about 25 miles beyond the village of Morro do Chapeo in the north. There may be other districts as rich, but this has a reliable water supply and has therefore been very thoroughly explored. In some sections the streams are dry in the dry seasons and short-lived torrents in the wet seasons, making it difficult to gather the cascalho in the one and to wash it in the other. The fields here also are very compact, extending about 150 miles north and south with an east to west width of about 15 to 30 miles. All the Bahia fields of this section lie within a strip of country about 225 miles north and south by 140 miles east and west. Diamonds are found, however, in the rivers having their rise in the diamond hills, far beyond the diamondiferous region. In 1898 diamonds were found with gold in the Rio Itapicuri, 250 miles below the town of Queimadas.

The diamonds are sold to buyers on the fields. These men assort the stones into five grades. "Bons" are crystals of good shape and color; "fazenda fina" are small and tinted, but fine; "melee" are imperfect and off color; "vitrie" or vidrilhos are very small bright stones of various colors; "fundos" are broken or defective crystals mixed with second quality carbons. The stones are usually small. Of a thousand carats taken as they were found several years ago, the largest stone weighed 3½ carats. That would produce a cut diamond of less than 1½ carats. About thirty per cent. of the production are fundos. It was reported in 1903 that prices paid at the fields averaged, $11.50 for

No. 1; $10.50 for No. 2; $5.00 for No 3 and $2.50 for No. 5, per carat. They are sold by the oitava (17½ carats). Vitrie are sold by the grao (about ¼ carat), in which there are six or eight stones. They brought about $2.88 at the time.

According to former Vice-counsel Rowe, the limit of price paid by the field buyers of Bahia in the spring of 1906 was as follows:

Bons, good, well formed stones averaging ½ carat	860 milreis per oitava	=	$16.38 per ct.
Bons, 6 to 8 graos each	20 milreis per grao	=	27.38 per ct.
Bons, 4 graos each.........	16 milreis per grao	=	21.90 per ct.
Bons, 10 to 16 graos each..	25 milreis per grao	=	34.25 per ct.
Fazenda fina	396 milreis per oitava	=	7.55 per ct.
Vitrie	7 milreis per grao	=	9.58 per ct.
Fundos	108 milreis per oitava	=	2.06 per ct.

The current rate of exchange at that time being at 17 pence to the milreis, the latter is reckoned in the above figures at 3 to the dollar. There are 72 graos to the oitava which equals 17½ carats; a grao is therefore about ¼ carat. Nearly all the stones are exported uncut, though there are several cutting establishments in the diamond region and one in Bahia city. To get a fair idea of the value of the stones in the market, there should be added the cost of transportation to Bahia, the export duty equaling about 13 per cent., dealer's profit, and steamer and insurance charges. When this is done it will be found that the Brazilian fields have approximated their prices closely to those established by the Diamond Syndicate in London.

Mining is conducted in a general way, the same as in all other alluvial deposits the world over, though no effort is made to divert the streams, as is done in some cases in the Minas Geraes diggings. A method peculiar to the Paraguassu, is employed largely on the main river, especially from Joao Amaro to Andarahy. The miners use diving machines, probably movable caissons, in which a man can work for several hours on the river bottom. Under cover of one of these, two men work alternately it is said, in three-hour shifts, gathering the cascalho into sacks lowered to them from the surface. Others dive for the cascalho much the same as the pearl divers dive on the pearl banks, gathering as much of the gravel as they can during the submergence. In the shallows, others drag the gravel into the mouths of sacks with their feet. The diamondiferous material is found not only in the beds of the streams and rivers, but also in fissures and gullies in the rocks which bank the valleys of the water-courses, as in the other Brazilian fields. The sands and gravels are gathered from the beds of the streams in dry seasons, and from fissures and beds in the rocks during the wet seasons. The richest finds are made usually in pot-holes in the river beds.

The tools and methods used in the mining are crude, and some think that with capital and machinery, better results could be obtained, but it is doubtful if it would be as profitable on the average. Undoubtedly there are great deposits of diamondiferous material yet unworked, and there are doubtless rich gravels in the sections already worked, which cannot be reached with the appliances now in use, as for instance the lower parts of the deposits in gullies and fissures in the rocks, river bottoms which have been covered by débris from washings on the streams above, and the like, but with deposits of uncertain richness, which may be here or may be there over square miles of very rough country, the odds seem to be largely against adequate returns for an expensive equipment. In the Minas Geraes district, two modern gold dredges adapted to save diamonds have been lately installed on the Jequetinhonha by American companies. The mining laws are another difficulty. Though liberal on the face, there are uncertainties which have proved costly. A former leaseholder may establish a claim, through some irregularity in a previous transfer, after the leasehold has been developed at great expense by a stranger ignorant of prior conditions. It should be remembered that the various States in which diamonds occur make their own laws governing the mining for them, and as they are somewhat complicated, an attempt to state the provisions definitely might prove misleading. As written, they tend to encourage enterprises of that character. Concessions are to be had on apparently easy terms. Persons of any nationality can take out a claim, but the authorities pass on the ability of the applicants to prosecute the work. In a general way, mining lands belong to the State. If diamonds are discovered on private property, the discoverer can be empowered by the State to prospect and mine, by securing the owner against surface damage to the property and paying a tax to the government. If the discovery it made on government lands, he can obtain a concession or a license to dig within certain prescribed limits, and if in the bed of a river, within a certain length of it, by making application to the authorities, and paying a small tax. In the case of a concession he must also prove his financial ability to be adequate to the undertaking. A prescribed time is allowed in which to commence operations and make them commensurate with the concession, at the expiration of which, if satisfactory work has not been done, the claim may be reëntered by another.

Altogether, the laws and conditions favor individual digging under a mining license. The concessioners and leaseholders usually find it to be more safe and profitable to allow miners to mine on their concessions for a royalty of from one-fifth to one-quarter of the value of the diamonds and carbon found, than to attempt to mine on their own account with hired labor. As the miners sell the diamonds to the field buyers of the cities, and the latter arrange to inform the leaseholders of the amount handled, and in some cases to reserve his royalty, the owner of the concession gets in that way more than would escape the thievery of hired labor to him, and with less trouble.

The field-buyers of Bahia, who represent a number of exporters in Bahia city, work independently, and the miners get the equivalent of outside market rates less costs and a fair profit for transference from the fields. The miners usually store the cascalho and wash it week ends. They are very expert in picking diamonds and carbon from similar stones.

The world's supply of carbonado, or "carbons" as the stones are called, comes from the Bahia fields. They are found with the diamonds in the Paraguassu diggings, and were first discovered in 1843 in grupiaras at San Jose, district Sincorá. Prior to 1856 they were thought to be valueless and were thrown away. It is said that there are swamps in the diamond fields, beneath which the diamondiferous deposits disappear. These deposits have been worked to the edge of the morass and then abandoned for lack of machinery to drain, and it is thought that in addition to the deposits lying under them, the swamps contain large quantities of carbonado that have been washed into them with the tailings and lost during the years when the value of carbons was unknown.

The output was said to average about 2,500 carats per month in 1902, but must be very much larger now and probably was at that time also. There is a steady and increasing demand for carbons owing to the constant increase of drilling, pumping, and other machinery requiring a very hard substance. The average weight of the stones found is about six carats. The most desirable sizes are those weighing from one to six carats, those being the sizes used generally for higher mechanical purposes. Larger stones are broken up and the pieces have the advantage over the natural stones that they show the inner quality of the stone. Nevertheless, selected natural stones are preferred by expert engineers, because the natural formation renders them less liable to wear and breakage than the square corners and sharp edges of the broken up stones. Some enormous pieces have been found. The first very large one, discovered on the ledge of a mountain in the Lencoes district in 1895 weighed 3,078 carats. It measured about 3 inches x 3 inches x 3½ inches. I. K. Gulland of London bought it September 15, 1895, of Kahn & Co. of Bahia for £6,400. He broke it up into pieces suitable for diamond drills and sold it for ten per cent. profit. Seven years later it would have brought four times as much. A piece of 975 carats was found the year previous. It was broken up in Paris and sold for a sum equal to over $19,000. The Parisian dealer was not fortunate, as it cost him more. Another large piece found in 1901, of fine quality and weighing 750½ carats, was broken to pieces of three to four carats. Another large carbon weighing $650^{3}/_{64}$ carats was found in 1909, and at present is not broken up. It is of good quality and worth in New York about $55 per carat. The specific gravity of good carbons ranges from 3.15 to 3.30. If a carbon is lower than 3.15 it is not sufficiently crystalline; if over 3.30, it is over crystallized for good work, approaching bort in construction. This piece has a specific gravity of 3.22.

The Cannavieiras district is quite distinct geographically from the other Bahia districts, which are all, though divided into districts surrounding as many towns as centers, practically the same fields. This came to be known as a diamond district about 1881. It is reached by the Pardo river in canoes 56 miles to Jacaranda, and from there by mule-back, 12 miles higher up the river to Salobro. The early workings were confined to the river and the immediate neighborhood, and the country has not been as widely prospected as in other fields, owing to a lack of water in many directions. The diamonds are usually small and clear, but do not average as good in quality as those of the Paraguassu districts. Little or no carbon is found.

There are two ways of reaching Diamantina, the center of the principal Minas Geraes diamond fields. First, by leaving the railway at Curvelho and making the journey of three or four days by mule-train through a very rough country by a trail which passes over two rivers separated by high ridges. Where the trail crosses the main ridge, which is 5,000 feet high, it can be done only on mule- or horse-back. The other way is by continuing north by rail to Curalinho and on from there by rough stages and wagons. Though the latter way does not contain as many blood-curdling passes as the other, it was considered worse, formerly, being very fatiguing. The introduction of rough country wagons of American make, over this route, ameliorated the conditions, and they have been further improved by a betterment of the road. Diamantina can now be reached by fast mule-back over this route in two days from the railroad.

This field extends over an immense territory of a very wild, rough character, on both sides of the northern end of the Serra do Espinhaco. It is a plateau broken up by steep-sided, deep valleys, in which numerous streams that feed the Jequetinhonha and the Sao Francisco rivers, have their rise. The Jequetinhonha after running north-east, when it turns due east to empty into the Atlantic, becomes the Rio Belmonte. The diamonds are found in the streams, the valleys of the streams, and in crevices and depressions in the hills.

Operations in Brazil are carried on now largely by "servicoes,"— bands of workmen hired by one man or organized into squads which divide results. These select "journaleiro," or spots where they feel sure of finding diamonds, and proceed to gather the cascalho and wash it in their primitive way according to the season and conditions. The natives carry small wooden bottles, made by boring out the center of a straight twig into which they fit a wooden stopper, for the purpose of depositing the small diamonds as they find them in the wash. Rich finds are sometimes made in a "poco" or pool in the river bed in which the cascalho has been caught, especially where a "cochoeira" or waterfall has been for ages washing rich deposits from above. The conical wooden dish used for washing is called "bateia." The "carimbé" is a smaller wooden bowl in which the cascalho is carried on the head. The river beds are worked in the dry season, and the deposits in fissures or depressions in the rocks, in wet seasons. Carbons do not occur in Minas Geraes, but larger diamonds are found than in Bahia.

The Agua Suja district is a southern continuation of these fields. It lies on the Bagagem river, one of the tributaries of the Paranhiba, 12 miles south and a little east of Bagagem, about three thousand feet above sea level. The Mogyana Railroad runs to Uberaba, 67 miles from Bagagem. The region is a series of terraces sloping to the west from Serra da Canastea to the Rio Grande. The fall of the rivers is considerable, and the currents therefore are swift. The Rio das Velhas narrows near Agua Suja to 50 feet, and rushes over two falls of ten and thirteen feet with great velocity. The Rio Claro, a tributary of the Rio das Velhas, also runs very swiftly over a bed of horizontal gravels and limonite conglomerate. The Bagagem river has a drop of ½ per cent. between Bagagem and Agua Suja. L. B. Gonzaga de Campos describes the bottom of the valley of the Bagagem river as consisting of mica-schist, and the soil on the slope towards Agua Suja as alluvial with pebbles of limonite. The Agua Suja valley, which runs east and west, and that of the

Bagagem river one and a half miles to the west, are full of old excavations of diamond workers. The soil near Agua Suja church is alluvial with patches of ferruginous gravel. The basal strata are of mica-schist and contain quartz, muscovite, altered tourmalines and almandine garnets. The heaviest pan-residues from this rock are magnetite, ilmenite, rutile, tourmaline, staurolite, and zircon. Large deposits are found in hollows in the hills. An examination of the rear wall of an excavation in one of these deposits, which illustrates their general character in this neighborhood is given by L. F. Gonzaga de Campos, as follows:

	Ft.	In.
Ferruginous clay and gorgulho	4	3
Ferruginous clay	13	2
Hard Clay schist (Secundina)	4	
Estrellada (diamondiferous)	2	
Secundina (diamondiferous)	3	3
Tauá (diamondiferous)	13	2

The ferruginous clay, like the "red earth" of S. Paulo and the wet diggings of Africa, leaves a residue on washing of ilmenite, magnetite, apatite, an abundance of hydrated oxides of iron, and water-worn quartz pebbles. The gorgulho contains fragments of quartz crystals, brown iron, hydroxide pebbles, needle-emerald (tourmaline) and fragments of rutile. Usually this carries few diamonds, but larger ones than the more prolific upper parts of the deposits. The "Star of the South" was found in a ferruginous clay above the gorgulho. The clay-schist "secundina" usually overlays the diamondiferous beds. It is rather soft and plastic but not easily disintegrated. Diamonds are usually found in any locality where "estrellada" occurs. Between its various colors are white points containing fragments of quartz. These give it the starry effect for which it is named. It consists of decomposed stratified rocks reduced to a clay. Among its components are, hornfels, fragments of opal, and pebbles of augite-porphyry. The diamonds found in it are usually small and have an appearance like bort, but cut to very brilliant stones.

Tauá is similar to estrellada, but is composed of larger fragments and the white spots are absent. Between alternate plates of red or green amphibolites and decomposed gray and yellow mica-schist, are pebbles of augite-porphyry and fragments of opaline chalcedony. In the red or yellow containing iron oxide and fragments of quartz, which fills the spaces between the pebbles, the diamonds are found. Tauá is the chief diamondiferous deposit of the Agua Suja district inasmuch as it is usually greater in depth and carries more diamonds, though the gorgulho yields larger stones. Being above water level it can be worked more economically also.

On both sides of the Bagagem river are shallow beds of gravel consisting largely of fragments of amphibolites, quartz and hyalo-tourmalines called "grupiaras." These are diamondiferous but have been about exhausted. The river beds are undoubtedly diamondiferous but their value cannot be fully determined without machinery capable of dredging the bottoms. The deep pools and depressions into which probably the richest washings of the torrents have been carried, are beyond the reach of the methods and appliances at present in vogue throughout the Brazilian fields. For more than a century the gravels of the hills and river valleys and accessible places in the river bottoms of the Minas Geraes diamond fields have been worked for diamonds, but there yet remains in the unworked portions of the streams themselves, the greatest likelihood of the richest deposits of all.

Scientists have thought that the matrix of the diamond in Brazil is itacolumite, a kind of laminated granular quartz or ferruginous quartzose, and some have claimed that the sandstone of the Grao Mogol district in which diamonds have been found, was the matrix. The diamonds are found under similar conditions, and in general, with certain companion minerals, throughout the Brazilian fields, in what might be termed three tiers of placement: in the heights: above the present water levels, and below the water levels in the beds of the streams. In the heights, where they are found in the itacolumite, the stones are not as plentiful, but they average larger in size, and the edges of the crystals are not as water-worn as those taken from the lower levels. On the hill-sides of the river valleys they are more numerous, more water-worn, and some of the heavier companion minerals are not as plentiful. The sands and gravels of the rivers yield even more diamonds, but they are usually smaller, and are worn smoother. The minerals accompanying them are of the lighter varieties. From these facts it is assumed that in the ancient upheaval, the diamondiferous material was exuded through fissures in the basic rocks, from which the rains of ages washed the lighter pebbles to lower levels. From these deposits the smaller stones were again rolled lower as the water-courses cut deeper into the valleys, to the river beds of the present, each process being marked by the increased rounding of the crystal edges and the diminution in size and weight of the pebbles carried along from stage to stage.

Although there is a general resemblance between the material of the several districts of Brazil in which diamonds are found, it is probable that the sources are separate formations, as there are distinct differences in the number and quality of the accompanying minerals, and the diamonds themselves differ in shape and character. The grupiaras of the Pardo district are similar to those of the Diamantina district of Minas Geraes, and they each contain quartz, yellow and red fragments of monazite crystals, white and brown zircon, cyanite, staurolite, almandine, titanite, magnetite, and pyrite, but corundum, which is found in no other Brazilian diamond field, occurs with the diamonds in the Pardo district. On the other hand, the Pardo fields are said to contain no anatase, tourmaline, hydro-phosphate or itacolumite. The diamonds also, unlike those of other fields, are octahedral, whereas the usual form of Brazil stones is cubic. In the Paraguassu district, the crystals are irregular and distorted; in Minas Geraes they are regular and cubic; in the Pardo fields, regular and octahedral. The diamonds of the Paraguassu, where carbons are found with them, though more brilliant, are not as clear as those of the Cannavieiras or Pardo region, where carbons do not occur. There are other differences. Bagagem yields the largest and best crystals. The crystals of the Bahia fields run smaller than those of Minas Geraes and carry more color. It is a peculiar fact that many of the colored Brazilian crystals cut white, even of those which in the natural state appear to be of sufficiently deep color to class as fancies. Some of the crystals have cavities which look like pumice stone. Surface impressions of other minerals in the natural facets are of frequent occurrence, many of them resembling the form of quartz crystals. Stones that will cut to fancy diamonds like those of Borneo and the Dutoitspan mine of the Kimberley group, are rare.

Diamonds of large size are seldom found in Brazil. Few have been found worthy of mention when compared with the numerous large crystals of Africa. The largest on record was found in Minas Geraes and weighed 254½ carats or about one-twelfth of the weight of the Cullinan and a little over a quarter of the size of the Excelsior. Since, one of 138½ carats was found on the Rio Abaété; one of 120⅜ at Bagagem and one of 107 carats at Tabacos on the Rio das Velhas. Most of the crystals run from ¼ to ½ carat. Though published reports from the Brazilian fields have always been untrustworthy, owing to the prevalence of smuggling, they give some indication of general conditions. According to the declarations made, only 80 stones of one oitava (17½ carats) and over, were found in the fifty years prior to 1830. In the best years of Diamantina, two or three stones only of 16 to 20 carats each were declared annually out of ten thousand.

The Pardo fields are said to be very unhealthy, but in the mountains of the Paraguassu and Minas Geraes districts, a foreigner, if careful, may escape the diseases of the lower lands. J. C. Branner claims that the catinga-covered highlands of Bahia, though hot, are as healthful as any in the world. The richest fields of Bahia were on the east side of Serra do Sincorá where the Paraguassu and Andarahy cut through the mountains. Late reports indicate that there are rich deposits yet farther back in the mountains.

The general character of the Brazilian diamond fields indicate a wide upheaval of the basic granite rock leaving a very rough and broken surface full of huge gullies and fissures. In these fissures, and in basins or depressions in the granite, are deposits of disintegrated material forming sandstones and conglomerates of varying hardness, in which the diamonds occur. These deposits have in a large measure been washed from the high places and again deposited in gullies and basins that were the water-levels of the streams ages ago, and parts of these have again been washed down to the banks and beds of the streams which now exist. The diamonds throughout are in an altered material, and the original character of the matrix is not surely known. The indications are that during a period of disruption it was exuded from the interior, since which it has been weathered and washed into a conglomerate of water-worn fragments, and deposited in the process in all the fissures, gullies, depressions and interstices of the surrounding rocks, that lay in the path of the waters to catch it. Of the pink Lavras quartzite beds of the Bahia diamond fields, J. C. Branner says in the *Engineering and Mining Journal* of May 15, 1909, "Cases of diamonds in place in these quartzites have been reported to the writer, but though he has never personally seen such specimens, the geologic evidence is all in favor of the theory that the diamonds and carbonadoes come directly from the Lavras beds." He gives an analysis of the quartzite by L. R. Lenox as follows: Silica (SiO_2)

97.94 per cent.; Fe_2O_3 and Al_2O_3 1.98; lime, none; magnesia, trace; total 99.92.

Mr. Orville A. Derby says of the diamondiferous beds of the Paraguassu district, "These beds, of which the thickness is estimated at more than 500 meters, are profoundly disturbed, being thrown into folds that may be compared to the waves of the sea, and are also cut up by faults with the uplift sides forming enormous steep-faced cliffs." These folds produce a series of outcroppings on the mountain sides and dip now to the east and now to the west. From Santa Isabel to Lencoes, the conglomerate dips to the east, and forms the eastern slope of the range. Over the crest it has a western dip after an interval which exposes a great thickness of the lower sandstone. He says further, "The points of easiest attack thus far worked are insignificant in comparison with the masses of material containing the precious stones still untouched."

All estimates of the quantity of diamonds mined in Brazil and exported are little better than guesses. The government claims ownership of all mines, but is unable to enforce the rights of ownership over the wild and difficult country in which the diamonds occur. It grants concessions, and the district authorities impose and collect taxes where they can, but both are powerless to protect concessioners and licensees against the native garimpeiros, who not only know the country, but the diamondiferous gravels, and are experts at picking the gem out of the material in which it is hidden. With hundreds of square miles of broken country covered with dense forest and jungle in which to roam; their only implements a wooden bowl in which to wash the cascalho and a little wooden bottle to hold the diamonds; undiscoverable hiding places on every hand, these men can work any part of a concessioner's territory but the one spot in which he has his men working, without fear of detection. There are no means of ascertaining the quantity of diamonds obtained in this way. The only real statistics are the declarations made for exportation and as the government imposes an export duty, it is well known that a part only of the diamonds exported are declared. From records made by a mine owner in Diamantina in 1906 it appears that the output of that district by lawful miners at that time was about 5,000 carats per month. These were reported as worth $40 per carat, but it is very doubtful if they realized nearly so much. Rough to command that price must be very good and though many of the diamonds of Minas Geraes are fine, the larger part are small or of poor quality, so that the average value could not exceed that of mines like the Wesselton and Jagersfontein of Africa, for instance. In that year the value of diamonds and carbons together, exported from Brazil, according to government statistics, was $310,000. In 1905 it was only $150,000. In 1890, before the African Syndicate had forced up the price of diamonds, the Minas Geraes output was said to be about 1,000 carats only.

The production of the mines of Salobro, Cannavieiras district, for the ten years ending 1890 was estimated at 193,644 grams. Although this region is not hilly, it is difficult to work, as it is covered with a dense forest growth, and the diamondiferous deposit lies usually about two feet under the surface. The conglomerate which carries the diamonds outcrops in the beds of the Salobro river and its tributaries, and some think that the whole region, back to the Pardo and Jequetinhonha rivers, has an understratum of the diamondiferous deposit. Several French and English companies have worked these Salobro mines for years at a profit.

Authorities conflict regarding the output of the Brazilian mines in the early years after their discovery. Up to 1740 estimates of the yearly production vary from 20,000 to 144,000 carats. From 1740 to 1772 the official reports gave an average production of about 52,000 carats per annum.

Then the government began to work the mines, much after the same methods pursued by the lessees, but guarding the diamondiferous districts with soldiers, to prevent ingress or egress of any not employed or properly accredited, and to arrest smugglers. The inhabitants even could not cross the line without a written permit, and everybody on leaving the diamond district was searched. If a smuggler was caught, his property was confiscated and he was sentenced to imprisonment, the soldier being rewarded. Notwithstanding the utmost watchfulness, smuggling was practiced on a large scale, probably with some connivance on the part of officials, and the contraband stones were usually above the average in size and quality. The cost of operation to the government was excessively high. For several years four to five thousand negroes were employed, but the number dwindled by 1808 to about one thousand. From 1772 to 1818, while the mines were under government administration, they are said to have yielded 1,298,037 carats, the best year being 1784, with an output of 56,145 carats, and the poorest 1818, with a production of

9,396 carats only. In round figures, the production, without guessing as to the amount taken by smugglers, has been estimated from the discovery to 1818, as follows: from the beginning to 1740, 240,000 carats. From 1740 to 1772, 1,700,000 carats, and from 1772 to 1818, 1,300,000. In all up to 1818, 3,240,000. Some authorities place the quantity produced through legitimate channels up to 1822 at a little under three million carats. The production, however, between 1818 and 1822 was small, having fallen to about 12,000 carats annually.

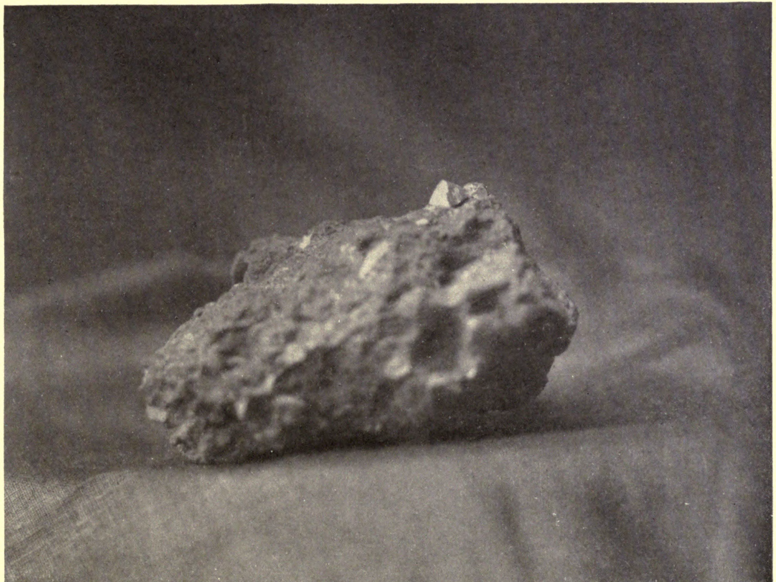
There appears to be little definite knowledge of the output from 1818 to 1850, but writers generally agree in putting the entire product of the Brazilian mines up to 1850 at a little over 10,000,000 carats, of which something over 5,800,000 is credited to the Minas Geraes district, nearly 1,200,000 carats to Matto Grosso, and over 1,200,000 to Bahia.

The discovery of very rich deposits in the Serra do Sincorá, Bahia, in 1844, drew thousands to these fields and the neighborhood of the rivers Paraguassu and Andarahy, where they cut through the mountains, was worked so diligently that for some time the daily output averaged between fourteen and fifteen hundred carats. As the exposed gravels were exhausted and it became more difficult to reach the diamondiferous material, the number of workers dwindled, and with them the production. The Bahia fields were constantly extended, however, so that by 1858 the production of Bahia was 54,000 carats as against 36,000 carats for Minas Geraes.

In 1850 and 1851 the Bahia yield was said to be about 300,000 carats per annum, but from that time, the average yearly production fell about half, though it recovered somewhat in the early sixties. From 1850 to the discovery of diamonds in Africa, the Brazil output amounted in round figures probably to 3,000,000 carats. After that it became an unimportant factor in the diamond market, though impetus has been given to the industry of late years by the high prices which the London Syndicate established for diamond rough, and the demand for carbon, which is found in connection with the diamonds suitable for cutting, in Bahia only. From 1870 to the present it is doubtful if the entire Brazilian diamond and carbon output much exceeded a yearly average of 100,000 carats.

The impetus given to the industry by the general prosperity of the opening decade of the twentieth century is indicated by the Consular reports, which give the production of the State of Bahia as 154,307 carats in 1906; 189,949 carats in 1907 and 298,046 in 1908. It is estimated that the entire output of the Bahia fields to the end of 1908 amounts to 12,351,576 carats.

When the market was first flooded with African diamonds, the Brazilian output dwindled rapidly. Not only could the African mines fully supply the world's rapidly increasing demand, but the Syndicate in London controlled the channels of trade. The unhampered sale of African rough in the beginning, rendered the Brazilian industry, if conducted on a large scale, unprofitable, and it is possible that one reason for the caution of the Syndicate in making their first advances in price, was to avoid encouraging a resumption of mining in Brazil. Not until late in the nineties, when the price of rough had been doubled, was there a revival of interest in the Brazilian fields. Since then, the good price obtainable



DIAMOND CRYSTAL IN KIMBERLITE

for diamond rough and carbon has given a stimulus to the industry, and considerable outside capital has been enlisted in developing new fields or working over the old ones, though some of the new companies formed for that purpose, in the United States especially, have not as yet got much beyond enlisting the capital. Withal, the output of the Diamantina region is given in consular reports as averaging about 5,000 carats per month only during 1906.

CHAPTER X

DIAMOND MINING IN AUSTRALIA, BORNEO, CHINA, GUIANA, RUSSIA, AND THE UNITED STATES, AND DIAMONDS FOUND IN METEORITES

IN the middle eighties, a Mr. Gilkes, while prospecting for gold in the interior of British Guiana, found a diamond. At that time the enormous development of the diamond mines of Africa from the chance finding of a single stone, had already attracted universal attention and prospectors were not slow to follow any similar lead. The gold prospector at once became a diamond seeker, and in a short time obtained quite a number of small stones. No large stone or great quantity was obtained, and probably for that reason systematic digging with the assistance of capital was not begun until early in 1900, when "the British Guiana Diamond Syndicate" obtained a concession of 2000 acres and commenced operations on the Putareng Creek, a tributary of the Mazaruni river. Later the Mazaruni Company obtained a concession of 5,858 acres in the district and is still in operation. Since then, a number of small companies, one of them American, operating on Nimbo Para creek, Mazaruni river, have been formed for the purpose of digging for diamonds in that district. There were 27 companies working in these fields in 1903, only 14 of whom reported over 100 stones.

The fields lie north of the Cordilleras of Parima, which at an average altitude of 4,000 feet, divide the rivers of the north coast line countries of South America from the great basin of the Amazon, south of which are the diamond fields of Bahia, Brazil. The diamonds are found in a somewhat remote part of Demarara. The route from Georgetown is up the coast about 20 miles to the mouth of the Essequibo river; up the river about 50 miles to Bartica, and thence by small boats, which must be carried around numerous falls, up the Mazaruni river to San-San-Kopai landing. This latter part of the journey consumes usually 14 days, the distance being between 90 and 100 miles. The diamondiferous area lies on the left bank of the Mazaruni river, between two of its tributaries, the Putareng creek, and a river which Alfred de Andrade, one of the pioneers of the fields, calls the Puruni river. Diamonds have been found also on the left bank of the Curibrong river near its junction with the Potari river.

The diamond-bearing gravel occurs usually under an overburden of gray sandy soil and rests on a clayey subsoil. The crystals are found chiefly in the lower part of the gravel and sticking in the upper part of the clay, associated with jasper and other siliceous pebbles. The diamonds are usually of good quality but very small. Most of them run about 15 to the carat. Stones of three-quarters of a carat and over are extremely rare, and none of importance have yet been registered from these fields. An early report of a day's work on a promising deposit, by one of the companies with a working force of 18 men, gave 22 cubic yards of ground handled, yielding 90 diamonds which weighed 5.7 carats. In the year ending June 30, 1902, 132,077 stones were declared; 1,414 from the Potari and other districts, the balance from the Mazaruni district. In 1902–3 the entire district registered at the Department of Lands and Mines, 163,680 diamonds weighing 10,446 carats. They were mostly marketed in London at $6.00 to $10.00 per carat. In 1903–4 the yield was about the same; 164,315 diamonds weighing 10,742 carats. Later reports show a falling off. In the calendar year 1905, only 86,096 stones weighing 5,315 carats were produced. Shipments in 1907 were 2,220 carats valued at $17,550 and in 1908, 4,968 carats valued at $40,872, but the indications are that the companies do not find it sufficiently remunerative to prosecute the work with much vigor. The fiscal year of 1908–9 shows improvement; 56,982 stones weighing 5,189 carats were reported. Some believe that persistent development with sufficient outlay to place the fields in better communication with the outside world, would pay eventually, but with the meager results hitherto, and the lack of encouragement which an occasional find of a large stone would give, capital does not seem inclined to take further risks. Machinery has been introduced of late years, but the cost of transportation is very high, and with alluvial deposits, unless they are very rich and so situated that the machinery can be installed and moved without great expense, it is doubtful if the use of it pays as well as the old methods. In the old way of working claims, one man shoveled the gravel and clay into a wheelbarrow; four men wheeled it to the place where the stuff was worked. There, two men melted it in a "tam"; two cradled it; two jagged the sieves, and two or three worked at the sorting table where the gravel was searched. It was practically the same method employed in other countries with similar deposits, and though crude, had the advantage of being inexpensive, and the plant could follow the finds without loss of time or at great cost.

A new deposit has been discovered about 115 miles from the mouth of the Cuyana river, near the Dukwarri cataract. The stones, like all other Guiana diamonds, are small.

Diamonds have been found also in the central part of Dutch Guiana in the Mindreneti district, between the Surinam and Saramaca rivers, but nothing of importance has been reported. All these are alluvial deposits, apparently very shallow and similar to those distributed among the streams of Bahia. The latter district is not noted for large stones, but those of the Guiana fields are yet smaller and less abundant.

Diamonds are found in Shantung, China. About 10 li (4 miles) east of the market town of Li Chia Chuang, is a low, sandy ridge, extending south and parallel with Ching P'u, the main road south, after it crosses the I Sui river about 18 miles southeast of Chefoo. The diamonds are found along this ridge for a distance of fully 8 miles. The natives will only look for them after rains, because they believe the rains bring them, quite oblivious of the fact that the washing of the sands by the falling rain discovers them. They cannot be persuaded to dig and wash the sand.

The stones are nearly all quite small. Occasionally, one as large as a pea or a hazel nut is picked up. The usual method of the farmers is to walk back and forth over the water-washed sands with sabots of rye-straw, which pick up the sharp-pointed crystals. The sabots are then burned and the ashes sieved for the diamonds. The larger ones are picked up from the ground when seen during the tramp. Many of them are broken or splintered crystals, and as they are used chiefly for drill points, most of the unbroken crystals are broken up later for that purpose. A few are sold for gem purposes. Some of them are white, but a large majority are yellow or brownish-yellow.

The finders obtain a good price for the stones, as buyers visit the place regularly at certain seasons of the year and usually carry away the entire output. The quantity obtained is unknown, but the output of stones suitable for cutting to jewels is inconsiderable.

Australia produces a few diamonds, usually quite small and of inferior quality as gems, though they have the reputation of being the hardest of any. Cutters say they can be cut only with their own powder. In hardness, average of size, and tendency, when colored, to great depth of color, they resemble the diamonds of Borneo. The crystals seldom weigh over one-quarter of a carat, though a few run up to three-quarters of a carat; occasionally one is found weighing upwards of one carat, and several have been reported since the first discovery, which weighed between five and six carats each. At Bingara they ran about five to the carat, and fifty per cent. were straw colored. They are found usually in the gold and tin washings. Almost the entire product comes from New South Wales, however, which is not nearly as rich in gold as Victoria, where few diamonds are found.

The discovery of diamonds was first reported from Reedy creek, a tributary of the Macquarie river, near

Bathurst, in New South Wales. The same year another was obtained near the Turon river. From that time, the attention of the gold diggers being drawn to the fact that diamonds existed in the gravels thereabouts, others were found occasionally in the neighborhood of all the streams emptying into the Macquarie as far north and west as the Cudgegong river, the earliest coming from the Calabash and Pyramul creeks. In September, 1859, several were found at Suttor's Bar on the Macquarie river, and another in October at Burrendong. These discoveries awakened considerable interest, but not sufficient for several years to enlist capital for an organized search for diamonds. Systematic work was begun in the neighborhood of Mudgee on the Cudgegong in 1869 by "the Australian Diamond Mines Company" of Melbourne, but the results were not satisfactory. In the first five months' systematic washing in the Cudgegong district, 2,500 diamonds were found, one weighing 5⅜ carats. They were mostly colorless, though straw, brown, black, and a dark green which looked as though it had been polished with black lead, were among them.

In addition to the fields near the tributaries of the Macquarie from Oberon to Wellington, one was discovered to the southwest near the Lachlan river. In the early seventies, considerable work was done in the Bingara fields on the river Horton, a tributary of the Gwydir river, to the northeast of the Macquarie, and since then and now, in the Inverell district, a little further north. Inverell is situated a few miles north of Bingara and the junction of Copes Creek and the Gwydir. "The Star of the South" mine, in the Inverell district, is on a hill of basalt in which shafts are sunk to the diamondiferous gravel. Reports have been made at various times of exceptionally rich washings from these districts. Prospectors found 551 diamonds in one load of wash in 1895. But the average bears no comparison with the yield of the African mines. At present, most of the Australian diamonds come from the Gwydir river and tributaries, near Inverell. A London company, "The Inverell Diamond Fields Limited," was formed in 1897, to operate in this district. The mine closed in 1900 with a total product of 37,400 carats and 39 tons of stream tin. They are found also along Shoalhaven river near the east coast. The first washing of the Elliott Diamond and Tin Mining Company, operating near Inverell, produced 3 carats of diamonds to the load and 40 lbs. stream tin.

In Queensland, diamonds have been found along the Palmer and Gilbert rivers; they occur also at Echunga, 20 miles southeast of Adelaide, Australia. Early in 1907 some were reported from that district, ranging from one to five carats each. In 1862, some were found in the gold fields of the Beechworth district in Victoria, and they occur near Freemantle in West Australia. A diamond found at Coriona in Tasmania in 1894 created considerable excitement, but the diggers who flocked there, failed to open up a new diamond field. Another was reported by W. H. Twelvetrees, the Government Geologist, in 1906, who with his report said that the ultra-basic rocks and the presence of ancient carbonaceous shale, indicated a possibility of diamondiferous material being found in the district. This diamond, a bright octahedral crystal, weighing one-eighth of a carat, was found at Long Plains on the west coast. When exposed to bromide of radium it glowed and became luminous in the dark. It showed a faint greenish-yellow tint at its terminations.

Some idea of the size and quality of Australian diamonds may be had from the estimate of the production of New South Wales, from whence most of them come, up to the end of 1901, which was 109,425 carats valued at $326,455, or a carat value of about half that of the Kimberley diamonds at the time of the De Beers Consolidation, before the London Syndicate began to advance the price. The yield of 1902 is estimated at $48,780. The production of 1906 is estimated at 2,251 carats, worth £1,992, and of 1907 at 2,539 carats valued at £2,056.

The diamonds are found in an alluvial deposit of gravel overlain usually by a basaltic flow. The deposits are near the present beds of streams, but are frequently at an elevation of some feet above the banks. According to Llewellyn Parker, the country rock under the gravel consists of carboniferous clay stones and tuffs, resting on granite. Doleritic dykes break through the granite and the leads lie above them and beneath the basaltic flow. A small diamond enclosed in a piece of rock was found in one of these dykes, about ten feet below the gravel layer. Five feet of the upper part of the dyke was decomposed into a soft yellow earth. Below, it was a hard, bluish-green, coarsely crystalline dolerite. Another diamond was found under similar conditions, and much interest in the matter was aroused among scientists, who thought it might afford a clew to the matrix of the diamonds. Four in all were found in a rock matrix, but a further examination of nearly 90 tons of the rock yielded no more. As in West Australia, some of the diamonds, according to Prof. David, occur in very ancient gravels now consolidated into conglomerates. The loose gravels are of a much later age.

The crystals are chiefly octahedrons, though dodecahedrons and similar forms occur also. They are of various colors, white, yellow, brown, black, and one twinned crystal of a dark green was discovered.

Diamonds similar to those of Australia are found in Borneo. They run small, are very hard and many of them are colored. The fields have undoubtedly been worked for centuries, as the Dutch on their first arrival there found mining operations being regularly carried on and ancient native gems are in the possession of the princes. The rajahs of Panembohan and Pongerans possess a large belt studded with diamonds, one of them weighing 67 carats. It is difficult to make a reliable estimate of the quantity produced. The natives regard the gold and diamonds as a kind of natural bank provided to be drawn on at pleasure. The native princes claim all stones over five carats at a fixed price. Undoubtedly they do not get them all, but naturally there is less public knowledge of the contraband stones than of those taken by the princes, and of them it is known only that the overlords have them in their treasuries. As far as records go, it appears that the production during the first half of the nineteenth century averaged about 5,000 carats per annum, and it is thought to be about the same now, though it is probably less, as mining operations have little encouragement.

In the eighteenth century, the yield was probably much greater, for the fields of Borneo are mentioned, with those of India, as important, in books published in the early part of the nineteenth century, and it was estimated that the production amounted at times to several hundred thousand dollars to upwards of two million dollars in value per annum. Evidences remain that numerous claims were worked, but as in India, the diamondiferous material is an alluvial deposit, and as these long known deposits have been worked for ages and no new discoveries made, they are nearly exhausted. A point was reached some time ago where the cutters of Borneo could buy diamonds from Australia and the Cape for less money than the natives could dig them in the home country, and to-day most of the diamonds cut in Borneo are imported from those countries. About 16,000 carats, worth $200,000, are imported from Africa annually.

Borneo cuts for Java, Singapore and Siam, sending the white stones to the latter countries and the yellow and colored ones to Java.

The principal diamond fields of Borneo are situated in the Landak district near Pontianak, the capital of Dutch Borneo, on the west coast, and in the neighborhood of Martapura on the south coast to the east of the island. They are found also along the Sarawak river north of the Pontianak or Landak district, in the northwestern part of the island, on the rivers Sikajam and Meran in the same section, and at Kusan on the eastern side. In 1904 some excitement in the diamond trade of London was produced by the announcement that an engineer in the employment of the British North Borneo Company had discovered in that part of the island a clay or rock similar to the kimberlite of the African chimneys. His report of the occurrence there of material of that character has been since verified, but no discovery of diamonds in it has been reported.

As in all other alluvial deposits, the diamonds are accompanied by pebbles of a siliceous nature and also by a form of blue or bluish-gray corundum which is regarded by the natives as a sure indication of the presence of diamonds. This companion of the "Prince," as the diamond is termed, is known as Ba tu timahan. It is not of a quality to cut for jewels, and was long thought to be a form of quartz. Like the black tourmaline or "jetstone" of the Bingara fields of Australia, its chief value in the eyes of the miners is that it assures them of the presence of the more precious gem.

Mining is carried on by Malays and Chinese, the latter being skillful and economical miners. A French company secured a 25-year concession in 1882 to work a tract of about 5,000 acres near Tjampaka in the Tanahlaut or Martapura district, but work was discontinued in about a year after operations began. Apparently, the deposits are not sufficiently rich and the location of paying diamondiferous material too uncertain, to warrant risking the expense of a thoroughly equipped mining organization. Even the skill and economy of the Chinese fail at times to win enough to hold them to the work, and the diamond diggings are deserted for the neighboring goldfields, from which returns are more sure. At times, however, there is great activity. In a few weeks of 1905, 1,278 licenses were taken out in Martapura.

Most of the crystals are octahedrons and dodecahedrons. The natives call the former "perfect stones," and simply polish the native facets; when the angles are sharp and the facets bright, they are called "intan menjadi" and are worn as found. Diamond cutting is done at Pontianak, Martapura and elsewhere. The art has been practiced in Borneo for centuries. There are two shops in Martapura, one employing 270 and the other about 150 workmen. Besides these about 300 polishers and 160 cleavers work independently. They are paid about fifty cents per carat for cutting brilliants, and about thirty-five cents for cutting roses. There are diamond-cutting establishments in Pagattam and Toenggoel also.

The diamonds are found in the beds of the streams of to-day, and also in the gravels of watercourses long since covered up. The miners sink shafts through the overburden and tunnel into the diamondiferous material in crude fashion, hoisting the gravel to the surface and washing it in about the same way as all others do who work in alluvial deposits. The Malays wash in a small bowl and show remarkable skill and keen vision, picking out with unerring rapidity diamonds so small as to escape entirely the observation of a European. The Malays mine and cut in the crude Oriental ways of ancient times, but the Chinese adopt some modern methods in their mining operations. The cutting is done by natives.

The deposits of the Landak district are older than those of the southeastern section around Martapura, but all the fields alike are remarkable for the number of stones of deep color they afford. Borneo has produced more diamonds, proportionately, of rare colors than any other country; red, green, black and deep rich brown. According to Dr. Theodor Posewitz, a mining engineer who resided in Borneo for some years, as given by E. W. Streeter in his work on Precious Stones, the natives have names by which they designate the most important.

A red diamond, which is very rare, is called "Radja intan" or King of Diamonds; bottle-green diamonds, also rare and valuable, are "Intan Katja hitam"; pale blue or sea-water diamonds are "Intan-ajer-Lant," and "Intan minjak" is the name given to brown stones. "Chaping" are flat twin crystals. Uncut diamonds are called "podi" and when cut they are "intan." Some fine colored diamonds have been found in the Sarawak and other rivers, but they can only be worked in dry seasons. A round, rolled crystal, of good color, containing a dark core, is sometimes found, which the natives do not attempt to cut, but wear it in its natural state as an amulet. They call it "Buntat intan," or "Soul of the diamond." When this is found in a digging, the digger moves on. He regards it as a sure sign that there are no other diamonds near. He also has faith that if he wears the Buntat intan suspended from his neck, it will bring him good luck in his search further.

As in Australia, the diamondiferous deposits lie at a considerable elevation above the present watercourses, though they are all near the banks of some river.

July 5, 1829, when Humboldt and Rose were on their journey to Siberia, the first European diamond is said to have been found in the district of Hütte Bisersk, in the Urals, Russia, by Count Polier. It was found in gold-washings on the estate of his wife, Princess Shachovskoi. Humboldt was convinced by the similarity between the gold and platinum deposits of that country and those of Brazil, that diamonds existed there, and practically staked his reputation for sound judgment in the matter, by assuring the Czarina when starting on the expedition he was about to make at the request of the Czar Nicholas, that he would certainly bring Russian diamonds back with him from the Uralian deposits. Though he had the enthusiastic assistance of Count Polier, Humboldt met with little success, and some Russians of the neighborhood have hinted that the diamond he brought back was placed there to be found for him. No proof of fraud exists, however, and as diamonds have undoubtedly been found throughout that section since, and Russian mineralogists, after carefully looking into the matter, were of the opinion that the discovery was genuine, he may be said to have proved his assertion.

This first diamond was found in a small gold-washing of Adolphskoi, on a stream connected with the Poludenka, a head-stream of the Kovia, which by way of another tributary flows into the Kama river. During the next five years, about 50 small diamonds were found, of which the largest weighed under three carats. Search has been made constantly in the gold-washings throughout the Ural mountains from that time to the present, and probably 200 stones in all have been found. Small crystals, of scientific interest only, have been picked up from time to time over a wide range south to the gold-washings of Katshkar. With few variations, the minerals usually associated with diamonds, occur with them here also, i. e., garnet, quartz, zircon, topaz, rutile, magnetite, cassiterite, epidote, etc.

There has been much scientific speculation as to the rock from which they were derived, but as the diamonds have been all found in sands, no undisputed conclusion has been reached. The mountain ridges above the streams are described as quartzose chloritic talcschist, and the sands lie on a bed of dolomite.

A few microscopic diamonds have been found in Russian Lapland in the valley of the Pasvig river. Gneiss is the bed-rock, and the associate minerals are with one or two variations the same as in India and Brazil.

A few diamonds have been found in the Sierra Madre, southwest of Acapulco in Mexico, and one was found in sand with Pyropes at Dlascekowitz, in Bohemia. A report of one discovered in Ireland was not authenticated.

There is a Jesuit tradition that diamonds have been found on Jesuit lands in the district of Tena, 30 miles from Bogota, Colombia, but several years' search has failed to discover any.

Strata of clay said to be similar to kimberlite exists in the State of Trujillo, Venezuela, and a concession was obtained from the government some years ago to work them for diamonds, but none were found.

A few diamonds have been found at various times in the United States, but until the discovery of what is thought to be a diamond chimney like those of Africa, in Pike County, Arkansas, in 1906, the fields gave no promise of others, sufficient to induce prospecting for more. Single stones have been picked up at long intervals, chiefly along the eastern base of the Appalachians, in Virginia, North and South Carolina, Georgia, and Alabama. Most of them have been found, associated with gold, in the Carolinas, though the largest, weighing 23¾ carats, was found by a laborer while working in an excavation in a street of Manchester, Virginia, in 1855. This crystal was an octahedron with rounded edges. It was cut to 11 $^{11}/_{16}$ carats, and though poor in color and badly flawed, brought a large price; very much more than it was worth. It was known afterwards as the "Dewey" diamond. No diamond as large has since been found in the States.

The diamonds found in this section of the country have been taken from detrital matter, derived evidently from the weathering of the crystalline-silicate rocks which constitute the surrounding mountains. The gravels contain minerals similar to those associated with diamonds in alluvial deposits elsewhere, viz., garnet, zircon, gold, magnetite and anatase, and some monazite, a rare mineral generally met with in the Brazil fields. The flexible sandstone, itacolumite, thought by some to be the matrix of the diamonds of Brazil, is also found with gold in the neighborhood of places in the Carolinas where diamonds have been found, though no report has been made of a diamond being found in it. The crystals are mostly octahedra and, excepting the Dewey, the largest, found in 1886, weighed 4½ carats. The first diamond found in North Carolina came from Brindletown Creek, Burke county, in 1843.

A few stones have been found in superficial deposits in Kentucky and Tennessee, but without indications of the source from whence they came. Work has been done on the peridotite dike at Ison creek in Elliot county, and other similar dikes in northeastern Kentucky have been prospected without success.

The path of the glacial drift through Wisconsin, Michigan, Indiana and Ohio, has afforded quite a number of diamonds. Most of them were found in Wisconsin. It is supposed that they were brought down from Canada by the ice, and in 1899, Professor W. H. Hobbs, after a careful study of the glacial striæ leading to the localities where the diamonds were found, surmised that they came from somewhere near James Bay on Hudson Bay. In 1876 a yellow diamond and some others were reported as found near Eagle in Waukesha county. In 1886 a pale yellow irregular rhombic dodecahedron weighing 21¼ carats was found at Kohlsville in Washington county, and in 1896 a diamond of over 6 carats was reported as having been found at Saukville in Ozukee county in 1880. In 1893 one of 3⅞ carats was found at Oregon, Dane county, in clay. Another, found in southern Wisconsin, which weighed over 16 carats, is now in the J. Pierpont Morgan collection.

Several diamonds have been found at various times in Morgan county, Indiana, for one of which $1,200 was offered according to report. The amount represented local sentiment, however, as the stone was not worth nearly as much. Most of these stones were found while cleaning up gold-washings. The first diamond found in America was found in Indiana in 1837. It is a white stone and cut as a jewel, weighs about 2 carats. It is claimed that diamonds with other precious stones have been found in the hills of Brown county within 40 miles of Indianapolis.

Diamonds have been found occasionally in the gold placer and platinum mines of California since 1850, most of them in the neighborhood of Fiddletown and Volcano in Amador county. They have been found also in Butte, El Dorado, Nevada and Trinity counties. The first of which there is a good record, came from the

Cherokee district, Butte county, in 1853. During the last ten years there have been numerous reports of "finds" which have been more fruitful of stock companies than diamonds and the "kimberlite" which South African experts have been called in to vouch for, has, in some cases certainly, proved to be a very different material from the South African peridotite, so named.

Diamonds have been reported from Idaho and Montana, and one brown crystal which weighed one carat, from Philadelphos, Arizona. Much excitement and some legislation was secured by the discovery of diamonds and rubies in Arizona Wyoming a few years back. The discoverers had first salted the ground very liberally with African diamonds and garnets. It cost their western dupes about three-quarters of a million dollars all told.

The finding of a diamond by John W. Huddleston, 2 miles southeast of Murfreesboro, Pike county, Arkansas, in August, 1906, has since been prolific of learned opinions and discussions and, as far as publicly known, about 140 diamonds ranging from $^1/_{64}$ of a carat to about 6½ carats each. Investigation showed that a volcanic pipe of material, which authorities pronounce similar to the kimberlite of Africa, exists where the diamonds are found, and it was confidently hoped that it would prove rich in diamonds. A company of reputable men was formed to develop the property and about 130 diamonds were found during the first year, but nothing of any importance has been reported, though much work has been done. Since the original company was taken over by another with a largely increased capital stock, however, there is a report that about 5,000 stones altogether, weighing 217 carats, have been taken from the property of the Arkansas Diamond Company, and about 35 stones from the Mauny tract in the same pipe.

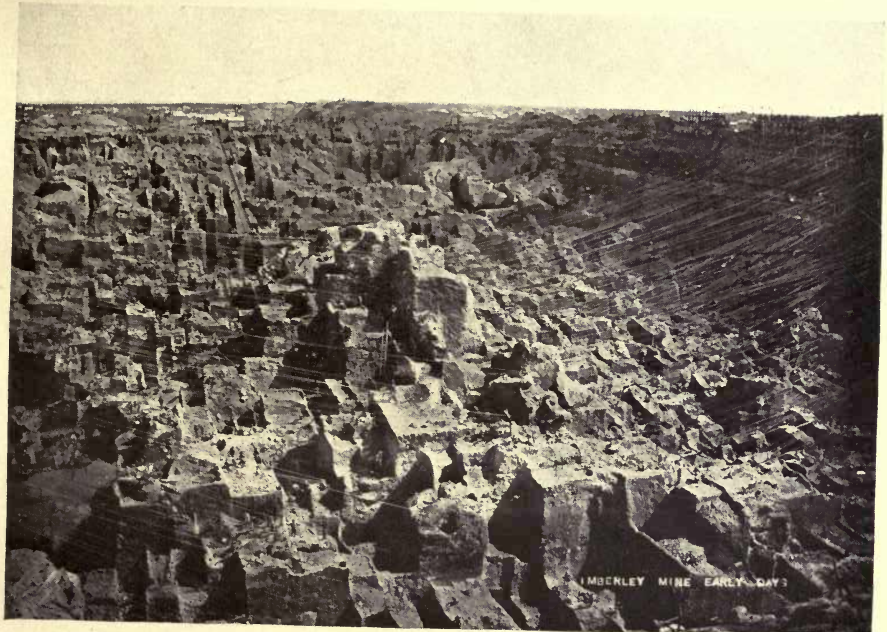
There is a popular idea that material like the kimberlite of South Africa necessarily carries diamonds. Not only is this not so, but when it does, it does not always follow that there are diamonds sufficient to pay for getting them out. The richest diamond chimneys of Africa together, do not average ½ carat of diamond to 1,600 pounds weight of the matrix, and though very many diamondiferous pipes have been discovered there, only a very few pay the expense of working them. Undoubtedly there are a number of volcanic dikes in the United States of similar material, and in some cases, almost identical with that contained in the African pipes, but in that which most resembles the African, no diamonds whatever have been discovered. Many of the so-called diamonds reported, have proved to be rock crystal; some of the genuine diamonds found are thought to have been placed where they were discovered, and the circulation of exaggerated stories in the press has always been followed by the formation of stock companies whose printing bills far exceeded in amount, the value of the diamonds produced. It is doubtful if all the diamonds found thus far in the United States would fetch $10,000 as regular merchandise even at the present high prices.

"One touch of Nature makes the whole world akin." For long years man regarded all the universe outside the earth as something foreign and strange; unlike the elements with which we are familiar. But the earth, sweeping through her orbit, catches betimes some wanderers in space and drawing them to her, anchors them forever from their aeonic journeyings. These meteoric visitors upon examination, reveal to us that in the far-away space which our imagination has peopled with spirits and things ethereal, are the same solid elements common to us here and subject to the same laws which govern ours. The white hot line which came from other worlds to cross our sky, when we dig it from the earth where it plunged to darkness, is found to be a mass of minerals the same as ours, heated as ours would be if a similar lump of them went hurtling through the air at 40 miles per second. Iron, the same as ours; olivine and augite, the same as that of earthly origin, and in some of these fragments of far-off worlds are crystals such as the people of earth cut into gems with which to bedeck themselves. It may be therefore that in other spheres there are creatures who also shine resplendent with diamonds.

On September 22, 1886, three of these meteorites fell near Novo Urei, a small place on the right bank of the Alatyr, a river of the Krasnoslobodsk district of the government of Penza, a remote part of southeastern Russia. One of these on examination by scientists was found to contain about 1 per cent. of diamantoid carbon in the form of carbonado in small grayish grains.

Diamonds in some form, usually as cubes of graphite, have since been found in a number of other meteorites which have come to the earth in various parts of the world. It is thought that these were originally diamond crystals and were later changed to graphite, as they would change if subjected to a high temperature without access of air. Such diamondiferous meteorites have fallen at Cañon Diablo in Arizona, at Toluca in Mexico, in Tennessee, U. S., Arva in Hungary and at Carcote in the desert of Atacama, Chile. In the latter, the grains of diamond were black.

The finding of diamondiferous carbon in these meteorites, which are fused masses, of iron principally, has done much to establish the conviction that carbon was crystallized in the earth by heat and pressure, and by the mental reaction of imaginative minds, has produced many fanciful theories and much poetic writing. It has been suggested that in ages past such meteorites, rained upon the earth and embedded there, the matrix dissolved by the restless chemistry of Nature, may have furnished for the discovery of later ages, mines of the indestructible gem. This is poetic babble. The earth needs not to draw upon vagrants of the sky, charged as it is in every pore with the element of which diamond is its purest and most beautiful form. In earth and air; in things animate and inanimate; in the vegetation of the earth and the bodies of men; in the charcoal pit and the breath we constantly expire, is that of which diamond is only a form, carbon.



KIMBERLEY MINE—EARLY DAYS

CHAPTER XI

THE DIAMOND MINES OF SOUTH AFRICA

IN writing the history of any important movement in the world's affairs, it is difficult to find the beginning of it. A turn of the lever will set a machine in motion if there is sufficient steam back of it. Similarly, the momentous results which sometimes follow a trivial action, would not happen but for preparatory conditions. The discovery of the African diamond fields, which has not only founded the fortunes of thousands throughout the world, but has also become a potent factor in the creation of a new empire, is usually ascribed to the chance finding of a diamond among a Boer child's playthings, and as the circumstance that first gets into print, or being in print, happens to be most widely quoted, becomes history, this will probably be accepted as an historical fact.

As the story goes, the little son of a Boer woman living near Hopetown on the Orange river, was in the habit of gathering the pretty stones lying in the fields thereabouts, to play with. One of them attracted his mother's eye and she spoke of it one day to a neighbor, Van Niekirk by name, when he stopped in passing, to gossip. As he seemed interested, she looked for it among the child's treasures, but it was gone. She found it, however, in the grounds outside, where he had thrown, or left it in his play. Van Niekirk offered to buy it.

Laughing at the idea of taking money for a stone, she refused to sell, but gave it to him. He showed it later to a friend named O'Reilly and the latter, when he went soon after to Grahamstown, took it with him and submitted it to a mineralogist there, Dr. Guibon Atherstone, who at once pronounced it to be a diamond. The crystal is variously reported to have weighed twenty-one and three-sixteenths, and twenty-three and three-sixteenths carats. After being exhibited at the Paris Exhibition, it was sold to Sir Phillip Wodehouse, governor of Cape Colony, for five hundred pounds. The story may be true, or partially true, or like novels and history, be founded on fact, though it was told among the diggers on the Vaal river a few years later, that the stone bought by the governor was picked up at Klipdrift by a Koranna. There is some confirmation of the latter version in the fact that the first diggers gathered on the Vaal about Pniel and Klipdrift. This stone, wherever found, may have been the first diamond recognized in South Africa, though earlier discoveries have been claimed by travelers through that country, one of them certainly from the United States, who said that he picked up a stone in the neighborhood of the Orange river in 1859, which was afterwards pronounced to be a diamond by several persons competent to pass judgment. It is probable that diamonds had been found there at various times without attracting much attention, or awakening sufficient interest to induce anyone to search for them through the barren wilds of that sparsely settled country. When Opportunity stares one in the face she is seldom recognized. The outcrop of a ledge of ore which afterwards became a famous mine in these

States, served for years as a doorstep for a native, until a passing stranger saw the possibility and got out the fortune which lay under it.

Van Niekirk's offer to buy the stone is also suggestive. A Boer does not often offer money for a thing unless it is worth money. His consultation with his friend, and the sending of it to an expert, indicates that he had heard of diamonds in that section.

Whenever the first stone was found and by whomsoever, the notoriety gained by that exhibited at the Paris Exhibition, turned the faces of adventurers toward the interior of South Africa and they began to drift that way.

This was in 1867. There was at that time a Moravian Mission at a place called Pniel on the southern banks of the Vaal river. On the opposite side was a settlement known as Klipdrift which has since become Barkly West. It was about these two places, but chiefly at Pniel, that the first diggers gathered. Most of them were from Cape Colony. A knowledge of things was disseminated more rapidly there, and the people were quicker to respond to an enterprise which took one from home, than the Boers.

Imagine the country. Far from civilization. A great plateau of warty kopjes among barren mountains; the wide stretches of stone and gravel, hidden in spots by a sparse vegetation of brush and grass. Here and there, many miles apart, Boer farm houses, or kraals of the natives. Wandering wide, sheep and cattle on occasional acres; the springbok and other wild game browsing unmindful over unmolested square miles. A borderland between a new Boer settlement and the roaming place of the mongrel Hottentot Griquas. For centuries, Kaffirs and Hottentots had wandered through it. The Boers had trekked it, the English following; both passing over land so poor and plenty that neither cared to take it from the natives who migrated there. Yet in the no-mans land which both left unconsidered when they drew their border lines, Nature had concealed treasures probably older than man and greater than he had yet conceived possible.

After the Dutch founded the Orange Free State, it became necessary to make a landmark which should be a respected dividing line between them in their new settlement, and the English with their coast line to the south and a habit of extension into the indefinite in all directions. By the treaty of Alivai, signed in 1869, England pledged herself not to interfere with the territory north of the Orange river. But big wheels turn on small pivots. That African diamond had already started forces working which would not only modify the treaty of Alivai but impregnate Africa with the seed of Empire.

There is no evidence that the few persons living in that territory made any systematic search for the precious stones. It had not yet occurred to them that there were enough to make it worth while. Undoubtedly the eyes of some roved when they went about, and Van Niekirk and others doubtless were alert for more stones like that other, which the children or natives might possess, but it is evident that those who knew of the diamonds did not spread their knowledge, for at that time there were diamonds sticking in the walls of some of the Boer farm buildings not many miles from the

Vaal, unrecognized. Neither were there many diggers from outside.

But in 1869 came a confirmation of the existence of diamonds in that locality, which created excitement. A diamond weighing over eighty carats was picked up by a native. It has since been named the "Star of South Africa." As soon as this find was noised abroad, adventurers flocked to the Vaal. The *New York Herald* in September, 1870, published an extract from the *Grahamstown* (*Cape of Good Hope*) *Journal,* of August 12th which said, "Every town and district in the Colony has sent its contingent to the army of workers at the Vaal fields. In May there were about one hundred men at the diggings. Before the end of June there were seven hundred, at the close of July there were over one thousand, and at present it is estimated that there are at the Klipdrift, Pniel, Hebron and Kuskamana Fields no less than two thousand men." As soon as the news was published in London and New York, men began to flock from England and this continent to the magic of "diamonds." Naturally much the larger number were from the colony's mother country. By April of 1871 there were about five thousand diggers scattered along the Vaal, Modder, and Orange rivers.

In these early days of the diggings, the men who gathered there were an orderly class of people. The difficulties and hardships to be encountered in reaching the fields, deterred the idle and worthless; the cost of the journey was a barrier to the impoverished, and there was not yet sufficient success to tempt the criminal and vicious. The country was outside the bounds of established law and government. Beyond the Cape Colony's jurisdiction, and supposedly within the undefined western territory of the Orange Free State, it lay really in the land of the Griqua chief Waterboer, over whom the British Government exercised some kind of protectorate. Until the arrival of the diggers, the entire country round about for many miles, was practically uninhabited. The miners therefore were a law unto themselves. When a number gathered at any particular locality, their usual method of procedure was to appoint from their number a committee of three or five, who under certain by-laws, rules, and regulations agreed upon, were empowered to grant licenses to diggers, preserve order, and punish offenses. These men received a small fee for the performance of their duties, and their authority was generally respected and sustained. Punishments were quite primitive; there were no jails. Natives were whipped for stealing. White men were put over the river, and occasionally got several duckings on the way. The license varied in the different localities, ranging from 2s. 6d. to ten shillings per month. The claims were thirty feet by thirty feet, a measurement which was maintained in all the fields later, when they had grown very considerably in importance. To prevent an idle speculation in claims the owner was obliged to work his claim continuously. If he failed to pick it at least once in three days, another might jump it and acquire ownership.

When the Free State government found that the business of digging for diamonds was assuming a degree of importance, it sent on magistrates and officers to impose and collect taxes on the miners and shopkeepers, but these refused to pay them until the question of jurisdiction was decided. The Cape Colony was appealed to, and Sir Henry Barkly, the governor, in the early part of March, 1871, visited the diggings and the President of the Free State, to endeavor to arrange matters between the miners, the Free State, and the natives who claimed that the territory was not in the Free State limits.

At Cawoods Hope, a settlement on the river, twelve miles from Pniel as the crow flies, the Free State had gathered a commando to enforce their demands. The diggers at once organized themselves into a military body and prepared to make a vigorous resistance. The Boer commando, however, kept within the territory they occupied. The contending parties finally agreed to submit the matter to a commission, and the English flag was hoisted at Kimberley, November 7, 1871. The commando of one thousand men was kept in the field until the arrival of the Cape Colony police, when upon demand of the governor, backed by his threat that he would not proceed with the arbitration otherwise, the president of the Free State dispersed them. Great Britain finally paid the Orange Free State £90,000 in 1877, in settlement of whatever rights that government may have had in the premises.

There had been another attempt to impose a tax upon the miners. This was for twenty-five per cent. of the value of the finds, and was made by the missionaries among the native tribes. This demand was also resisted and could not be enforced. In 1871, therefore, the territory west, from east of Platberg on the Vaal, to Ramah on the Orange river, passed under the jurisdiction and government of the Cape Colony.

By 1870 the Inland Transport Company ran an express wagon from Cape Town to Klipdrift once a week, carrying passengers for twelve pounds sterling each. The journey consumed from seven to ten days. The wagon and horses were carried by rail to Wellington. From there on, the journey was made by wagon, drawn sometimes by eight horses, two abreast, at others by ten mules, through Karoo Poort, an opening between two mountains leading to the Karoo Plains, a desolate stretch of forty miles enclosed on all sides by lofty mountains, and on over the Karoo to Beaufort West, Victoria West, Hopetown, across the Orange river and on to Pniel.

Although Port Elizabeth was nearer, the fields were much more difficult of access from there, as the only public means of conveyance was by ox-wagon, taking from thirty to sixty days to accomplish the journey.

The search for diamonds was carried on in primitive fashion. The newcomer might preëmpt a new claim by taking out a license, or jump an old one if the former owner had failed to pick it in three days according to rule, or he could buy one from the owner. At that time claims were sometimes sold for as much as one hundred pounds, but not often. The implements necessary were pick, shovel, rocker, or a couple of half barrels, and, if away from water, an ox or mule, and a cart. The latter could be hired by the day if the digger did not own them. Some provided these things at the coast towns and brought them along, but they could be obtained cheaper at the diggings. In the early days, before the finding of the "Star of South Africa," the departures were about as frequent as the arrivals. The funds of many of the diggers were exhausted before they found anything, consequently there were enough implements being sold at auction all the time to supply the newcomers. The rocker was a crude affair. A box about two and a half feet high, open at the top and one end, was put on rockers like a cradle. In this were set at intervals, two or three screens made of wire or perforated zinc; coarse, medium and fine; the coarse one on top. A piece of wood nailed perpendicularly to the closed end of the box served as a handle so that the digger could stand in front and rock it. The earth and gravel was shoveled into the top screen and one digger rocked while another poured in water. When the screens were full of stones, caught as the water washed the dirt through, they were taken out and the stones emptied onto a sorting table, where the digger with a piece of zinc several inches long and straight on one edge, scraped off the worthless stones, saving those of value. Generally the table was scraped clean. Sometimes a new man would joyfully save some glittering pieces of rock crystal, to learn later from a more experienced neighbor that he had not yet caught the precious diamond. But men soon learned to know at sight the spot of light in the gravelly heap, which betrayed the gem, and the refuse would be scraped away with a rapidity that impressed a new man as improvident and reckless carelessness.

Some diggers used two tubs for washing. A barrel cut in twain served the purpose. The two halves were filled with water. A square sieve was filled with gravel and shaken in the first tub until the dirt and fine gravel was washed out. The stones were then rinsed in the second tub and emptied on the sorting table.

Claims on the river were easier to work because of the nearness of the water. If away from the river, the gravel had to be carted there, though some carried it in buckets or sacks. Either way, the work was hard, and many men who went there with visions of diamonds in every bucketful, tired of it, and left the fields without diamonds or money.

All about the river banks were gravelly shallows between kopjes twenty-five, fifty, and sometimes a hundred feet high, and scattered over all, big stones and bowlders, looking as if at some time the whole section had been under water. The dirt and gravel was picked and shoveled into heaps ready for washing, and sometimes a big stone was found while this was being done.

Notwithstanding the disappointments of many, diamonds were found constantly. Some were fortunate. One might pick and scoop the gravel for weeks and find none, or at best a few small ones. Another working near him might strike a pocketful of them. Occasionally the camp would be electrified by the find of one large enough to make a snug fortune for the lucky finder. Sometimes false reports of big finds were set in motion to prepare the way for the sale of a worthless claim for a price.

So the diggers worked and spread themselves over the country, some keeping close to the rivers, some led off by an unexpected find away from the shores, for diamonds were found at a distance of several miles from the river, left there as the diggers supposed, by waters that had since receded, or by rivers that had changed their channels. The work was hard and for the most part unprofitable; the fare coarse, and the climate somewhat trying. In the summer the thermometer would go to 115° in the shade. In winter there was freezing weather. Shelter was of the roughest. The houses were built of packing boxes and pieces of tin. The pioneers carried with them small tents or "bug-walks" as they called them. Getting there, especially by the ox-wagon route, was the most tiresome part. Barnato said of his journey to Kimberley, that he paid a big price for the privilege of walking beside a wagon by day and sleeping under it at night. But work at the diggings was more dangerous. The hard work, poor shelter, almost entire lack of good drinking water, for the African rivers are all muddy, and there was no water at that time at the dry diggings, and the abundance of troublesome insects, made a combination to which many succumbed.

Meantime diggers were straggling among the kopjes to the South toward the Modder river. About half way between the Vaal and the Modder rivers, one of them discovered a number of small diamonds among a lot of stones the children of a farmer played with. This was in December, 1870, on the Vooruizigt farm. Diamonds had also been found among a lot of pebbles picked up on the Bultfontein farm. Immediately, the diggers began to swarm throughout that neighborhood, prospecting in every direction. They found a number of diamonds sticking in the walls of Farmer Van Wyk's dwelling, which he had plastered with mud from a neighboring pond of his farm Du Toit's Pan. This led to the discovery of the mine so named, which was the first of the four celebrated mines known later as the De Beers Consolidated Mines. The excitement grew, and the influx of men seeking for diamonds aroused the attention of the scattered Boer farmers, who found many of these people a dangerous nuisance. Diamonds were in the thoughts of every one. Even the Boer farmers grew observant. New discoveries would be followed by a "rush" of floating diggers. Disputes arose about claims and boundaries, which the men, upon whose lands the diggers swarmed, were unable to adjust or regulate. So troublesome were the newcomers, that the owners were glad to dispose of their land to escape the difficulties. English capital already had representatives upon the field. The Du Toit's Pan was sold to an English Company for £2,600. The Bultfontein, south and a little west of the Du Toit's Pan, was next discovered. Then the prospecting which had been going on since December, 1870, on the Vooruitzigt farm, resulted in the location of the Old De Beers mine, so named because the farm was owned by a Boer of that name. On July 21, 1871, the old De Beers New Rush on Colesburgh Kopje near by, discovered the last of the great quartette, and these New Rush Diggings as they were called, became the Kimberley mine, and as it proved, the richest mine of the four.

By this time it had come to the understanding of the miners, that these finds back from the rivers, were not occasional scatterings of a few diamonds in an alluvial deposit, but that there were large areas of diamond-bearing earth quite independent of the rivers, and out of the reach of the water-courses.

As the gravel was picked and sieved without the aid of water, they were called "dry diggings." In these places, the miners would handpick the earth they had shoveled, and sieve the balance dry in a square sieve with four handles requiring two men for the operation. The miners also learned that diamonds were always found in a certain kind of yellow earth that lay upon, or very near the surface, and which penetrated the earth to some distance, consequently wherever they found that yellow ground, mining claims were staked and worked over for the diamonds it always contained.

The number of these claims grew, and the number of those who worked them increased, and to them were added a motley collection of natives, until there was a horde of men of every kind and class, engaged in an occupation which stimulated greed, encouraged theft, and attracted rascality from all quarters. Soon, even the unruly found, that not only some kind of law, but a governmental power able to enforce it was necessary. But what government? The mines were in a no-man's land. They were near the undoubted territory of the Orange Free State, but the English were on the spot, and English capital was being invested rapidly in the development of the mines, therefore England became interested. Under these circumstances the appropriation of the territory on the appeal of the miners and the Griqua chief, was but a natural evolution of conditions. It should be remembered also that at the time, neither miners nor capitalists had any idea of the vast reservoirs of diamondiferous earth which lay under what they all supposed were shallow alluvial deposits. Diamond-mining then, was not regarded as a permanent industry which would keep an army busy for many years, unearthing treasures buried so deep that the art and science of the old countries would be stimulated to furnish the necessary equipment. It was a feverish scramble to get quickly fortunes lying around loose, soon to be gathered up by the fortunate. It was the looting of a chest discovered by chance in an out-of-the-way room in a long-forgotten castle.

Whatever justice or injustice there was in the action of the British Government, the Cape Colony police brought order out of chaos, and under the hand of a strong government, the industry was rapidly developed to tremendous proportions.

As in the wet diggings, the claims at Du Toit's Pan and Bultfontein were thirty by thirty English feet in extent. At the De Beers and Kimberley they were thirty by thirty feet Dutch measurement, which equaled about thirty-one by thirty-one English feet. To afford entrance and exit to the inner claims, the authorities, profiting by experience on the three other mines, required that a strip of earth running north and south, fifteen feet wide, be left between every second row, on the Kimberley, to be used as a roadway, thereby taking 7½ feet from each claim. The dividing lines, being in earth which might carry anywhere a stone worth a fortune, were a source of trouble. The claim owner sat at a stake in the roadway which marked the corner of his claim. Ropes and a pulley were attached to this by which the earth was hauled up from the digging. As the workings went down, these roadways became dangerous walls and finally had to be taken down. A system of haulage from all parts of the mine by wire ropes and buckets to the reef was then adopted at all the mines, and they became pandemoniums of creaking cables and swaying buckets. This haulage system was in the hands of a mining board, who assessed the miners for the cost. In the early stages of the open workings the "stuff" was hand picked and sieved dry, but with depth, as the rock became harder, it was found necessary to pulverize and wash it, so that water and facilities for washing had to be provided. An 18-foot main was built to bring water from the Vaal river, and springs in the neighborhood were utilized. These conditions rapidly increased the cost of mining, and tended to eliminate the original digger. Mining was evolved out of digging, and the independent digger, doing much if not all of his own work, was replaced by the small mine owner who superintended the work of hired labor.

To fully understand the situation one must bear in mind always that these mines were squares of the earth lying in a crater enclosed by the reef, as the natural strata of rocks were termed. This reef walled the crater in all around. In the reef were no diamonds, but there were diamonds all through the earth which it enclosed, any pailful of which might contain one of great value, and the squares into which these enclosures were divided, were being dug out to various depths by different owners, so forming a vast hole in the ground, the bottom of which was a mass of deeper holes, hills, and terraces.

In 1876, Kimberley, now a city of thirty-five thousand souls, equipped with all the appliances of civilization, consisted of a few tin huts and Kaffir kraals. It had passed from the honest digger stage into a mining camp. Gambling places, saloons, and the usual dens of a mining camp abounded. In the motley crowd of white men and black men, were representatives of all conditions and races. Theft and illicit trading in diamonds was common. Rumor has since told of fortunes founded on the purchase of diamonds from thieving natives for small prices, by rascally whites who encouraged them to rob their employers. These blacks used every aperture of the body to conceal their spoils. It was a common practice to swallow them, until powerful drugs made that method of concealing them unpopular. White men often obtained from native women, for little or nothing, gems which they in turn had procured from the blacks working in the mines. It was a time of sordid avarice and unrecognized crime. Conditions assisted the criminals. The Orange Free State border was but a short distance off. There was no extradition law. The buyer of stolen diamonds had but to carry them across that line and the Cape Colony authorities were powerless.

This state of things continued until 1881, when the De Beers Company inaugurated a system to cope with it. Up to that time it was estimated that diamonds to the value of one million pounds sterling had been stolen annually. A law against illicit diamond-buying was passed which provided a penalty, on conviction, of eight to fifteen years hard labor on the breakwater at Cape Town. Rogues began to be more cautious. The clumsy ones were caught or driven out of business. Shrewd ones had to resort to extraordinary methods, and use great precaution. It is told of one, that he invited the chief of the detectives to join him in a shooting expedition. The detective carried his diamonds over the line for the man he was watching, concealed in cartridges with which his crafty host had provided him, and which he exchanged for others when the detective found they did not fit his gun. Though the I. D. B. act, as it was called (I. D. B. stands for Illicit Diamond Buying), materially reduced the illicit trading in diamonds, it did not stop it entirely. The natives, who were much more expert thieves than the whites, continued to make the attempt, and though they were often caught, frequently succeeded. White buyers were always ready to take chances and buy. Men well acquainted with the fields, for a long time reckoned that fully five per cent. of the diamonds found, passed out surreptitiously.

As the miners learned of the well-defined lateral limits to the yellow ground which only contained diamonds, and followed it down in the vertical dykes containing it, they began to encounter new difficulties which at the depth they were working, not only menaced their fortunes, but the lives of those working in the mines. The towering walls formed by the dividing roadways of the Kimberley were taken down and gone, but the reef of all the mines began to fall in on the adjoining claims. Men with good paying claims would wake to find that overnight, hundreds of tons of worthless rock and earth had fallen and covered them. Sometimes it covered the miners also. There were mud-rushes and underground currents of water which made havoc. The unfortunate who had insufficient capital to tide over the expense entailed, sometimes were obliged to sell out to men or companies waiting for such opportunities. Some did not have sufficient faith in the continuance of the diamond-bearing material. Not all made fortunes. The number of ownerships on the pipes became smaller; the necessity for united action became greater. Millions were spent in overcoming the difficulties encountered.

By this time, the volcanic origin of the pipes was generally understood, and the miners realized that larger and more expensive methods must be used, for the workings were nearly four hundred feet deep in places. Conditions were fast reaching a point where open-cut working would have to be abandoned. Before this time, a crisis had been reached in which the future of the industry and of the fortunes of those engaged in it were staked upon their judgment, for the end of the yellow ground which had been so prolific in diamonds came. There were generally about fifty or sixty feet of it, after which in some cases came a sort of transitional stratum of a rusty color, sixteen to twenty feet thick, before the "blue," which has been worked ever since, was reached. When the yellow ground came to an end, and the "rusty" earth or the first blue under it yielded few diamonds, many thought the end had come, and that the time had arrived to get out, sell out if possible, and seek new fields. Barnato used to tell of a man who had some good claims on the Kimberley, and who when he got through the yellow and saw the blue, allowed a friend to dump a lot of worthless yellow into his claims so as to cover the bottom. He then sold them for what he could get and cleared out. That man sold his claims for four hundred pounds because he thought the diamond mines were basins, into which the yellow diamond-bearing material had been somehow washed, and that the blue was bed rock. A little later he could not have bought back the claims for forty thousand pounds, for the belief of others that the diamonds came from below, and would also be found either in the blue or below it, had been established.

This idea that the blue was bed rock and that the end of the diamonds had been reached, together with the increasing water charges, caused many men to sell out. Some, if they could not find a purchaser, abandoned their claims lest the charges should eat up all they had previously made. The miners were forced to back their judgment of the mines with their fortunes. If, as was first thought, these mines were huge basins into which at some early period, a great mass of diamond-bearing earth was swept, and the blue ground was the bed rock, then to keep on working and pay the heavy charges being made, meant early ruin; if, on the other hand, the new theory, that the diamonds had been thrown up from the bowels of the earth, and that there were more in the blue or under it, was correct, then fortunes awaited those who held onto the mines. Some had faith and remained, acquiring all the properties they could of those who had no faith and left.

It was soon found that the blue ground was fully as rich in diamonds as the yellow, and was practically inexhaustible. London and Paris heard of it. Tales of fabulous fortunes made in the diamond mines of Africa flew everywhere on the wings of rumor. Thousands itched for a share of the stream of wealth coming out of those ancient volcanoes. Men at the mines were not slow to recognize the opportunity. Here was a mine opening, richer than the mines they already owned; the mine of the stock market, in which the public would take the risks and the miner the lion's share of the profits. Companies were floated, and the stock was greedily taken in the home countries. Barney Barnato floated his first company in 1881. He had saved about £3,000 and bought some claims in 1876 which paid him well. He bought others later and turned them into a company at £25,000 each. The company paid dividends of 9 per cent., quarterly. He claimed to have made £200,000 on the last six claims held by an individual in the Kimberley which he bought for £30,000 each.

The African mines were now on a very safe basis for the promoters. But with a supply of diamonds inexhaustible, a market for them at a price, two-thirds of which ought to be profit, and outside capital to risk in ambitious schemes for enlargement, the stock-company form of gambling, or swindling, had so taken hold of the fields, that many of the mines could not be made to pay the home investors any returns on their investment. It was an ideal time for the growth of millionaires, and they grew. A great many companies were formed on each of the chimneys. A few of them made money by selling out to the De Beers at the time of consolidation, but many of them never paid a dividend, and some of those that did, could only squeeze one out occasionally, by unusually good management. Though some claims had yielded enormous profits to the original diggers, and still did so for the companies into which they were floated, others could not be made to pay after they had been capitalized. Meantime Barnato and his friends spread their fingers over the Kimberley; Rhodes at the De Beers spread nets over the entire Kimberley field, and they bided.

The consolidation of the claims began with the exhaustion of the yellow ground. It was accelerated by the formation of companies, whose promoters often paid big prices for claims which they could turn in at a large profit. Then came the end of the open-cut working. They were all down about four hundred feet, the Bultfontein four hundred and sixty feet in places. The reef began to cave in to such an extent that further profitable working by that method was impossible, and underground working conducted by different interests on the same pipe was impractical. It had been tried on both the De Beers and Kimberley, and was not a success. On the De Beers Mine, the De Beers Company, the Victoria, the Oriental, the Gem, and others tried it, and as Barnato stated at the first annual meeting of the De Beers Consolidated Mines Company, "one company worked against another. If one company was on the 500 foot level and another on the 450 foot level, the opposing companies could eat into each other's boundary walls and pillars to such a dangerous extent that the entire mine was in a condition which threatened collapse at any moment." The same thing happened on the Kimberley mine, between the Central, the French, and the Standard. Consolidation became an absolute necessity for the salvation of the mines. It was doubted if the Dutoitspan and Bultfontein could be made to pay even then by the underground system, as their diamonds at that time were fetching only 6s. to 7s. per load, and the cost of the underground work on the Kimberley and De Beers was then 10s. per load. The policy of Rhodes, therefore, to force an amalgamation of all the mines, and thereby reduce the cost of production by united action, and by control of the diamond output of the world practically, to be able to increase at will the price of their product, under the conditions which existed, changed a threatened collapse into one of the most stupendous successes of the age.

When the amalgamation was finally consummated, the De Beers Consolidated owned the Kimberley, De Beers, Bultfontein, and three-quarters of the Dutoitspan, and of the £200,000 the company paid for leases to other companies, most of it came back, because it owned most of the stock of the properties leased. From 1889, therefore, the De Beers Consolidated Mines Company controlled the diamond industry of the world. It had an inexhaustible supply from which the management could draw whatever quantity it desired, and so placed that it could tell beforehand exactly how much they would cost, and the output was very nearly the world's supply.

Other mines were discovered from time to time, but few of them were sufficiently important to affect the market. If a producer of size appeared, the De Beers were able by purchase of the stock of the company or other methods, to control the output. In 1891, a mine was discovered one mile east of the Dutoitspan on the farm of Mr. J. J. Wessels in the Orange Free State, which proved important. It was at first called the Premier, but later was known as the Wesselton. This mine has never yielded as large a percentage of diamonds to the load as the Kimberley and the De Beers, but the quality is exceptionally fine. It was also brought under the control of the Consolidation and with the Jagersfontein has supplied a majority of the fine white goods of size.

In order to control more perfectly the selling as well as the producing end of the industry, and incidentally to add to the profits they already enjoyed as the largest stockholders in the mines, the De Beers management created out of their number principally, another body known as "The Diamond Syndicate," whose business it was to take over the output of the mines under contract, and market the diamonds. Having control of the diamond output of the world, the next step was to get as much for the diamonds as the world would pay, and it was decided that a company of men, in close touch and largely interested in the mines on the one hand, and equally familiar with the trade on the other, would be better able, by advising the mines what their output should be, to keep the market supplied at advancing prices without endangering the advance by a glut, than the mines could do it by continuing to sell direct at Kimberley. The plan was carried out with remarkable shrewdness and foresight. The contracts with the mines permitted such large dividends to the stockholders that the terms of the contract between the mines and the syndicate were not questioned, and the stockholders were satisfied to receive whatever information the management were willing to give them. The trade and the public were so well manipulated by the syndicate, that every raise in the price of the rough was accepted as the fiat of an irresponsible and supreme authority. Until the beginning of 1908 this syndicate governed the diamond industry of the world, not only fixing the price which buyers should pay, but the quantities they must buy in a parcel. So absolutely did they control the situation that a "sight," as an opportunity to look at the parcels of rough from Africa was termed, came to be regarded as a favor, and buyers almost begged for a chance to buy at the sellers' price and terms. Single purchases must be to the amount of not less than ten thousand pounds, and the terms were simply "cash."

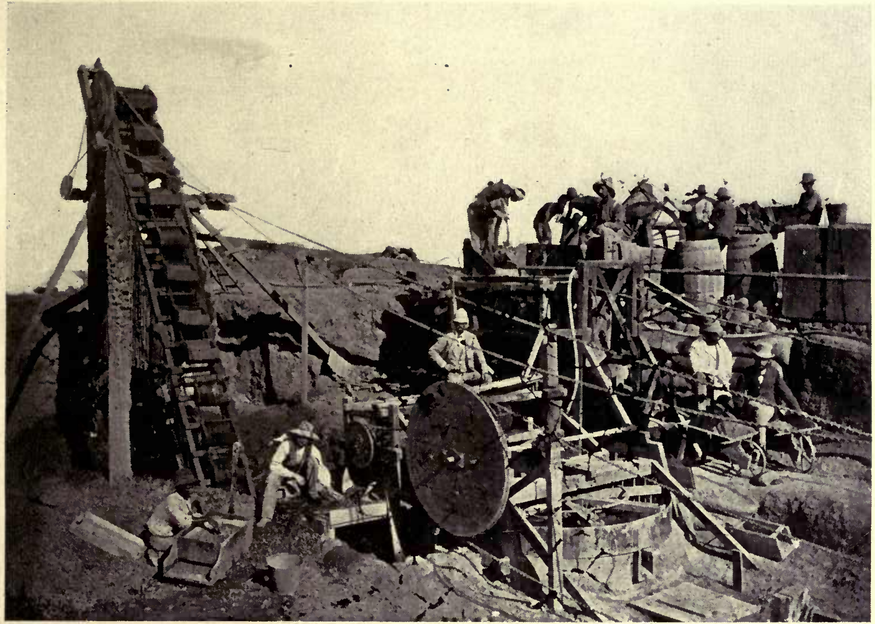
This condition will probably never exist again. There are now many diamond mines in South Africa, and though comparatively few are of sufficient importance to affect singly the decrees of the syndicate, their present output in the aggregate is sufficiently large, and it can be made much larger. Some of them do not produce enough to pay the cost of working; others yield some return on the investment, though the output is too small to make them of material influence as factors in the industry, but some of the new mines are greater than any heretofore discovered, and reports indicate that more of the same character will be opened up in other fields in the near future.

As separate chapters will be devoted to the leading mines, only a review of them as contributory elements of the African fields will be made in this, to give an idea of the extent of the African fields in the past and their condition at the present time. As heretofore explained the term "dry diggings" includes all mines in the volcanic pipes or chimneys, though the diamondiferous earth of the dry diggings is now washed much more thoroughly and systematically than that of the "wet diggings," which term is used to designate diggings in alluvial deposits.

These vertical dykes of diamondiferous material are peculiar to Africa and have revolutionized diamond-mining. Prior to their discovery, diamond-mining was an uncertainty in Africa, as in all other countries where diamonds are found. Diamond-mining was like searching for Indian arrowheads in ploughed fields that were once the camping grounds of the Indians, but with the discovery of the diamond pipes, it became a known quantity, requiring the ablest financiering, the greatest skill in business and science, but abundantly sufficient to pay for the best, and leave an enormous margin of profit. One could reckon for a thousand feet down in the earth, how many loads of material there were in the chimney and how many carats of diamonds in the loads. The cost of mining and washing was known to the fraction of a penny, and the stones were contracted for at a fixed price long before they were dug out of the bowels of the earth. It was no longer an occasional find, but the exact quantity of a known average. It took some years, however, to find this out.

The size and outline of the various pipes differ greatly. The Premier of the Transvaal is nearly eighty acres in extent; some are quite small. The size of the Kimberley mines, when in the early days they were all staked out in claims, was reckoned by the number of claims. There were 470 in the Kimberley; 622 in the De Beers; 1,067 in the Bultfontein and 1,441 in the Dutoitspan. A rule in force in the Kimberley mines in the early days, similar to one adopted at the wet diggings, required the digger to work his claim uninterruptedly. If he failed to do so in eight days, the claim could be jumped. This was enforced for about two years. Before the process of amalgamation set in, there was a period during which the tendency was quite the reverse. Owners of claims sold parts of them, and there were many owners of halves, quarters, and down to one-sixteenth of a full claim. In 1874 there were about 1,600 owners on the Kimberley. From its discovery it had a stronger attraction for the diggers than either of the other mines.

Although the crude methods in use during the early days allowed many stones of fair size and nearly all the very small ones, to escape with the tailings, enormous profits were made out of some of the claims. Barnato claimed that he made £1,800 per week out of the claims he owned in the Kimberley in the seventies.



WASHING-GEAR, KIMBERLEY—EARLY DAYS

CHAPTER XII

DIAMOND MINES OF SOUTH AFRICA — CONTINUED

FROM the discovery of diamonds in Africa until 1884, there are no records by which one may know with certainty what the production was, either in weight or in value. The probability is that up to and including 1873, it was not over one million carats. From 1874 to 1883, however, there was a very large increase. The output ranged probably from a million carats in 1874 to something over two million carats in 1883 and possibly three million carats each for the years 1881 and 1882. From 1884, official records were kept of the exports from Cape Town to London. These show an average of close on to three million carats per annum for the twenty years including 1903, at an average yearly value of nearly twenty-six and three-quarter millions of dollars, the average value per carat being lowest in 1888 at $5.095 and highest in 1902 at $9.922.

Large percentages in the yield of diamonds were reported in the early days, of the Kimberley mine especially, and undoubtedly there were very rich streaks and spots in the mine then as now, but it seems probable that those reports give an exaggerated idea of the average yield of the entire mine. If some claims proved rich, others were very poor, and before the mines came under one management, it was probably the rich ones that were reported. There were also persistent rumors that some extraordinary rich yields reported in the early days, covered additions by purchase of stones from undisclosed sources. It is generally acknowledged that the volume of illicit trading was very large, and it is equally certain that the most successful traders escaped detection. As such transactions could be concealed in no other way so readily, nor the purchases be disposed of so easily, the presumption is that among so many, some of the claim owners took advantage of the situation. There has been an apparent decrease in the yield per load of most of the mines as they have been carried deeper. The De Beers and Kimberley have steadily declined from over one carat per load in 1888 to .80 of a carat in 1898 and .37 in 1908. The Dutoitspan, which from the beginning gave a small average yield, has nevertheless held very steady, dropping by one hundredth of a carat only in the yearly average from .26 in 1905 to .23 in 1908. When first reopened in 1904 the yield was only .12. The yield of the Wesselton also has been very uniform, being the same in 1908 as it was in 1898, i. e., .27 of a carat per load. In the interim it has never been less than .28, and in 1907 it was .32. The Bultfontein shows an increase from 1902, when the yield was .21 of a carat, to .41 in 1905, since which it dropped again to .32 for 1908. The increase of the first four years after the consolidation began to operate it, is accounted for by the fact that there was an accumulation of poor material which was first cleaned up. The Koffyfontein runs even: .473 in 1906 and .476 in 1907.

Of the open-cut mines, the Premier of the Transvaal shows the greatest decline in average yield. In the beginning, like the Kimberley, it was very rich, running at times over two carats to the load; it is now about .30 of a carat. The Roberts-Victor also, which opened up with a yield of .91 in May, 1906, dropped to an average of .536 for the year 1907. Part of this apparent deterioration is undoubtedly due to the fact that when a mine is opened, especially if the entire chimney is under one management, the most promising spots are worked first, whereas when the mining is deeper, not only must the entire area be worked, but the left-over part of the higher levels have to be taken down and included. The showing of the Premier and the Roberts-Victor illustrates the probable conditions of the Kimberley when it was first opened, but which did not appear, because there was no exact report of entire results, but uncertain returns from some of the many owners of parts of the chimney. It will be noticed that most of the mines eventually settle down to a yield of from one-quarter to one-half of a carat per load, especially after the open cut is abandoned and underground working begins, when there is not the same opportunity to make selections, but good and bad sections are worked together.

A number of true pipes have been discovered. In the eighties already, some fifteen were known in the Kimberley district and the Orange Free State. Many of them, however, yielded but little, and are comparatively unknown. There are several other mines in addition to the five mines of the De Beers Consolidation, in the Kimberley section. The Peizer, the New Weltevrede and the Frank Smith, north-west of Kimberley. In the Orange River Colony are the Jagersfontein, Lace, Koffyfontein, Monastery, Kaalvallei, New Driekopjes, New Randfontein Reef, Voorspoed and Roberts-Victor. The Elandsdrift Diamond Mining Company and a smaller company, are on a large pipe in the heart of the Vaal River diamond country. Near Pretoria in the Transvaal are the Premier, Schuller, Kaalfontein, Montrose and Beynespoort. Of all these, the most important are the Jagersfontein, Premier, Roberts-Victor and Voorspoed. The output for these four mines for 1907 being:

	Carats.	
Premier	1,889,986¾	
Jagersfontein	219,275	
Roberts-Victor	132,809	
Voorspoed	46,340	(for six months)

An idea of the enormous quantity of diamonds taken from the chief producers on the diamond pipes of Africa during the last ten years may be obtained from the following table:

1898	De Beers group................	2,792,606 cts.	
	Jagersfontein	232,433	3,025,039
1899	De Beers group.................	2,932,228	
	Jagersfontein	288,937	
	Koffyfontein	40,170	3,261,135
1900	De Beers group................	1,221,726	
	Jagersfontein	183,399	
	Koffyfontein	30,564	1,435,689
1901	De Beers group.................	2,498,496	
	Jagersfontein	18,002	
	Koffyfontein	16,847	2,532,955
1902	De Beers group.................	2,631,189	
	Lace	16,562	
	Koffyfontein	2,442	2,650,193
1903	De Beers group.................	2,527,035	
	Jagersfontein	29,302	
	Lace	38,899	

1903	Koffyfontein	16,738 cts.	
	Premier	93,203¼	2,705,177¼
1904	De Beers group.................	2,456,050	
	Jagersfontein	167,593	
	Kamfersdam	27,467	
	Koffyfontein	22,384	
	Lace	20,029	
	Frank Smith	7,465	
	Premier	749,653½	3,450,641½
1905	De Beers group.................	2,310,376	
	Jagersfontein	266,225	
	Kamfersdam	39,562	
	Koffyfontein	18,190	
	Frank Smith	15,458	
	Lace	2,905	
	Premier	845,652	3,498,368
1906	De Beers group.................	2,215,394	
	Jagersfontein	255,841	
	Kamfersdam	42,041	
	Koffyfontein	33,340	
	Lace	27,992	
	Roberts-Victor	20,406	
	Premier	899,746	3,508,210
1907	De Beers group.................	2,619,870	
	Jagersfontein	219,275	
	Roberts-Victor	132,809	
	Voorspoed (6 mo.)	46,340	
	Lace	41,418	
	Koffyfontein	31,604	
	Kamfersdam	21,715	
	Premier	1,889,986¾	5,003,017¾

A total of nearly thirty-one million carats, to which may be added, in order to make a fair estimate of the entire production of South Africa in the ten years, five per cent. for thefts and the product of the alluvial deposits and other sources; a grand total of thirty-two and a half million carats. At the same time (1907), the De Beers group alone had in sight above the lower levels of the mines and on the floors, 57,409,013 loads of blue, which at present average yield would represent in round figures over seventeen million carats more. Reckoning the value of the output for the ten years upon a basis of the average price realized by the De Beers group, during that time, South African diamonds must have realized over seventy-eight million pounds sterling.

Even these stupendous figures do not give an adequate idea of the reservoir of diamonds which exists in Africa. How deep these diamond chimneys now being worked, go, is still unknown, and reports are constantly coming in of new pipes discovered, and of large fields of alluvial deposits which indicate the existence of other pipes yet undiscovered. The source of the Vaal river diamonds cannot be from the Kimberley mines, as a ridge intervenes. The drainage also of the Wesselton, Bultfontein, and Dutoitspan is in another direction. The stones also differ in appearance. It would appear, therefore, that the source of the river diamonds has not yet been discovered. The chairman, at a general meeting of the Option Syndicate, held in London lately, said that Mr. Nichols, an engineer sent expressly to Rhodesia to prospect that territory, proved by numerous borings the existence of deposits greater in area than the De Beers and Premier. Diamond-mining is increasing in German Southwest Africa, and the indications are, after making full allowance for the hopefulness of prospectors and the imagination of promoters, that the immense territory of Griqualand, Orange River Colony, the Transvaal, Rhodesia and contiguous land, is honeycombed with diamondiferous chimneys, with many miles of alluvial deposits lying between them.

The following illustrates the changes which have occurred in the method of diamond-mining in South Africa in the last thirty years. Up till 1877, one person could have but two claims in the Kimberley unless he was the discoverer of a mine, in which case he was entitled to hold two in addition to his discovery. In the beginning of 1909 the De Beers Consolidated Mines Company practically own and control the De Beers, Kimberley, Bultfontein, Dutoitspan, Wesselton and Jagersfontein mines entire. In the seventies there were about sixteen hundred individual owners of the Kimberley, the smallest chimney of the Kimberley group. The New Premier of the Transvaal, more than four times as large as the whole Kimberley mine, and equipped now to turn out three to four million carats per annum, was opened up and is owned by a single company capitalized at eighty thousand pounds. A digger in the Kimberley could take up his choice of the free claims, by paying a tax of ten shillings a week; the De Beers Consolidated Mines Company paid in 1908 a tax on the profits of 1907 to the Cape Colony amounting to £302,-174.

Looking backward, one realizes that the change from separate ownerships to the united control or single management of an entire chimney was inevitable. When with increasing depth the reef began to fall in, covering up claims sometimes with millions of cubic feet of worthless material which must be taken out at enormous expense before any further returns could be had from the buried claims, the miners found that some united action was necessary to insure themselves against disasters which threatened all, and would be ruinous to those who chanced to be the unfortunate ones. The Kimberley Mining Board was therefore established in 1874, to remedy all mishaps, and assess the cost upon all the owners pro rata. Thereafter each one was obliged to pay his share of these expenditures for the common interests, or sell his claims. This resulted in the sale of many claims, usually to companies who were in a better financial position to pay these big charges and wait for the profits which would accrue later. And as these companies acquired more claims, if one was covered by fallen reef, they had others from which they could be drawing money to offset the charges made upon them, whereas if a man's single claim were buried, his income with which to pay charges was buried with it.

The consolidation of the mines was therefore a result of the force of circumstances, for which shrewd men on the fields, who foresaw what the trend of things must lead to, prepared themselves financially, both by husbanding their own resources, and also by establishing connections with men of large capital. This was done in a smaller way in the Kimberley by Barney Barnato, simply as a money-making affair, and on a larger scale by Cecil J. Rhodes when he forced an amalgamation of all the Kimberley mines.

Some idea of the extent and power of the De Beers Consolidated Mines Company may be had from the statement of Mr. Gardner J. Williams, the former manager, that it occupies 200,000 acres, employs 15,000 natives and 2,500 white men; (in 1906 the five mines employed nearly 24,000 natives, but owing to the 1907 panic in the United States, the number of employees had been reduced by the end of 1908 to 12,278), consumed monthly in the compounds 250,000 lbs. of mutton, 200,000 lbs. of beef; uses 6,000 tons of coal a day; has 2,000 horses and mules, and keeps 12 stallions of the best breeds and 200 brood mares, and this in a country that a little over thirty years ago was over four hundred miles from the nearest railroad and port, and was obliged to transport most of the necessities through an undeveloped country by ox or mule wagons. At that time coal cost at the diggings eighty dollars per ton; wood, one dollar and seventy-five cents per one hundred lbs.; eggs were seventy-five cents a dozen. The first machinery used cost fabulous prices. A hundred horse-power engine cost forty thousand dollars delivered in Kimberley. Transportation from Port Elizabeth or Cape Town ranged from two dollars and fifty cents to seven dollars and fifty cents per hundred pounds. Wages were also very high. White men in the mines got from twenty to forty dollars per week; natives five to eight dollars. In the seventies, as the companies being floated sought to acquire properties, the price of claims soared until some of them brought as high as fifty, seventy-five thousand dollars, and even one hundred and fifty thousand dollars each.

Washing machines were first used in 1874 and notwithstanding the great cost, more machines were introduced from year to year, as they were found to earn many times the cost, in the saving of labor and the increase of yield and production.

After the railroads from Cape Town and Port Elizabeth were brought into Kimberley in 1885, prices fell. English coal could then be had for forty dollars per ton; wood for fifty cents per hundred pounds. Freight rates dropped to about $1.50 to $2.00 per hundred lbs. Wages fell. At present, they range in all the mines, from fifteen to twenty-five dollars per month and lodging for natives, and sixty to one hundred dollars per month for whites in the mines and prospecting.

All the diamond chimneys of South Africa contain the same kind of rock, now called kimberlite, and wherever that rock is found it contains more or less diamonds. The hardness of it varies in different mines, but it usually grows harder with depth. For this reason open-cut workings have an additional advantage in cost over those operated on the underground system. In the underground workings, shafts are sunk in the reef about two or three hundred feet from the chimney, and tunnels cut from them into the kimberlite, which is run out on cars and hoisted to the surface. Taken from these low levels the rock is hard and not fit for the washers. It is therefore spread out on "floors"; large level stretches of ground, and exposed to the weather. The rain and sun disintegrate the rock and make it friable. Six to twelve months are usually given to this operation, though it is sometimes hastened by sprinkling and harrowing. Near the surface, the rock is softer and does not require any exposure. An open-cut mine saves this expense. The New Premier runs its diamondiferous material, which is unusually friable, direct from the mine to the washers, and as it is very much greater in extent than any other, it will have this advantage over the older mines for some time to come. While they are constantly increasing the depth and consequent cost of working, the Premier will simply spread itself over a greater area of workings, in material that will not require the cost of spreading, nor the loss of time in weathering.

Though the kimberlite of all the mines is the same, the diamonds from the various chimneys are so characterized by differences, that men acquainted with the mines can usually tell from which mine a parcel of crystals comes. Some have claimed that there are those who can designate not only the mine but the part of the mine from which any crystal submitted to them, was taken, but this is an exaggeration, for though the stones from the different mines are generally characterized by certain peculiarities, all kinds of stones are taken from all mines. The Kimberley, though rich in diamonds, has been distinguished by generally poor quality. This mine has furnished a much larger percentage of bort than the other mines of that district. Great quantities of fragments of crystals, smoky stones and yellow stones, have been found in it and the different kinds were quite constant in particular sections of the mine. It is noticeable that the part of the mine which lies in the direction of the Dutoitspan, carries a similar class of crystals.

In the De Beers, one finds all kinds and colors, but the surface of the natural facets are finely granulated, and have a somewhat greasy luster similar to the luster of many of the cut Premiers. As in the Kimberley, fragments are abundant, but there is less bort and the crystals run larger and have more color (yellow) than those of the Kimberley.

The diamonds of the Bultfontein are mostly small, white, flawy octahedrons.

The Dutoitspan diamonds show more color than any, many of them being sufficiently deep and fine to be classed as fancies. Large and also very small stones are found, and the crystallization is usually very good.

The Wesselton crystals are noted for their perfect octahedra and purity. The color and brilliancy are so superior that very fine white diamonds similar to river goods are now quoted as Wesselton. The average yield of the mine does not however command as good a price as that of several others.

The kimberlite of the Jagersfontein mine is free from pyrites, and to that is attributed the remarkable purity of color for which the stones of this mine are celebrated. They are very brilliant and the color inclines to blue. For this reason, "Jagers" command the highest price of any South African diamonds, except blue rivers and some of the fancies of the Dutoitspan. In common with all stones of this character, they are very subject to bad flaws and what are termed carbon spots. The percentage of flawy stones is so great that the average price of rough from this mine is less than that of several others.

A large percentage of the diamonds of the New Premier of the Transvaal is bort. Of those suitable for gem purposes, many are characterized by an oily luster similar to that of the zircon. The color inclines to blue, often of a very deep tint, but it is frequently a false color, that is, tints of other colors show in some lights. An unusual number of very large stones has been found in this mine, some of them of extremely fine color and purity.

The Voorspoed promises to be a large producer of low grade diamonds. The Roberts Victor on the contrary yields a good average of white fine material. The diamonds of one mine, the Leicester, differ from those of any other. The crystals are cross-grained and have a frosted, etched appearance. They are difficult to cut. These marked variations between the diamonds of different mines suggest not only a difference in the forces causing the crystallization, but the presence in some cases of elements in varying degrees and conditions, which were absent in others during the process of crystallization.

Following the methods of India and Brazil, it is customary in Africa to encourage diligence and honesty among the workers in the mines by a system of rewards. If a white miner finds a diamond in the blue while it is yet in the mine, and reports it to the manager, he is credited with three shillings per carat, a native gets six pence per carat. If the stone is found on the floors, the reward is one-half as much. The I. D. B. act, which did not permit a native to have a diamond in his possession, and obliged a suspected white man to prove his right to possess any he might have, if it did not encourage honesty, did much to discourage dishonesty. Some of the natives, however, are such inveterate thieves, that cases have been known where, with little chance of getting away with them, they have swallowed so many that death resulted. It is reported that sixty carats of diamonds were taken from the body of one who died under suspicion. The compound system inaugurated by the De Beers Consolidated Mines Company is the greatest preventive. The natives are obliged to sign a three months' contract, during which period they must remain in an enclosure on the company's premises. This is a large square of about twenty acres, surrounded by rows of one story buildings of corrugated iron, divided into rooms, each holding about twenty natives. Every provision is made for their health and well being. There are stores which sell the necessaries of life at reduced prices. Wood and water are supplied free of charge. There is also a hospital with medical attention, nurses and food, free. There is a large swimming bath in the enclosure, also a space for games, dances, concerts, or any amusement the natives may desire. Some of them save their wages, giving it to the superintendent to keep for them, quite content if he will show them the money when they ask to see it. Many of them renew their contracts again and again without leaving the compound; some of the married men do the same, sending money to their wives from time to time. Before leaving the compound they are subjected to a rigorous bodily examination, and held sufficiently long to make swallowing diamonds useless. Men of the various tribes represented keep to themselves. There are some of almost every tribe, Kaffirs, Hottentots, Zulus, Griquas, Fingus, Basutos, Matabilis, Bechuanas, Swazis, Koranas and others.

The prices obtained for Cape rough diamonds up till the time when the De Beers Consolidation was formed, cannot be definitely stated. Prior to that the market was open, assortments were not nearly as close as later, and ideas of value from former conditions yet prevailed. India and Brazil produced few stones of great size, therefore large stones brought a big advance per carat over those of ordinary size. This idea of relative value influenced prices for some years, until the abundance of large stones found in the African mines forced a readjustment of the comparative values of sizes. Though there is no evidence that the method of reckoning the value of diamonds by the square of the weight at a base price ever existed except as a trade fable furnished to writers, large stones did command very large prices from the public, and much more proportionately than now, from the trade. But definite prices for any size or color did not exist until the De Beers Consolidation. Competition, a variable demand, and many men new to the industry, both at the producing and selling ends, conspired to make many irregularities and constant variations in price. Nor was the rough as closely assorted as it has been since the Diamond Syndicate undertook to market the product of the mines. In these days a parcel of rough will cut very close to what it is sold for; in the early days of the Kimberley there was often a wide range of color and perfection in a lot. The average price received by the various producing mines of the De Beers consolidation up to and including 1907 are as follows:

	De. B. & K.	Wesselton	Jagersfontein	Bultfontein	Dutoitspan
1889	25s.				
1898	26s. 6.2 d.	20s. 9.3 d.	33s. 3.1 d.		
1899	29s. 7.2 d.	22s. 10.1 d.	33s. 6.3 d.		
1900	35s. 10.2 d.	25s. 0.2 d.	40s. 9.1 d.		
1901	39s. 7 d.	27s. 3.7 d.	41s. 2.3 d.		
1902	46s. 5.7 d.	33s. 5.9 d.		30s. 4.7 d.	
1903	48s. 6.3 d.	34s. 4. d	54s. 2.6 d.	30s. 10.2 d.	
1904	48s. 11.8 d.	34s. 10.4 d.	66s. 3.7 d.	29s. 7.7 d.	
1905	52s. 10 d.	36s. 11.1 d.	61s. 5.9 d.	34s. 11.18d.	69s. 11d.
1906	61s. 0.11d.	43s. 9.26d.	63s. 4.3 d.	42s. 11.49d.	80s. 11d.
1907	64s. 9 d.	41s. 1.3 d.	71s. 6.69d.	43s. 6.34d.	79s. 6 d.

The average of some of the independent mines is said to be as follows:

	Premier	Roberts-Victor	Lace	Voorspoed
1905	23s. 6.3d.	75s.	40s.	
1906	28s. 10.7d.	65s to 75s.		
1907	18s. 0.2d.			30s.
1908	14s. 9.4d.			

The prices are the average for the output of the mines, and cover a wide range of prices for the various qualities. They are also the prices paid to the mines by the Diamond Syndicate, as there was little selling independent of the Syndicate until 1908. Nor do these prices give a clear idea of the value of the mines as producers, because that depends largely on the yield per load and the cost of mining. Mr. G. A. Hay, presiding officer at a meeting of the Roberts-Victor Company early in 1907, gave the value of diamonds in the blue of various mines per 100 loads as follows:

Roberts-Victor	£260
De Beers & Kimberley	123
Dutoitspan	99
Bultfontein	77
Premier	45
Jagersfontein	38
Voorspoed	26
Lace	24

It will be noticed that the Jagersfontein, which produces the finest diamonds of any, yields a money value per load of blue much less than the De Beers and Kimberley, which give a much poorer grade of diamonds, and only about one-seventh of the new Roberts-Victor, which yields a large percentage and good quality both. It is doubtful, however, if this difference will long exist, as the average yield of the Roberts-Victor has fallen fast; nevertheless, like other new mines, it can be worked at much less cost than the older ones. This mine from

May, 1906, when it was opened, to the end of December, showed a profit, after paying all the expense of prospecting, developing, mining operations and registration, of £39,045 from 20,406 carats found.

One of the most important processes in winning diamonds from the matrix is the weathering. The "blue" of nearly all dry diggings is refractory. It is about as hard as sandstone. It was found, however, that exposure to the weather crumbled it so that it could be washed without further preparation. Level pieces of ground hardened by heavy rollers were enclosed convenient to the mines, tracks laid, and the blue as it was taken out of the mine, was loaded on cars and carried to these depositing floors or "Floors" as they are called, where it was spread and left exposed to the weather. According to the nature of the blue, which varies in hardness, it takes from two to twelve months to make it sufficiently friable for the washers. An abundance of rain with hot sunny days intervening, hastens the process, and if rains fail, the miners sometimes water and harrow it. That there may be no interruption to the work of the washers, it is customary to keep sufficient blue on the floors at all times for two seasons' work. If the work of mining were at any time suspended, a mine could nevertheless turn out a full year's supply of diamonds, after the mine was shut down. In 1906 the De Beers mines had 8,300,000 loads on the floors.

When the blue is sufficiently weathered, it is put on trucks and taken to the washing machines, where it is agitated with water, and forced through a series of revolving cylinders perforated with holes one inch in diameter. Lumps which resist the process are returned to the floors or sent to the crushing rollers. The gravel which is left from the washing is worth about £150 per load. A load of the blue as it went in would be worth about 30s. The gravel is then sent to the pulsators: steel sieves with holes from one-sixteenth to five-eighths of an inch in diameter, which separate the sizes. The small sizes are conveyed to a washing pan and the larger ones to revolving picking tables, where the large diamonds are taken out. All the remaining stones then go to the grease-shaking tables. In 1897 an employee of the De Beers named Fred Kirsten noticed that of all the minerals contained in the blue, only diamonds would adhere to grease. This resulted in a machine which not only separates the diamonds mechanically much more rapidly than it could be done by hand, but surely secures all that are present, however small they may be, and prevents opportunity for theft. It consists of a series of sloping corrugated iron tables which are coated with grease and shaken by percussion as the gravel goes over them. Everything but the diamonds passes on, they alone adhere to the grease. The tables are then cleaned, and the process repeated. It is said the grease, after being used awhile, loses its power over the diamonds, but regains it after being melted. The crystals are then cleaned in a mixture of acids, assorted, weighed, registered, and added to the stock in readiness for shipment. As a precaution, the grease tables are arranged in series, though a diamond seldom escapes the first table; about one-third of one per cent. only. It is said none ever yet got past the second.

Perhaps nothing illustrates more strikingly the potency of conditions in the United States, than the effect of the panic here in November, 1907, upon the diamond mines of South Africa. The De Beers closed down a large part of their works in 1908; reduced their expenses £100,000 per month; to avoid the British income tax, turned their London headquarters into an office for the transfer of shares only, transferring their headquarters to Kimberley, and borrowed a million pounds on the security of their investments. It paid the Cape Colony £302,174 as a tax on its profits for 1907, and estimated the tax for 1908, including the British income tax to April 1, at £110,683 only. The Jagersfontein reported sales to March 31, 1908, at 53s. 1d. as against 71s. formerly. Premier goods dropped from 18s. per carat to 14s., and the big Transvaal mine cut down its production some thirty thousand loads monthly. The Diamond Syndicate did not renew its arrangement with the Premier to market the diamonds of that mine, nor did it exercise its option with the Consolidated Mines on December 21, 1907, thereby terminating its contract, and it is claimed on good authority, that contrary to the policy steadily maintained heretofore, of holding the market price of diamonds, it made sales during 1908 at a cut on 1907 prices. According to the *Frankfurter Zeitung,* the De Beers Consolidated made sales to the Syndicate early in the fall of 1908 at a 25 per cent. reduction.

Among the valuable items of information gathered by experience in the mines is one relating to timber. It has been found that California redwood outlasts any other wood used. Redwood sleepers after being ten years in the ground proved to be as sound as when first put in, whereas those of Oregon pine, Puget Sound cedar, African yellow wood, and Baltic deals, were decayed and had to be replaced.

Compared with the yield of the dry diggings, that of the wet diggings are and have been since the first discovery of the chimneys, inconsiderable, nevertheless they are worked to-day as they have been from the first. It does not require much capital to search for diamonds along the rivers, and there is a fascination about its uncertain results which holds many men to the work, and constantly draws recruits. The diamonds are usually of finer quality than those found in the chimneys, and sufficient large ones are found to excite expectation among those who haunt the river diggings. In October, 1907, a man named Harrison found one weighing 31¾ carats, at Klipdam in the Vaal river fields. Three weeks later he found another which weighed 220½ carats. This he sold for £2,420, and it is reported that it is worth more. A number of large stones have been found in these river diggings, among them, the Star of South Africa, of the finest quality, weighing 83½ carats, at Klipdrift, and the Stewart, which weighed 288⅜ carats, at Waldeck's Plant, both on the Vaal river. Diamonds have been found in wet diggings along the Vaal, Vet, Modder and Orange rivers. On the Vaal the diggings extend over a distance of about 200 miles as the river winds, from the junction of the Vaal with the Orange river, to Bloemhof in the Transvaal. Some of the principal points are Waldeck's Plant, Delport's Hope at the junction of the Vaal and Hart rivers, Good Hope, Barkly West, Pniel, Klipdam, Wedburg, Fourteen Streams, and from Hebron to Bloemhof and

Christiana. There are a few companies, but a majority of the miners are independent diggers. The work is done by Kaffirs, and the white men oversee them.

The terraces and river gravels vary in depth from a few inches to 40 or 50 feet. In Smith's Gully at Waldeck's Plant, the diamondiferous material was found, on reopening it after the Boer war, to be 75 feet deep. In some cases these deposits extend laterally three or four miles from the river, and in places there appears to have been more than one period of sedimentation; the pebbles in the last have a matrix of stiff siliceous clay. In the gravels are large greenstone bowlders filled between with sand and pebbles, the whole resting on a floor of amygdaloidal greenstone. The pebbles are principally siliceous; jasper, chalcedony, agate, and with them, greenstone, ironstone, ilmenite, garnet, topaz and diamond. The diamonds are usually dodecahedral crystals, free from flaws. All colors are found, though a yellowish tint predominates. Mr. T. E. Coe says that the deep places are the result of a period of great erosion, as the steep channels were worn through hard diabase and were filled with sand, pebbles, and bowlders much rolled and smooth. In some cases this deposit was overlain with red sand, the "rooi-grond" of the early Dutch digger. The bed rock of these deep places consists of Karoo shale on a bed of amygdaloidal diabase. The diamonds are not distributed uniformly through the deposit, but are found in "bantam" layers; beds of smooth pebbles of moderate size.

The Zaud deposit near the Wedburg placers has an unusually thick layer of the surface sand in which most of the early wet diggings was done. Now, where open working is not practicable, shafts are sunk to the lower layers of gravel, which are richest in diamonds, and it is taken out by tunneling.

From the nature of it, the yield of an alluvial deposit is uncertain and irregular. Mr. T. E. Coe stated that 116 carats of diamonds were taken at the Zaud Kopje in the first two months of 1903, from 1,340 loads of gravel. This would equal only 0.087 of a carat per load, but they sold for 94s. 6d. per carat. The alluvial diamonds of the Transvaal in 1898 amounted to 12,283 carats, and brought £35,228, or a fraction over 57s. 4d. per carat. The diggings at Christiana on the Vaal in the Transvaal in 1907, yielded 2,562 carats and sold for £13,579, or 106s. per carat. The output of the Vaal river diggings for 1905 is given as 81,749½ carats, at an average value of 77s. 7d., and for 1906 as 101,-607¼ carats at 77s. 3d. The alluvial diggings of the Orange River Colony for 1907 yielded 7,102 carats valued at £36,895, or 103s. 8d. per carat.

It is doubtful if all the wet diggings of Africa have exceeded an average of 100,000 carats per annum since the discovery of the Kimberley pipes. The diamonds, however, have probably brought an average of fifty per cent. more than the average for the dry diggings.

The territory in which diamondiferous deposits and chimneys in Africa are known to exist, is spreading constantly. Alluvial deposits containing diamonds have been found east as far as longitude 28° E. in the Orange River Colony and the Transvaal; west to German South West Africa; north to the watershed of the Limpopo and Zambesi rivers in Matabeleland at about 19° S., and south to about 31° S. in the Orange River Colony.

Numerous diamond-bearing pipes have been discovered, and though many of them do not contain sufficient diamonds to pay the cost of working, they indicate that volcanic dykes of that character are not uncommon, and are not confined to a narrow limit. From the Jagersfontein mine near Fauresmith in the Orange River Colony, to fifteen miles north of Kimberley, a range of over 100 miles, there are quite a number of pipes. In the Pretoria district of the Transvaal also, and the Kroonstad district in the Orange River Colony, there are clusters of them, and the character of the crystals found in the deposits along the Orange, Riet, Hart, Vaal and Modder rivers, together with the enormous alluvial deposits lately discovered in Rhodesia, indicate that other great diamondiferous chimneys exist elsewhere, probably at a considerable distance from any known at present. In 1906 Rhodesia exported diamonds valued at £25,469.

Rhodesia, a name given in honor of Cecil J. Rhodes, comprises Matabeleland and Mashonaland, two well-watered districts which will undoubtedly prove ere long to be not only most favorable for colonization by white men, but very productive also agriculturally, and rich in minerals. The territory is governed at present by the Chartered British South African Company, from whom the South African Option Syndicate, formed in 1902, have secured an option granting discoverers' rights to locate 200 square miles to work for precious stones. This section, which the latter company is prospecting, lies along the Buluwayo and Gwelo R. R. In the Somabula forest, about 12 or 14 miles east from Gwelo, the company's prospectors have discovered a diamondiferous area of about 45 square miles, over which there is an alluvial deposit ranging from a few feet to 25 feet in depth. The company controls 65 square miles. They reported in the early part of 1906, that in 30 days they recovered from the rotaries over a surface 56 yards long, some diamonds, 3,320 carats of chrysoberyl, sapphire and ruby, and other precious stones which brought the total up to 7,470 carats, at the rate of 2.14 carats to the load. In the autumn of 1907 they reported 4,000 carats of diamonds and 44,000 carats of other gems won up to that time. The deposit is located in an open valley, about 6,000 by 3,000 feet, between ridges in the Somabula forest, and is watered by the Somabula river. At the head of the valley lies the great watershed of the Zambesi and Limpopo rivers. As the district has an elevation of about 4,000 feet, it seems probable that the source of the deposit exists somewhere in the neighborhood, in large diamondiferous chimneys similar to those of Griqualand West, the Orange River Colony, and the Transvaal.

The gravel contains enstatite, olivine, ilmenite, burnt-garnets and mica, garnets, chrysoberyl, sapphires, rubies, amethysts, jasper, iron conglomerite, and diamonds. The presence of some of the softer stones suggests that the source from which the deposit came is not far distant. It is probable that diamonds will be found north also, in Mashonaland, for Keane says in "Africa" (Vol. II, South Africa): "In 1894 a survey of the Labangwe affluent of the Zambesi gave indications of diamond-bearing ground." The Somabula alluvial is now practically deserted, as diamond pipes have been discovered lately at Bambesi and are being developed.

The largest, named the Colossus, is claimed to be larger than any other known.

A claim of contract between the Chartered Company and the De Beers Consolidated Mines Company made by the latter company, operated until now against a vigorous prosecution of work in the Rhodesian district. It was fought in the courts and decided in the Chancery division of the High Court, February 10, 1910, against the De Beers Company.

That the De Beers Consolidated Mines Company consider the control of these fields a matter of vital importance, is shown by the fact that they have since decided to take the case to the House of Lords, though the Court of First Instance and the Court of Appeal both decided in favor of the Chartered Company, and the feeling of the settlers of Rhodesia is strongly against the Cape Colony Company. This action of the De Beers, however, prevents immediate development, and in the meantime they have unloaded more diamonds on the United States during the last year than in any year previous.

Diamonds have been discovered in considerable quantities lately in German South West Africa near the coast at Lüderitz Bay, formerly Angra Pequena Bay, longitude 16° E, and latitude 26° S. The fields are located near the town of Lüderitzbucht. A syndicate headed by Senator Achelis was formed in Bremen as far back as December, 1902, to search for diamonds in this colony. The German Colonial Company now holds the mining rights over a territory having 300 miles of coast line and extending 60 miles back. The Calanan's Kop Diamond Company and the Staunch Company, each have a fifty year lease of about 15 square miles on the diamondiferous deposit, and another company, the Weiss de Meillon Company, have one on a tract of three or four square miles. It is reported that the district is producing 12,000 to 15,000 carats monthly. The quality and color of the stones are good, but the crystals are small and cut to a fine grade about 1/8 of a carat.

The diamonds occur in a deposit of sand and gravel said to range from six to twelve feet in depth and traceable in one place, a quarter of a mile wide, for 17 miles. The gravel is sieved as in other wet diggings, and the water for washing is obtained either by pumping from the sea or by digging shallow pits, into which sufficient water for the purpose collects.

In January, 1909, the Emperor William issued a rescript establishing a government monopoly of the trade in all diamonds found in the Colony. All the stones found must be turned over to the representative of the government, who will sell them and after deducting expenses and a tax which, together amount to about one-third of their value, will turn over the remainder of the proceeds to the owner. The present owners of the diamond properties have agreed to form a joint stock company to act as the government's representative.

The output of these fields has already materially affected the price of small diamonds and as they are now under the direct supervision of the German government, they should be beyond the control or influence of the English Diamond Syndicate. An apparent inability for any but a favored few to obtain the rough in 1909, followed by a rise of price to the Syndicate level, aroused suspicion of German freedom from syndicate influence. It is rumored, however, that German colonial officials are being investigated. The Transvaal and Orange River Colony should be equally free, as the governments of those colonies are practically partners in the mines within their borders, and therefore probably will not allow a syndicate operated for the benefit of the Cape Colony mines, to restrain their output for the purpose of holding up prices to a figure profitable to the Cape mines. The diamond industry is in a critical condition. For twenty years the De Beers Consolidation, having control of the supply and aided by an abnormally good demand, has made prices, holding supply to the demand. That control lost, it appears probable that the ancient millstones of economic principles will once more grind supply and demand to a natural adjustment with the cost of production, though it must be admitted that by shrewd manipulation, prices now (1910) have been restored to the levels existing before the panic.

In 1908 the De Beers group of mines produced 2,177,191 carats. These were not all sold and prices realized were lower, £800,000 only being distributed in dividends as against £2,550,000 in 1907. The De Beers and Dutoitspan mines were closed. The average yield per 100 loads in 1908 was about the same in the De Beers, Kimberley and Bultfontein as in 1907, but a little less in the Wesselton and Dutoitspan.

A new alluvial deposit was discovered July 16, 1908, at Harrisdale, 14 miles from Kimberley. The gravel runs from four inches to three feet thick. £20,000 worth of diamonds of excellent quality were reported in the first six weeks, averaging £8 per carat.

The Transvaal produced in 1908, 2,184,490 carats valued at £1,879,551, principally from the Premier, though 11 other companies and the alluvial diggings at Christiana contributed. The Premier output was for their year ending October 31, 2,078,825 carats at 14s. 9d. per carat.

Orange River Colony product for year ending June 30, 1908, is given as 505,452 carats valued at £1,069,942. Average price per carat fell from 60s. 6½d. to 42s. 1d., owing to the unstable condition of the diamond market. The greater part of the product came from the Jagersfontein, Koffyfontein, Voorspoed and Roberts Victor mines. The balance came from the Lace, Ebenezer and Monastery mines and the alluvial diggings. The value of the latter was 66s. 10½d. per carat. The Roberts Victor Company paid a dividend of 25 per cent. in March, 1909.

Up to December 31, 1908, the diamonds found in German South West Africa are estimated at 40,000 carats worth $269,000. Since then the German Committee for Colonial Development report that 80 new companies have been formed. The output for the current year 1909, averaged about 45,000 carats per month and the price has risen from $5.33 to $8 per carat. In seven months of 1909, 273,701 carats worth nearly $1,904,000 were obtained, from which nearly half the amount was deducted by the Treasury. In some places there are several layers of the diamond-bearing pebbly deposits, separated by sand. Of late some diamonds weighing up to six carats each have been found.

CHAPTER XIII

PRINCIPAL SOUTH AFRICAN DIAMOND MINES

The Dutoitspan.

DIAMONDS had been found in the dry bed of a stream on the Jagersfontein in August, but the first opening on a diamondiferous volcanic pipe in Africa was made in 1870, when prospectors discovered diamonds on the Du Toit's Pan, owned by a Boer farmer named Van Wyk. After trying in vain to regulate the diggers and collect license fees, he sold his farm for £2,600. The farm lay about twenty-four miles south and a little east of Pniel on the Vaal, where the diggers first made their headquarters. All the so-called mines worked prior to this discovery were merely diggings in alluvial deposits, as this also was supposed to be at that time. Many diggers were attracted to it in the beginning, but the discoveries of the Bultfontein, De Beers, and Kimberley, following in rapid succession, drew many away, especially when it was learned that the two last were much richer in diamonds. So small was the yield near the surface that little persistent work was done on this field until 1880. As the diggers neared a depth of 200 feet, the yield improved so greatly, and the diamonds were distributed so evenly through the rock, that the work was prosecuted with more vigor, and the mine's output was brought up to a considerable amount.

The average yield at that time was, it is claimed, about three-quarters of a carat to the load.

Not only was the Dutoitspan the first of the Kimberley mines discovered, but it is also much the largest. The original locations numbered 1,441 claims, equal to about 23½ acres; nearly four times as many as on the Kimberley pipe, but none of the Kimberley pipes are as large as the first locations indicated, because some were outside the diamond-bearing area. Like the others, it began with individual diggers, then the grouping of claims in the hands of small owners and speculators who floated them into stock companies, and in turn consolidated, until at the time of the De Beers Consolidation in 1889, "The Griqualand West Mining Company" owned about half the pipe. Cecil Rhodes said of the mine, "It is too poor to work, and too rich to allow others to acquire it," and for that reason it was forced into the Consolidation. Those who opposed the amalgamation, claimed that the De Beers people wanted it in order to close the mine. Barnato, on behalf of the De Beers, denied any such intention, saying that the government would not permit it and also that the licenses due the London and South African Exploration Company amounted to such a large sum that it would not pay to do so. The mine was practically closed at that time as far as open working was concerned. Heavy falls of reef had materially damaged it. What diamonds were being taken out cost about the same as they brought, viz.: 6s. to 7s. per load. The De Beers argued that if the various owners could not make it pay with open working they certainly could not with the more expensive underground system. A majority of the owners agreed;

the terms offered by the De Beers were accepted, and the Dutoitspan became a part of the Consolidation. The De Beers management, nevertheless, having gained control of the mine, did close it down and kept it idle until they succeeded in buying up all the outstanding shares. Then they made preparations to work it.

When the De Beers began to work the mine, there was about a hundred feet of water in it. Pumps were installed and about 296,000,000 gallons removed. On August 13, 1901, a shaft in the reef was begun and sunk to 775 feet. It went through:

	Ft.
Debris	19
Basalt	106
Shale	239
Conglomerate	6
Quartzite	82
Diorite	63
Melaphyr	269

This arrangement of the strata differs from those surrounding the other mines of this group, as the company had never met with diorite before, nor had they ever encountered quartzite above the melaphyr. It is supposed to be a displacement by the intrusion of the diorite.

From the main cross cut, drives were run to a distance of 500 feet, and it was estimated that the mine contained in sight above the 750 foot level, 24,380,000 loads. The equipment of this mine has been exceptionally good. With the experience of years to draw upon, the best has been furnished. The equipment is electrical. Underground locomotives for haulage, hoists, and pumps are run by electricity. The washing plant is situated on the floors about a mile from the mine, and has a capacity of about six thousand loads per day. In 1905 the shaft was carried down to 814 feet.

The company did not meet with much encouragement at first, for their outlay. In 1904 only 3,032 carats were won at an average of .12 of a carat to the load, valued at 42s. 3d. per carat; 1905 made a much better showing, with 24,902 carats which brought 69s. 11d. per carat and a yield of .26 of a carat to the load; 1906 gave .25 of a carat which realized 80s. 11.52d per carat; 1907 at an average of .24 of a carat to the load, yielded 365,821½ carats; 1908 showed another slight loss of average yield, it being .23, but the output brought 74s. 5.07d. per carat. The cost of producing in 1905 was very high, amounting to 47s. 3.3d. per carat, but was reduced nearly half in 1906 to 29s. 2d. per carat, and in 1907 to 27s. per carat. Unfortunately, just as the mine was becoming important as a producer, and profitable on account of the good prices the product commanded, the sudden falling off in the demand for diamonds, decided the management to close it on April 24, 1908, until business showed some improvement.

The quality of the diamonds in this mine has improved very materially with depth. Most of them show color but many are fancy. In the lower workings also there is an almost entire absence of fragments and broken crystals. In the eighties, Dutoitspan diamonds brought on an average about 23s. to 28s. per carat, or twenty-five per cent. more than the average of the three other Kimberley mines. The output at that time ranged from 500,000 to 700,000 carats per annum, about the same as that of the De Beers and of the Bultfontein, and two-thirds that of the Kimberley, the value being greater than either. Until the limit of open-working was reached, it was a great producer of valuable material, nevertheless Barnato at the first meeting of the De Beers Consolidated, stated that hardly one company had paid a dividend in the seventeen years they had been working it. That two companies on the mine, the Griqualand West, and the Anglo-African Company, had paid very small dividends, he attributed to the extraordinary financial ability of their respective managers.

The Bultfontein.

Rumors had come to the ear of Cornelis du Plooy on his farm, the Bultfontein, that north of him toward the Vaal river, men were picking stones out of the earth and selling them for money, sometimes getting more for one stone than a man would have to pay for a tract of land larger than his own wide stretch of brush and gravel. He had heard too that a lot of those restless Englishmen from the Cape Colony were already scratching and digging the earth in every direction in search of these stones that could be sold. If stones could be sold for money, it behooved him to look into the matter, for there were plenty of them scattered all over his own morgen, where the goats and sheep picked a living. It would be easier to pick up stones than to raise hides and wool for the semi-annual trading trip to Grahamstown. So after some days of cogitation, he gathered a pocketful of pebbles, and on November, 1869, carried them to the store of a Mr. Hurley to see if he could learn what kind of stones they were which had drawn the army of invaders into the barren Boer settlements. The scientist and geologist, Mr. Draper, was there, and he recognized a diamond among the stones Du Plooy had. Whether or no he disclosed the fact to the Boer farmer does not appear, but soon after, Mr. Hurley and some others bought the Bultfontein farm for £2,000, began prospecting, and formed the "Hopetown Company." Title to the land was afterwards conveyed to the London and South African Exploration Company, when disputes among former owners brought the case before the Land Commission in 1876.

While this was being done, others were looking for diamonds among the kopjes of the neighborhood, and some were found in a kopje on the Du Toit's Pan farm, a half to three-quarters of a mile away, and claims were staked out. This later became the Dutoitspan mine. Very soon after, the Bultfontein mine was discovered. At that time, these were not the mines as we know them, but places here and there over the surface, where a digger, having found some diamonds, staked a claim to cover as much about it as the mining rules allowed, upon the chance of finding more. There was room for 1,753 such claims within the supposed diamond-bearing area of the Bultfontein mine, as it was known later. There were 1,067 original claims, equal to 23.54 acres.

The mine is situated in the suburbs of Beaconsfield, about three-quarters of a mile southwest from the Dutoitspan, and not quite three miles southeast from Kimberley. In extent it is the second largest of the Kimberley mines. Possibly it has some subterranean connection with its immediate neighbor, as it is reported that the Dutoitspan and the Bultfontein are dipping towards each other at the low levels now being worked.

In the first years of its history, this mine was not worked with the same energy as the Kimberley and De Beers. It was not as rich in diamonds as they, nor were there as many large stones found in it to excite hope. The diggers hovered about the rich Kimberley, hoping to make a strike there. When, however, the Kimberley diamond-bearing area became well defined, and the surface was all taken up, the Bultfontein was worked steadily with good results. Later, as a public demand for stock in diamond mines developed, a number of companies were floated on this field, and the various managements, in the effort to earn dividends, prosecuted the work with vigor. In the eighties, after records were kept, the output from this mine ranged from 500,000 to 700,000 carats per annum, and sold for an average price of 18s. to 22s. per carat.

The diamonds of the Bultfontein are usually small, white octahedrons. The color is very good, but the majority are flawed. Colored stones are rarely found in it.

As the open workings were carried down, the same difficulties were encountered in this as in the other mines. Falling reef, mud-rushes, and a growing necessity for united action and large capital to cope with the difficulties, made the work of most of the companies unprofitable. In 1887 the open work had reached a depth of 460 feet, and a large part of it was covered with fallen reef. Although the De Beers Consolidated Mines Company, who already owned a large interest in the mine, forced it into the amalgamation of 1889, it was evidently for the purpose of removing competition when they began their policy of raising the price of diamonds, and with the expectation that it would pay later, though it could not earn dividends on underground work at that time.

The mine was practically shut down for some years, but preparations were made for underground working. By 1902 there were 18,700 feet of tunnels, and it was operated on 6 levels down to 600 ft. In that year 352,042 loads were handled, 20,194 loads washed, and 4,486.5 carats of diamonds won at a cost of 6s. 6.4d. per load and a value of 6s. 9d. per load, the price per carat being 30s. 4.7d. The yield averaged .21 of a carat to the load. The year 1903 showed an improvement, as 76,573 carats were taken from 317,185 loads washed, an average yield of .24 of a carat. The cost also was reduced to 5s. 9d. per load, and the price realized was slightly increased to 30s. 10d. per carat. Although the price fell in 1904 to 29s. 7d., the gross yield of diamonds, and the average yield per load, improved sufficiently to more than offset it, as 148,219 carats at .29 to the load were won, at the same cost per load as in 1903. The following year, 1905, showed a much greater improvement in every way. At a cost of 5s. 10.5d. per load, 611,491 loads were washed, yielding 249,002 carats or .41 of a carat to the load, for which 34s. 11d. per carat was realized. The percentage per load has since fallen to .32 in 1908, but at .32 and a cost of 6s. 2.4d. per load in 1907, the output was 547,485¼ carats. The price was advanced to 42s. 11.49d., with a yield of .36 of a carat at a cost of 5s. 5.3d. per load in 1906, but fell back to 41s. 4.8d. in 1908. The mine therefore made a better showing each year from the commencement of underground working in 1902, when there was a profit of 3d. per load, to 1905, which showed a profit of 8s. 4d. per load.

Open working was carried to a greater depth in this mine than in either of the other Kimberley mines. Four hundred feet was the usual limit, but the Bultfontein was dug to 460 feet.

The De Beers.

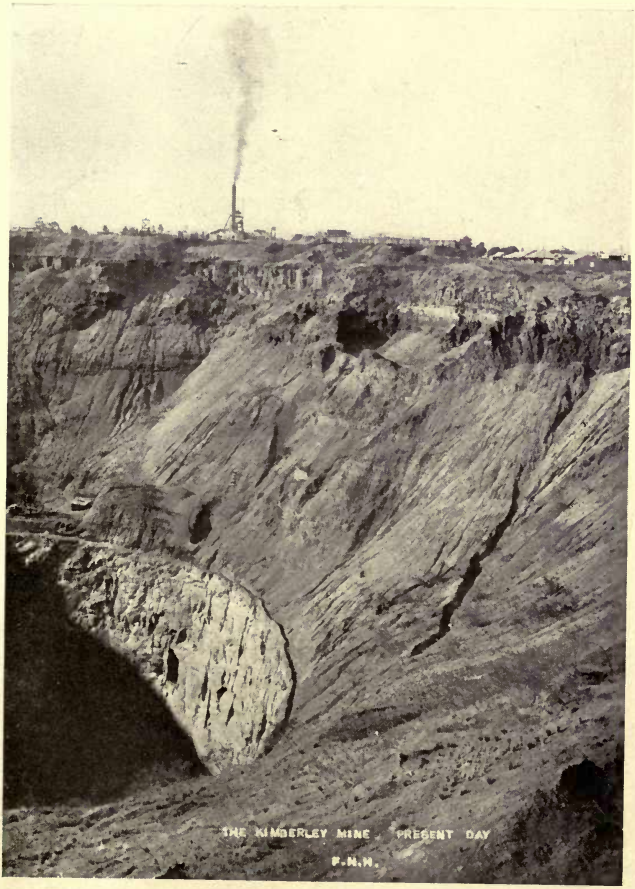
The De Beers diamond mine is about one mile east from the Kimberley and in the central part of the city of Kimberley. In extent it is 958 feet east and west by 630 feet north and south and the original locations covered a surface equal to 622 claims or 13.72 acres. It was in this mine that Cecil Rhodes centered his interests, and from the nucleus he created there, forced the Kimberley interests to join the combination which finally embraced all the producing mines of South Africa at that time. The De Beers did not in the beginning, nor does it now, yield as many diamonds as the Kimberley, but the average quality is better, though not as good as those from the west end of the Kimberley, and the percentage of crystals which can be cut to jewels is larger. What the comparative output of the two mines of late years is, cannot be stated, as the returns are given together in the yearly statements of the company. In 1907 the combined output was less than that of the Wesselton or the Bultfontein, and the yield per load was but little better than either of the latter, the De Beers and Kimberley being .37 of a carat, the Wesselton .32 and the Bultfontein .33.

This mine is more liable to mud-rushes than the others of the Kimberley group. In 1902, 3 natives were killed and 6,989 feet of tunnels filled. The rock shaft at that time was down 1,784 feet, and the mine was worked from 11 levels at 40-ft. intervals, from 1,100 to 1,400 feet deep. 15,506 feet of new tunnels were cut. They had in sight above the 1,400-foot level, 1,289,500 loads of blue, and had, developed between that and the 1,720-foot level, 3,375,400 loads, a total of 4,664,900 loads in sight June 30, 1902. The cost of mining, depositing and washing that year was 9s. 0.9d. per load, $^{7}/_{10}$ of a penny per load more than the year previous and a little more than 2s. in excess of the Kimberley cost for the same year, which was 7s. 8.6d. per load.

In 1904 the rock shaft was down to 2,076 feet. In 1903 a tunnel was made around the mine in the hard rock under the shale, the same as in the Kimberley mine, to take up the water from the mud-rushes.

According to the annual reports published by the company, the combined yield percentage of the De Beers and Kimberley has declined steadily since the consolidation, the lowest averages in the history of the mines being those of 1907 and 1908, which were alike, .34 of a carat to the load. At the same time the cost per load has increased in the last ten years from 6s. 7.4d. in 1898 to 9s. 0.8d. in 1907.

The upper part of the De Beers mine was very poor. Some parts of it contained so few diamonds that it did not pay to work them. At two to three hundred feet, there was a marked improvement, which was maintained for a long time, and the fact probably gave rise to the general report, yet circulated with regard to the Kimberley group, that the blue is richer than the yellow was,



KIMBERLEY MINE—PRESENT DAY

the evidence of the annual reports showing the contrary, notwithstanding. The yellow ground of the Kimberley, from all accounts, contained more diamonds than any level of the blue under it, but in the other mines, both the yellow and the upper part of the blue were much poorer than the blue from about 200 to a thousand feet down. Below that, however, the yield per load appears to decline steadily with depth in all the mines.

The Kimberley.

The Kimberley diamond mine is situated at the city of Kimberley in the Griqualand West district of Cape Colony, South Africa, in lat. 28° 43 S. and long. 24° 46 E. By rail it is 647 miles northeast of Cape Town and 485 miles north of Port Elizabeth. It is a few miles from the borders of the Orange River Colony, formerly the Orange Free State. The town and mine were named after the Earl of Kimberley, H. M.'s Secretary of State for the Colonies when the town came into existence.

At the time of its discovery, July 21, 1871, the mine was called the "Old De Beers New Rush" or "Colesburgh Kopje New Rush," because a "rush" was made by the diggers from the De Beers mine lately discovered nearby, to a new field on Colesburgh Kopje which was reported to be exceedingly rich.

The district was then supposed to be in the Orange Free State, because the English had agreed not to interfere with the Boers north of the Orange river. All the Kimberley mines were on Boer farms so-called, though they were little more than wild tracts of land upon which the few Dutch settlers raised cattle, sheep, and goats, in a primitive and Oriental way. The country lay west of the territory in which the Free State had practically established the routine of governmental functions, and within an undefined stretch of land sparsely inhabited by a mongrel tribe called Griquas, of whom one Waterboer was the chief. As there were, however, a few Boer settlers scattered about, to that extent the land may be considered properly to have been a part of the Free State in embryo, or a territory in the wilds within the scope of the Free State's influence, to which that State might rightfully lay claim, and establish within it the functions of government when the inhabitants called for it, and they and their possessions were of sufficient importance to warrant it. By the rapid influx of men from the English Cape Colony and from England, however, together with the investment of English capital, the preponderating element became English and called for English governmental control. Griqualand West, as it was called, therefore eventually became a part of the Cape Colony.

Of the four mines discovered in that neighborhood and which have been since known as the Kimberley mines, the name of this one has on that account become more generally known. With the general public it stands not only for all the mines of the De Beers consolidation, but to most people, it is a name for all diamond mines of South Africa.

It is the smallest of the four Kimberley mines, but has proved the richest, from its discovery until the present time, the percentage of diamonds to the load of clay having been sufficient until lately to more than offset the greater proportion of bort which is found in it.

The Kimberley is a true volcanic chimney or pipe and the contents carry diamonds throughout. When discovered, volcanic pipes of diamondiferous material were unrecognized. The surface was staked out in claims and worked as a very rich alluvial deposit, until it was discovered that the supposed deposit was a circumscribed area within well-defined limits, and the bed rock on which it rested was simply an unoxidized continuation of the same material to an unknown depth.

There were 470 full claims on this pipe, which at one time were split up among 1,600 owners, but which later fell year by year into fewer hands, and finally became absorbed into the De Beers Consolidation in 1889, as described elsewhere.

What the output of this mine was, in the early days of individual claims, is unknown. It has always been comparatively large, but different parts of the chimney have varied greatly, not only in the quantity of diamonds contained in the earth, but in the character of them also. Some spots have been very rich, others poor. In the west end the crystals are perfect octahedrons or white glassy stones; elsewhere they are rounded or the edges are beveled. In the southeast section, the diamonds have shown a color tendency resembling those of the Dutoitspan. The north and northwest section of it, held many smoky stones, bort and broken crystals, many of them mere fragments. Owing to the number of owners, the great amount of stealing that went on, and an entire absence of public records up till the consolidation, no definite knowledge regarding the quantity of diamonds won could be had.

It was in this mine that the interests of Barney Barnato, one of the so-called diamond kings, centered. He had accumulated some money as a general trader and speculator when he made his first purchase in 1876, of claims on this chimney. His faith in the theory of Dr. Atherstone that all these Kimberley mining claims were in volcanic pipes, was later demonstrated by his purchase of the last claims owned by an individual in the mines, six in number, situated in the center of the pipe, for £30,000 each. This was a record price on the Fields. He continued to acquire claims when many thought that the diamonds ceased with the upper layer of yellow ground, and by the time that the underlying blue ground was reached and proved equally rich, or richer than the yellow, he had obtained an interest which enabled him later to exercise a powerful if not controlling influence in the affairs of the Kimberley mine. At the eighth meeting of the De Beers Diamond Mining Company, Barnato claimed that his interest in the mines of the Kimberley district amounted to nearly two million pounds. A large share of this was made undoubtedly by floating stock companies.

An exact knowledge of the mine could not be had during the process of consolidating the various interests in it, so after its amalgamation with outside interests in the De Beers Consolidated Mines Company, it became difficult to entirely separate its affairs from the others of the combination of which it was a part, inasmuch as the working of each was regulated or modified by the general interests, and the results of the De Beers and Kimberley were published together.

The Kimberley, like the De Beers, is distinguished by a yield of large yellowish crystals with curved edges, and it produces more bort than any other of the old mines. At the time of the Consolidation, in 1889, the Kimberley and De Beers mines together, were said to average 1.283 carats per load, and the diamonds had brought an average of 19s. 8.75d. per carat. The average price for the year of 1889 is given as 29s. per carat. From that time the yield declined and the price increased. In 1898 the average per load was 0.80 of a carat; in 1889 0.71 of a carat. Excepting 1901 and 1902, when it was 0.76, the yield declined steadily until it was but 0.37 of a carat for 1907 and 1908. The cost of mining in 1898 was 6s. 7.4d. per load, and it was steadily increased to 9s. 0.8d. in 1907. As the yield of diamonds per load has at the same time as steadily decreased, there is a material increase in the cost per carat, which is now in the neighborhood of 27 shillings. The increased price obtained for the diamonds has more than compensated the extra cost of producing. The joint policy of the De Beers Consolidated Mines Company and their cog wheel, the Diamond Syndicate, since they obtained control of the market, of regulating output to the world's demand and willingness to pay advanced prices, has more than doubled the value of rough to the mines, and still further increased the cost to the cutter. It was not until the year 1900 that the mines received any considerable advance, i. e., 35s. 10.2d. as against 29s. 7.2d. in 1899. From that time the price was steadily raised to 64s. 9.74d. in 1907.

Mining operations are being carried on at a greater depth in the Kimberley than in any of the other mines. In 1902 the main shaft was down 2,233 feet, and actual work in the blue was done on 9 levels 40 feet apart. In 1904, the main shaft was sunk 60 feet further to 2,599 feet. The lowest working level in the early part of 1907 was at 2,520 feet.

Gardner F. Williams, in "The Diamond Mines of South Africa," says that when the claims on these four mines were consolidated by purchase, the open-mine surface was figured to be: Kimberley, 33 acres; De Beers, 22 acres; Dutoitspan, 45 acres; Bultfontein, 36 acres.

The Jagersfontein.

This mine is in the Orange River Colony, formerly the Orange Free State, near Fauresmith and the Riet river, and about eighty miles south and a little east of Kimberley. It was discovered about the same time as the Kimberley mines, and a controlling interest in it was secured by the De Beers Consolidated Mines shortly after the establishment of that company. Jagersfontein was owned by a widow named Visser and the farm was worked by her overseer, De Klerk. He, noticing garnets in the dry bed of a spruit, and having heard that the Vaal diggers considered them an indication of diamonds, sieved some of the gravel and in August, 1870, found a diamond weighing fifty carats. This led to the discovery of the Jagersfontein mine by the diggers who flocked there and worked allotted areas of 20 feet square on a royalty of £2 per month to the widow. In 1888 the New Jagersfontein Exploration Company was incorporated and gradually absorbed the various interests. The New Jagersfontein Company, as it is known since the Boer war, is capitalized at £1,000,000, divided into 500,000 each of ordinary and deferred shares. The shape of the mine is a rough oval, and the size of it about 1,500 by 2,000 feet, and it contains 1,124 claims. It has been skillfully and methodically worked as an open mine to depths, which in all the others entailed most disastrous consequences. It is worked down in concentric terraces. The three lowest are carried down 360, 410 and 450 feet, with a small area below, 480 feet deep, and late reports claim that a depth of 700 feet in the open has been reached. So well has this been done that the system serves as a model to mines discovered later, in their open working.

At the beginning of the Boer war, this mine had been producing about 250,000 carats yearly. In 1898, 232,433 carats; in 1899, 288,937 carats. In 1900 the production fell to 183,399 carats, and in 1901, while the war was on, to 18,002 carats. Work was then abandoned until July, 1902, when the English company again took possession of the mine. Some months were occupied in getting the water out of the mine, repairing and replacing machinery, etc.; after which, work was resumed and 29,302 carats won for the year ending March 31, 1903. For the year ending March 31, 1904, the yield was 167,597¾ carats. In 1905 the output was back to the old figures, being 266,225 carats. The year 1906 gave 255,841 carats and 1907, 219,275 carats.

The yield of .diamonds to the load in this mine is very small. Before the war it was 0.112 of a carat to the load. In 1904 it was only .0968. The management attributed the decline to reef and mixed material having fallen in. 1905 showed an increase to .1049 and further betterment in 1906 to .1089, but 1907 fell to .0911. The quality of the diamonds, however, is very fine, combining great purity of color and brilliancy, similar to the Indian goods. Consequently they have always brought high prices. From 1887, when they realized about thirty shillings per carat, the price rose steadily to over sixty-six shillings in 1904. In 1905 the price dropped to 61s. 5d., but in 1906 advanced to 63s. 4d., and at the time of putting out the report for that year, the price had advanced again to seventy shillings, and the yield for the year to March 31, 1907, realized 71s. 6d. The yield being so small, the cost of production per carat compared with some other mines is very high, running in the neighborhood of thirty shillings per carat. It was 2s. 10.79d. per load in 1904, which equals 30s. per carat.

The profitable nature of African mining, once a true pipe is obtained, and the mine is worked under a single and capable management, is forcibly illustrated in the Jagersfontein. With a yield of about one-tenth of a carat to the load, two dividends of £100,000 each were paid in 1904, and a balance of £85,297.10.10 was carried over. In 1905 £362,500, and for the year ending March 31, 1906, £425,000 was paid. The profits of the year to March 31, 1905, were £437,355; of the next year, £437,293, and to March 31, 1907, £429,373.

The mine employs from two to three thousand natives. 2800 are needed for the capacity of the mine, but as many of the natives go to their kraals in planting time, there is sometimes a shortage of labor.

The Wesselton.

The Wesselton, or Premier, as it was first called, takes its name from J. J. Wessels, Sen., the owner of the Benaaudheidfontein farm, on which it was discovered, in September, 1890. It is situated about one mile south of the Dutoitspan, in Cape Colony, on the border of the Orange River Colony; formerly, the Orange Free State. In extent it is equal to 1162 claims, equal to about 24 acres. The De Beers Consolidated Mines bought the property in December, 1891, subject to certain mining rights, and assumed control of the mine in January, 1896. Since that time it has proved a valuable addition to the De Beers and the Syndicate. Although the yield per load has always been moderate, it runs very even, and the output has been large in the aggregate. The quality of the diamonds also is exceptionally good, and when free from flaws, they are rated almost equal to white river-goods.

By 1903, the management was operating on seven levels down to 500 feet, the two upper ones open work, the others underground. It was estimated at that time there were 17,730,000 loads of blue in sight. It has been one of the most profitable mines of the De Beers group, as the following table shows:

	Carats won.	Cts. per load.	Val. per ct.	Val. per load.	Cost per load.
1898 ..	189,356¼	0.27	20s. 9d.	5s. 8d.	2s. 7.1d.
1899 ..	496,762¼	.30	22s. 10.1d.	6s. 9.8d.	2s. 3.3d.
1900 ..	220,762½	.30	25s. 0.2d.	7s. 5.9d.	2s. 7.5d.
1901 ..	447,399¾	.295	27s. 3.7d.	8s. 0.6d.	3s. 0.9d.
1902 ..	521,437	.30	33s. 5d.	9s. 11d.	3s. 5.2d.
1903 ..	594,890	.30	35s. 4d.	10s. 3.2d.	3s. 3.7d.

	Carats won.	Cts. per load.	Val. per ct.	Val. per load.	Cost per load.
1904 ..	605,241	.28	24s. 10d.	9s. 10d.	3s. 7.3d.
1905 ..	578,152	.284	36s. 11d.	10s. 4d.	3s. 7.3d.
1906 ..		.28	43s. 9.12d.	12s. 3d.	4s.
1907 ..	604,915½	.32			3s. 8.9d.
1908		.27	38s. 11.4d.		

Two diamonds weighing 18¾ and 21 carats respectively, of a form rarely found in the African fields, were taken from this mine. They were cubes with beveled edges similar to many of the Brazilian crystals.

The name "Wesselton" is now given to clean, well-made cut diamonds, with a quality rating between top crystal and Jagers.

The Premier Diamond Mine.

The greatest known diamond mine in the world is the Premier of the Transvaal, South Africa. In extent it is nearly as large as the four De Beers Consolidated Mines combined, and though the yield of diamonds per load of diamondiferous material is not now as great as that of some others, its yield in the aggregate can be made at will much larger than that of any other, and at considerably less expense.

The Premier of the Transvaal is sometimes called the New Premier, to distinguish it from the old Premier of the De Beers Consolidated Mines Co., now known as the Wesselton. It is situated in the Pretoria district of the Transvaal, near the railroad to Delagoa Bay, and twenty-one miles east of Pretoria. It was reached formerly by a wagon road from Van-der Merwe, a small station on the railroad seven miles away. In those days a conveyance from the station to the mine cost twelve dollars, but the company has since built a spur to the railroad at Rayton Station, 5½ miles off.

It was known that there were diamonds in the Pretoria district for years before the discovery of the Premier mine, and properties were developed which did not pay; others were profitable, but proved to be small mines. There are three such between Van der Merwe and the Premier, viz.: the Schuller, the Montrose and the Kaalfontein. An article in the Queenstown "Representative," March 3, 1871, told of a 4¼ carat diamond found on a farm near Pretoria, also of others found on the banks of the Elands river and several other places. It was said that a government commission had been sent out to examine and report. No general interest was awakened apparently until 1897, at which time Mr. W. C. Schuller, the owner of the property in that district, succeeded in interesting scientists in the field. Mr. David Draper recognized some specimens shown to him in April, 1897, as true diamond-bearing rock, and in September of that year, he formally announced before a meeting of the Geological Society, the discovery of a true diamondiferous pipe in the Transvaal. He said it was enclosed by the Magaliesberg quartzite, a foundation much older than the Karoo beds about the Kimberley pipes. He had visited the locality with the owner in August and assured himself that it was a true pipe. One diamond had been found, and others were obtained on making a trial opening. Dr. Molengraf then visited the place, and confirmed Mr. Draper's opinion. The subject, with specimens, was then laid before the Volksraad at Pretoria.

The struggle for recognition being successful, the necessary assistance of capital was obtained and work began. In 1898, the year following, 22,843 carats were obtained in this district. Then came the war, which suspended all operations.

Meantime an enthusiastic believer in the possibilities of the Transvaal as a diamond-producing country, named T. M. Cullinan, had been prospecting in that neighborhood, and had become convinced that there were diamonds, and plenty of them, on the land of Joachim Prinsloo, a Boer farmer. Prinsloo farmed parts of his wild tract in the usual Boer fashion, and rented small parts of it to natives. He was of course aware of the possibilities of the country, though it is doubtful if he had much faith in his own portion of it; the desolate stretch of scrub and brush did not suggest visions of wealth and magnificence beneath it. Cullinan wanted an option on the property, and was willing to pay a big price, if, after prospecting, he was satisfied that his judgment was correct, but the farmer would only sell outright for £25,000. The property cost him £500. Nothing came of it, and Prinsloo tried in vain to sell at his price. Then came the war.

After the war, Cullinan made new overtures, but the Boer had raised his price to £50,000, and still refused to give a three months' option at any figure. Finally Cullinan bought it, some say with additional expenses which brought the cost up to £52,000. The farm was the freehold of Prinsloo's portion of Elandsfontein No. 85, district Pretoria, in extent 817 morgen, 431 square roods. (A morgen equals 2.11 acres.)

The Premier Company has since added to its possessions, a second portion of the farm Spitzkof, No. 31 (Wilge river) in extent 673 morgen, 420 square roods, and a portion of the farm Kameelfontein No. 106, in extent 236 morgen, 505 square roods, for the construction of three large dams in addition to one of 4,000,000 gallons capacity built on the Elandsfontein farm. The three large reservoirs have a capacity of 246,000,000 gallons, and are fed from springs and borings on the land. In them the water is collected for use in the dry season.

Cullinan bought the property in October, 1902, and wasted no time in getting to work. On washing the first boring, he got a few garnets, olivines, and other stones usually associated with diamonds, but no diamonds. One may imagine the anxiety with which another trial was made. The second boring, on being washed, yielded eleven diamonds, one of them weighing sixteen carats. It was the beginning of a mine which has been prolific of large stones. In the first year or two, it produced four of over three hundred carats each; two between two and three hundred carats each, and sixteen between one and two hundred carats each. In January, 1905, the Cullinan of over three thousand carats was found, and another of 334 carats was brought to light in the middle of the next month. Satisfied by the experiments that diamonds were really there, a washing plant was immediately installed and put in operation.

In those first months of the mine's history, much prospecting was done. One hundred and eight shafts with a total footage of 2,362 feet, were sunk. Two bore holes, one of them a thousand feet deep, and the other

826 feet, were made and found to be all in diamondiferous ground, though they also showed considerable waste and inclusive rock. Little water was encountered, except at the juncture of the rim rock, where there was considerable.

The Premier was found to be a huge volcanic chimney of diamondiferous earth similar to those of the Kimberley district, but very much larger. It has since been found to cover an area equal to 3,571 mining claims of 30 by 30 feet, or about eighty acres. Of this total claim area, 3,441 claims have been worked down to an average depth of eighty feet. Unlike the Kimberley mines, it had no limestone capping, but under the tufaceous top, the crater was covered with a red clayey surface soil five or six feet thick. Under this lay about thirty feet of yellow ground which gradually merged into the unoxidized blue peculiar to the African diamond pipes. The blue of the Premier is much more friable than that of the Kimberley mines, and therefore does not need weathering as that of the other mines does, but goes direct to the washing plant, thereby eliminating the expense and loss of time resulting from spreading on floors. Below the sixty-foot level the blue became very hard. It was found, however, by sinking shafts, that it was a layer only, about eighty feet thick. Below it, the blue becomes soft and friable again.

The Premier mine is shaped like a pear. It is situated on a level plateau at an elevation of about two hundred feet, and is surrounded by hills and kopjes about a hundred feet high. The surrounding geological formation differs somewhat from the Kimberley district. Some sandstone outcrops, but diabase is the common rock. It has one great advantage over the De Beers mines, in that the rim rock is very firm, and therefore is not liable to fall as the shale formations of Griqualand, about Kimberley, do. The contour of the surrounding surface also is favorable both to the drainage of the mine, and the storage of water by easily constructed dams.

The Premier crystals have a peculiar laminated appearance. Many of them also have an oily luster, and are quite blue. There are also many false colors. Nevertheless some are of the finest quality and color. It is a mine which yields the extremes. The percentage of bort and large crystals of gem material is greater than from any other mine. The immense Cullinan was of exceptional purity. All the stones cut from it, ranging from five hundred carats down, are flawless.

In the beginning, the Premier washings gave extraordinarily large results; nearly one and a half carats to the load. (16 cubic feet, equivalent approximately to a ton, now constitute a load.) The average of June, 1903, was 1.45; of July, 1.47; but from that time the yield steadily declined, the average to October 31 being 1.29. The highest average for any month in 1904 was .92; the lowest .62. The highest in 1905, .85; the lowest .26. The highest in 1906 was .35 and the lowest of average material .27. The yearly average since the opening of the mine and the value per carat is as follows:

1903	1.29 carats	27s. 8.5d.
1904	.793 carats	23s. 1.2d.
1905	.609 carats	23s. 6.29d.
1906	.301 carats	28s. 4.2d.
1907	.290 carats	18s. 0.2d.
1908	.258 carats	14s. 9.4d.

The Cullinan is included in the valuation of 1906 at a nominal figure, and the proceeds from the big diamond are not included in the figures of 1907.

The number of carats found and the cost of production per carat washed is as follows:

1903	99,208¼ carats	3s. 6.8d.
1904	749,653½ carats	3s. 3.6d.
1905	845,652 carats	5s. 4.7d.
1906	899,746 carats	11s. 6.6d.
1907	1,899,986¾ carats	8s. 1d.
1908	2,078,825¼ carats	7s. 2.2d.

It may be that the weathering-out process to which the top layers in these chimneys have been exposed, reduces the bulk of the material and thereby increases the percentage of diamonds. It is also probable that the first work was done on promising leads. All the African craters have streaks and pockets in the diamond-bearing earth which are far richer than the average, and men experienced in mining there, know the indications. Some spots in the Premier carried twenty carats to the load. At the beginning of an enterprise like the opening of the Premier, it was but natural that the management would wish to make a good showing, and therefore work the rich spots first, so as to get the largest returns in the shortest time possible. Good results meant money for development and a ready sale at good prices for the stock of the company. Having established the mine in the public confidence, and equipped the treasury with a surplus, the company could then afford to work over the entire area, many parts of which were richer in over-burden and inclusions than diamonds, consequently the yield would fall to the mine's actual average, taking the bad with the good.

At the start, the equipment was small and the expense of mining and washing very moderate. The earth was removed by endless rope haulage from the open workings to the washing plant on a small elevation at the edge of the crater, where the tailings were simply run over to the other side. There was one washing plant of four pans, and one of six pans. The diamonds were all picked by hand. The material from the pulsators was first picked by skilled white sorters and afterwards, the tailings, by young Kaffir boys, for the small diamonds. It was difficult to get satisfactory help. In 1904 there were three open-cut mines in work, and it was estimated that there were ten million loads above the fifty-foot level, and one hundred and five million loads above the four-hundred-foot level, to which depth the work could be carried on by open cut.

Constant additions have been made to the plant, which for the year ending October 31, 1908, washed nearly 27,000 loads per day, reckoning 300 working days in the year. In 1909 it will probably be increased to a capacity of forty thousand loads per day. By arrangement with the De Beers, grease tables were put in use and the whole plant has been rapidly brought to a high standard of efficiency, though, it being an open-cut mine, little machinery is required compared to that necessary for the underground workings of the De Beers mines.

The diamondiferous material carries fewer garnets than that of the Kimberley district, nor are serpentine and olivine as conspicuous. Mr. Troge describes it as a serpentive conglomerate, similar to the Kimberley blue, of a greenish-gray ground-mass inclosing deep green diallage-like augite, some olivines, biolite, magnetite, ilmenite, and pyrite with pyrope garnets.

In the beginning, the diamonds were taken to Kimberley every two weeks and sold to the Syndicate, but as the output increased, they were sold in the open market. Later, as the yield assumed proportions which threatened the stability of the market and made the Premier a formidable competitor of the syndicate established by the De Beers management, an effort was made to include the sale of the Premier output with that of the Kimberley mines, under the same management. A contract to that end was made October 28, 1907, for a short period, but it was terminated in March, 1908, and the Premier Company again marketed its own diamonds.

Notwithstanding the decline of percentage in yield per load, the increase of total yield was so rapid and phenomenal, that the men who had hitherto controlled the world's industry in diamonds were staggered.

Owing to a glut of diamonds in the market after a year of enormous production followed by a panic in the United States, which practically cut off demand from the industry's best customer, part of the plant was shut down January 1, 1908, thereby reducing the output thirty thousand carats per month, but the mine is evidently in a position, with the plant to be installed in 1909, to turn out at will from three to four million carats per annum. Back in 1905, the management declared that it was then prepared to supply up to twelve million loads of blue per annum, for one hundred years to come. Even at the present decreased yield per load, that would mean three million carats annually. At that time the company was considering additions to the plant at an estimated cost of £300,000. That equipment would enable the mine to handle 45,000 loads of blue a day.

Under the ordinance of 1903, which was put through when the Premier people had little influence with the Parliament and received scant consideration, the Transvaal Government receives six-tenths, and the shareholders four-tenths of the profits, after the company has first recouped itself for capital outlay on development and plant. Since the start, to October 31, 1908, this outlay has been large, amounting to no less a sum than £1,413,666, compared with which the initial capital of £80,000 is small.

Although the government takes sixty per cent. of the net profits, the balance pays enormous dividends to the stockholders. The net earnings of the mine for the first year ending October 31, 1903, were £102,863. The year following they were £667,738. In other words, the net earnings for the second year of the mine's existence, were more than eight times the amount of its entire capital stock. These profits were used in further developments. In the five years since, the profits have averaged over £750,000 per annum. The diamonds produced in the three years, 1906, 1907 and 1908 averaged over $1,500,000 per annum. From 1902 to 1908, 20,000,000 loads of "blue" were washed. The company's share from the sale of the Cullinan diamond according to the directors' report of February 25, 1908, was £116,682.

The present company was floated as "The Premier Transvaal Mining Company, Ltd.," with a capital of eighty thousand shares of one pound each. These were later changed into 160,000 preferred shares of five shillings each with a cumulative preferential dividend of 250 per cent. annually, and 320,000 deferred shares of 2s. 6d. each, thereby splitting up the stock into smaller shares without increasing the gross capital stock, and creating a wider field for speculation and manipulation. With an earning capacity of four to five hundred per cent. after paying the preferential dividend, the Premier deferred shares have fluctuated within about three years between 20 and 4⅛, both preferred and deferred standing to-day at about £8.

It is worthy of notice and highly suggestive of the advanced conditions which will prevail in the new empires now forming in Africa, that the two new colonies of Great Britain, formed and governed by a mixture of English and Boers, show an advanced understanding of the natural rights of all the people to a share in the natural wealth which one or a few may chance to discover.

In the Transvaal, the government has established in practice the idea that natural wealth does not justly belong entirely to the discoverer, but should inure largely to the people who through their government must protect and uphold him in the seizure and possession of it. This just recognition of the communal rights of the people is a distinct adjustment of methods, to the advanced condition and enlightenment of the people, and is a decided and advantageous contrast to the dealing of the neighboring Cape Colony, where the natural, ready-made wealth of the country, has been taken out to enrich a few men, who have grudgingly returned to the government the smallest contribution which could be arranged between grantee and grantor that would placate the general public and enable the exploiters to carry the country's natural treasures away. Whereas the Premier pays the Transvaal government sixty per cent. of its profits, the De Beers Company, a few miles off in the Cape Colony, is taxed only ten per cent. This unrighteous condition, established in the Cape Colony by the powerful influence of capital upon legislation at a time when the people of the colony did not understand the situation, which permits millions of the natural wealth of the colony to be carried annually to the mother country without adequate compensation, would place the industry in the Orange River Colony and the Transvaal outside the possibility of competition, were it not for the smaller cost at which the new mines can be operated. The area of the Premier is so great that it can be operated as an open working for years. It is estimated that the claim area to a depth of 70 feet contains 20,000,000 loads. It is being opened in a similar way to a quarry, after which manner open working has been carried on in the Jagersfontein mine in the Orange River Colony, it is said, to a depth of 700 feet.

Roberts-Victor Mine.

For several reasons the Roberts-Victor mine is one of the most important of the new mines of South Africa. Its initial capital is £160,000, divided in one pound shares. With one exception, the diamonds from this mine have brought the highest price per carat of any. In 1906 the average price of the Dutoitspan diamonds was 80s. 11.52d., whereas the Roberts-Victor brought only 75s., but in the value of the yield per load it far exceeded any other. One hundred loads of Roberts-Victor brought over £260, whereas with a higher price per carat, the yield of the Dutoitspan was so much smaller that one hundred loads brought but a little over £100.

The mine is in the Orange River Colony near Boshof, about forty miles from the Kimberley mines. It was acquired by the present company from the original owners in 1906. At that time there were about ninety claims. The company now owns 500 acres.

Work in the mine began in May, 1906. The percentage of carats per load for the first month was .91, but it fell so that the average for the first year was .698. To the end of December the yield was 20,406 carats, which left a profit after deducting the expenses of prospecting, developing, mining operations and registration, of £39,045. Out of this, however, the Orange River Colony is entitled to a share, the maximum being forty per cent. of the profits.

The output for 1907 was 132,809 carats, but the percentage of diamonds per load was still less, being given as .536. It is considered one of the most promising of all the South African mines, as it combines fine quality with abundance. The diamonds are of very good color and many of the crystals are very perfect and beautiful.

The Voorspoed is an Orange River Colony mine capitalized at £400,000 in £1 shares. Work commenced in 1907, and the first six months yielded 46,340 carats at an average of .21 of a carat per load. They realized an average of thirty shillings per carat. Only one mine yields less in money value per load, the Lace. Nevertheless it is confidently expected that it will be a factor in the diamond market, as it will probably produce three to four hundred thousand carats per annum. The crystals are usually small and of mediocre quality. The average yield including 1909 has been a little over .19 carats per load. The year 1909 yielded a total profit of £53,870.

The Koffyfontein continues to turn out in the neighborhood of ten thousand carats monthly. The output for March, 1910, was 9,803 carats, which were sold at an estimated profit of £7,500. At that time there were over one million loads of blue ground on the floors.

The "Frank Smith," and "Otto's Kopje" diamond mines, are situated in Griqualand West, between the Vaal and Hart rivers about forty miles from Kimberley. The former produced about 23,000 carats in 1904 and 1905 but did not pay and has been closed down. The latter from August, 1900, to July, 1902, produced diamonds which realized £21,425 exclusive of one of 336½ carats. It did not pay and was closed at that time and a proposition made to reorganize the company.

In 1909 in German South West Africa, 14 producers won 560,977 carats worth £836,000. Eighty-five per cent. was sufficiently good to cut. The average size of the stones was one-fifth of a carat. About eighty per cent. of the output was sold in Antwerp and Brussels, the balance being distributed in Amsterdam, Germany, London, New York and Paris. The net profits after paying expenses and government charges amounted to £34,500.

Several large diamonds have been found in the Barkly district during the winter of 1909–10: a fine blue-white stone of 90 carats and a very good one of 65¾ carats at Baboon Island, and one of 35 carats on the Barkly West Commonage.

The diamond chimneys are usually somewhat funnel-shaped at the surface, so that many of the surface locations on the edge of them ran out with depth.

DE BEERS FLOOR—BOYS BREAKING BLUE

CHAPTER XIV

DIAMONDS FOR MECHANICAL PURPOSES. ARTIFICIAL DIAMONDS AND DIAMOND WEIGHTS

IN addition to carbonado or carbon, there are other forms of diamond which are used largely for mechanical purposes. Of these the principal is called "bort." This is crystallized diamond not sufficiently transparent or clear to cut as jewels. A large part of the product of the diamond fields is composed of this material. It is estimated that one-quarter of the yield of the Brazilian diamond fields and about forty-five per cent. of the African mines, consists of bort. Some of the African mines yield a larger proportion than others, notably, the Premier and the Kimberley.

Usually it is too brittle for drill purposes, the crypto-crystalline carbon being harder and better able to resist pressure. Nevertheless, bort, in sizes from one to three carats, is used to a certain extent in drills which are not forced to any great depth, or through very refractory strata.

Crystals weighing one-half to one carat each are used extensively as teeth in stone-saws for sawing marble and stone for building purposes. Revolving saws up to 75 inches in diameter and sometimes over, carry up to 100 diamonds weighing in the larger sizes 25 or 30 carats worth $20 per carat. These saws with a rim speed of 10,000 to 12,000 feet per minute, cut into limestone over

7 inches per minute. Large quantities are used in electrical machines as jewels for meters, etc. It is recorded that Solomon used diamonds to cut the stones for the temple at Jerusalem, so that the enterprise of our modern machinists may be but the resurrection of very ancient methods, and it is not improbable that the Jewish King obtained his diamonds from the same or neighboring sources, for there is evidence of ancient mining in Rhodesia, in a section where late discoveries of diamonds have been made.

Small pieces of bort, and crystals which are full of inclusions and fractures, are crushed to a powder for use as an abrasive.

Unlike carbon, which is found with the gem diamond stones in one district only in Brazil and to a very limited extent in Borneo, bort is found in all diamond diggings the world over.

As there has been no sustained effort, by controlling the output, to maintain prices, the price of bort has varied considerably since the discovery of the African diamond mines. It has depended largely on the demand created by the use of it for mechanical purposes. In 1875 the price for unassorted lots at the mines was about 50 cents per carat, but as it was found useful for more purposes, and the number grew of those who knew its value for their uses, the price rose gradually, until by 1883 the mines were getting an average of about $2 per carat. These are much less than the market prices for assorted goods during the same period. Since then there has been considerable fluctuation, but the tendency has been upward, especially since the rough was marketed in London, though the opening of the Premier with its big output of bort, broke the upward movement. Present New York quotations are as follows:

1 to 3 carat crystals for drills................	$8.00 to $15.00	per ct.
½ to 1 carat crystal for saws, etc............	3.00 to 4.00	per ct.
16 to 20 to the ct. crystals for meters, etc.....	3.00 to 3.50	per ct.
Small and poor crystals for crushing........	.75	

In the early years of the African mines, dealers made large profits. The market price in 1875 was about $4 per carat for fragments, and $10 for crystals. It fell steadily to 40 cents to $1.50 in 1892. It then rose to $4 to $8 in 1901, since which it has declined steadily again. Small diamonds, or corners of crystals, having an edge suitable for glass cutting and called "glaziers' diamonds," have a wide range of price, selling from $6 to $50 per carat.

"Flats" are thin crystals or parts of crystals into which holes are bored so that they can be used as dies for drawing wire. In many of the fine and delicate adjustments required now, in electrical machinery especially, it is necessary that wire shall be drawn to a gauge infinitesimally exact. Constant drawing of wire through metal dies, even of the hardest, soon enlarges the hole, and consequently the size of the wire also, but with a diamond die, enormous lengths can be drawn without any appreciable difference. These tiny plates of diamonds have therefore become valuable assistants in the progress of machinery and its adaptation to applied science. They are sold now for $3.50 to $8.00 per carat. The dies for which diamonds are used are for drawing fine wires. The holes range usually from 0.001 inch to 0.064 inch, though they can be made accurate to 0.0001 inch. The wear of metals on diamonds increases in the following order, it is said: Gold, silver, copper, brass, bronze, platinum, nickel, iron, crucible steel.

"Splints" are sharp-pointed splinters of diamond crystal. They are obtained from the refuse of the cleaving and cutting establishments and also, since the use of the grease-table, from the mines, with the unbroken crystals. As noted elsewhere, the matrix of the African mines contains many fractured crystals, and the grease-tables hold small splintered pieces which formerly escaped attention when hand picking was the custom. They are used for small drills, for turning jewels for watches, electrical machinery and similar purposes, and at present bring from $3 to $10 per carat.

In the use of diamond in any form for mechanical purposes, care must be taken to avoid crushing or overheating. The hard fragments of a broken diamond involved in machinery turning rapidly, do serious damage almost instantaneously, and overheated, the crystal loses consistency and carbonizes the soft iron of the setting, turning it at once into hard steel. This applies particularly to carbon when used for deep borings. A hard blow will often crush carbon to fragments, and heat injures the quality. A stoppage of the supply of water to the borer has been known to change the hard carbons of the drill to a mass resembling black glass which yielded to a file, while the soft iron of the bit was at the same time turned to steel. Great skill and care is necessary also in the setting of the carbons in a drill for deep boring. If one gets loose, it quickly tears itself and the bit to pieces, and fishing for a loose carbon through a small tube several thousand feet down in the earth is wearisome and expensive.

Carbonado, or carbon, is the most important form of diamond for mechanical purposes, as it is used in the larger operations of deep boring.

The colors of carbons vary from light brown to jet black. Usually they are lighter on the inside, but with long exposure after splitting, the pieces grow darker. There is a wide difference in the quality, and the toughness can never be determined by the color, and not always by the appearance. The specific gravity test is safest. Usually those of a dense, close texture, are hard, but sometimes porous, or open texture pieces, are very hard, and close grained ones, soft. Formerly carbons were all split in Europe, but 25 or 30 years ago Mr. I. C. Yawger built a machine here for that purpose, and much of it has since been done in this country. To split a carbon, it is placed between hard chisels or cutters and subjected to heavy pressure or a blow.

In diamond drills, pieces of carbon, usually 8 pieces, are set in circular rims of soft steel or iron, 4 on the inner side of the center of the rim, and 4 on the outer, placed alternately. The metal is burnished well up on to the carbons to withstand the strain and hold them. These bits are attached to tubes in sections, and borings have been made in this way to a depth of over 6,000 feet. Only carbon can stand such a strain and pressure; bort is too brittle. Owing to the increasing demand and consequent advance in the price of carbon, these bits are expensive necessities in mining explorations.

A bit for deep borings will require 8 carbons of not less than 3½ carats each, or 28 carats for the bit, which would bring the cost of the carbons alone, for one bit, at the present price of $85 per carat, to $2380.

The carbons are bought for cash, at first hands, in unassorted lots of all sizes and qualities, running from 300 to 1,500 carats. As with all expensive material, frauds are perpetrated on the unwary by some unscrupulous dealers. Poor diamonds are fixed up to look like carbons, bogus carbons are mixed with the genuine, and sometimes unadulterated frauds are palmed off for genuine.

In the natural state, carbons usually show no regular form of crystallization, though octahedrons, and cubes have been found. Under the microscope, however, they appear to be formed of minute diamond crystals, and carbon powder is composed of bright brown half transparent diamond octahedrons, frequently with opaque enclosures. Carbon therefore appears to be a mass of infinitesimal diamond crystals. To one outside the trade, the stones have no appearance of value whatever. They are light in weight and therefore do not impress one as the heavier metallic ores do. Irregular in shape, of a dull grayish-black, brownish, sometimes greenish, color, there is nothing about them to suggest value, yet half a dozen of them as large as hickory nuts would be worth several thousand dollars. Close examination under a loup will discover a porous-looking surface covered with angular indentations having a lace-like appearance and a wave-like arrangement. In and about the crevices are numerous infinitesimal glistening specks like the faces of small crystals. Some pieces have a vitreous sheen like a piece of molten glass. This characterizes many of the carbons from the Morro district.

There are certain risks attached to the breaking up of the large stones which make them highly speculative. There are sometimes vicissitudes of price in the journey from the cascalho to the machine maker, and they lose not less than ten per cent. of the weight in breaking. For the large carbon of 1895 the finder got about $16,000; the owner of the claim receiving one-fourth of the amount. It went through several hands and was sold in Bahia city for 121,000 milreis, equal at that time to about $25,400. The London buyer paid about $32,000 for it, and after breaking it up, got nearly $36,000 for it. The smaller one of 1901 brought the finder $17,380, or about five times as much comparatively, so much had the price advanced in the six years. The rapid development of electrical and other machinery is indicated by the rapid rise in the price of carbons. In 1884, $4 to $4.50 per carat was paid to miners in the fields for unassorted lots of good material. In 1898 the price was up to $11 and over. In 1902 it was reported in London that £8.10 to £9 per carat was paid in Brazil for fine quality carbons of the desirable sizes, though consular reports quoted $24 as the price paid in the field for unassorted stones over three-quarters of a carat; $7.20 for half to three-quarters of a carat stones, and $2.75 for smaller ones mixed with imperfect pieces and refuse diamonds.

The limits of prices given by Bahia firms to their field buyers to be paid in the spring of 1906 was given by former Vice-consul Rowe as follows:

Carbon

1st quality, 6 to 120 graos.......	31 milreis per grao	= $42.45 per ct.
120 graos upward	30 milreis per grao	= 41.07 per ct.
2nd quality (porosis)	15 milreis per grao	= 20.54 per ct.
Crystallino	10 milreis per grao	= 13.69 per ct.
Ballas, broken pieces, 6 graos up	10 milreis per grao	= 13.69 per ct.
Ballas, broken pieces, 4 graos up	20 milreis per grao	= 27.38 per ct.
Ballas, broken pieces, 3 graos up	12 milreis per grao	= 16.44 per ct.
Fundos	2 milreis per grao	= 2.74 per ct.

Ballas or Borts

1st quality white, 6 graos up....	30 milreis per grao	= $41.07 per ct.
Colored, 6 graos up	25 milreis per grao	= 34.25 per ct.

A grao is about ¼ carat; 72 graos = 1 oitava = 17½ carats.

It is difficult to tabulate prices exactly, as they vary according to conditions and the average quality of the lots. Though in a general way prices at the fields follow the market, they do not adjust themselves as quickly to the immediate demand throughout the scattered diggings in the interior wilds, as at Bahia city. Nevertheless, as there is competition among the field-buyers, and they are kept well informed by the houses they represent, the diggers receive on an average, a good share of the market value, though naturally they do not benefit as fully from a sharp advance of price.

As in Brazil, London sells chiefly in unassorted lots, but Germany has established a profitable business in carbons, by assorting and selling separately, according to individual requirements.

Though the source of supply is comparatively near New York and a large quantity of carbons is used in the United States, our supplies come chiefly via Europe. There is a monthly steamer plying between Bahia and New York, but several steamers leave Bahia each week for British ports. At one time firms exporting up to $150,000 per annum paid a tax of $1,500; if the exports exceeded that amount, $3,000 per annum. There was an export tax of seven per cent. ad valorum, but this was abolished for a tax on individual shippers calculated to bring the amount up to what it would be at seven per cent. if all the diamonds shipped were declared. Many dealers met this by combining to ship as one firm. These taxes prevent the beginning on a small scale of export in a new direction, though it is probable that more goes to New York direct than official reports show.

The price of carbons in New York at present (1909) is quoted as follows by Mr. J. S. Rose:

Carbons for mining drills, 3 to 6 carats	$60.00 to	$85.00	per ct.
Carbons for mining drills, 1½ to 2½ carats	45.00 to	55.00	per ct.
Carbons, 1 carat	35.00 to	40.00	per ct.
Carbons, ½ to ¾ carat	30.00		per ct.
Carbons, ¼ carat	15.00		per ct.
Carbons, smaller	8.00		per ct.

Mr. I. C. Yawger gives the price of carbon for mining purposes in New York from 1879 to 1899 as follows:

1879	$ 5.00 to	
1880	5.00 to	$ 7.50
1881	6.00 to	10.00
1883	15.00 to	24.00
1884	8.00 to	20.00
1885	6.00 to	12.00
1886	6.00 to	15.00
1887	12.00 to	18.00
1888	10.00 to	18.00
1889	12.00 to	16.00
1890	12.00 to	15.00
1891	15.00 to	16.00

1892	$16.00 to $17.00
1893	16.00 to 20.00
1894	15.00 to 16.00
1895	15.00 to 21.00
1896	20.00 to 36.00
1897	31.00 to 36.00
1898	33.00 to 36.00
1899	35.00 to 39.00

Since which the price of fine carbon rose rapidly to $95 two or three years ago, dropping back to the present price of $85 per carat. Stones down to one carat in weight are occasionally used in mining drills for some purposes. The smaller ones are used for emery-wheel dressers, turning hard stones and hard rubber, drilling semi-precious stones, eyeglasses, etc.

In 1904–6 there was an enormous consumption of carbon in the United States, owing to the great development of the machine industry. Sales amounted to nearly $3,000,000 annually; considerably more than the amount declared in the exports of Brazil. Prime carbon brought as high as $95 per carat. At present the price at the fields is about £10 to £10. 10s. per carat.

Among other things, diamonds are used for points, lens, drills, dental drills, pivot jewels, glaziers' tools, glass cutters' sparks, etc. Bort is used for stone saws, prospecting drills, emery-wheel dressers, wire dies, electrical jewels, small tools and to crush for powder.

Misunderstanding regarding prices arises from a habit of quoting prices in trade journals without stating where those prices rule. The price of carbonado in the Transvaal has been quoted at $60 when it was selling for much less in New York, and there are great differences between prices at the mines and in the various markets of the world, owing to the wide range of quality in the unassorted lots at the mines and the varied assortments made to suit the demand of different countries and also to the fact that the character of the material is speculative. It is also necessary to ascertain the exchange value of the milreis at the time, when quotations are made in Brazilian money, as there have been great variations in the value of the milreis.

Artificial Diamonds.

There have been many attempts to make diamonds. The difficult problems involved have excited the desire of scientists to solve them and the great value of the gem has been an incentive to hundreds who experimented in the hope that they might learn how to turn one of the common elements of the earth into costly jewels. Stimulus was given to these endeavors by the discovery of the diamond chimneys of Africa. Occurring there in the mother-rock, it was thought that clues might be obtained to the processes by which Nature accomplished the crystallization of carbon, but so far, of all the theories evolved by observation and experiment, those which were in any degree carried to a successful issue, demonstrated more forcibly in practice the insufficiency of man's appliances, than his ability to compete with Nature.

Carbon, unlike many elements, occurs in Nature uncombined with others and in three forms; as graphite, carbonado and diamond. In combination with others, it appears as a solid in minerals, a semi-solid as in vegetation, a liquid as in earth-oils, and a gas as in carbonic acid. At a high temperature it vaporizes without liquefying, and in the presence of oxygen at a high temperature combines with it to form a gas, the union being accompanied by light and heat. The problem has been, how to separate it from its affinities and establish it as a single element in the stable crystalline state.

Probably the first definite theory on record of the origin of the diamond is that of Sir David Brewster, who believed that the diamond was at one time viscous like a resin, and that its formation came from the vital processes of plants, as tabasheer, a form of silica, grows in the stem of the bamboo. This theory was accepted by later eminent mineralogists and physicists. Others adopted it with various modifications. Some thought it a product of the decomposition of extinct plants by which, through the evaporation of the decomposition products, pure carbon only was finally left, and that this eventually was transformed from an amorphous to a crystalline state. This theory assumed that the processes were evolved at a low temperature, as graphite would result from high temperature.

Others thought that heat was necessary, and that small particles of carbonaceous matter, contained in an igneous rock or taken up from neighboring sources during the passage through them of a volcanic magma, crystallized out as diamond as the mass cooled.

Several thought that large quantities of carbon dioxide in the interior of the earth were reduced at a high temperature by other metals present, the pure carbon crystallizing in the process. From the fact that liquid carbon dioxide is supposed to exist in cavities in some diamonds, one scientist formed the opinion that liquid carbon dioxide at a high temperature and under great pressure, would dissolve carbon, and that diamond might crystallize out of the solution. Experiments in this direction, however, failed to dissolve the carbon.

Liebig thought that pure carbon in the crystallized form was the final result of the gradual decomposition of a fluid hydro-carbon at a low temperature. Another scientist claimed that such a separation could only take place by the action of heat. One thought that the diamond crystallized out of carbon volatilized by volcanic heat, and yet another was of the opinion that it was formed from an excess of carbon during the oxidation of the emanations of a gaseous hydro-carbon.

The decomposition of various mineral compounds of which carbon was a constituent, is believed by many to have been the method by which, during the chemical reactions, diamond was precipitated as a crystal. Others discredit the solution theory and maintain that it was accomplished by the interaction of gases.

Professor Moissan, the most successful experimenter, obtained diamonds by a combination of heat and pressure simultaneously applied to a solution containing carbon. Knowing that molten iron was a good solvent for carbon, he took iron filings and charged them with pure sugar charcoal. Placing the mass in an electric furnace of his own construction, in which he was able to concentrate the energy of 100 horse power upon the crucible, and produce a temperature between 6,000° and 7,000° F., he melted the carbon-charged iron to an ingot. When at this tremendous heat the iron began to vaporize, he plunged the seething metal into water or molten lead, solidifying the outer skin of the ingot by the sudden cooling, about the still liquid interior, Cast iron, though it contracts later in cooling, expands when it solidifies and the expansion of this liquid interior within the rigid shell, as it solidified, produced an enormous pressure. When the iron was eaten away by repeated acid baths, there remained a number of crystals, microscopic, but veritable diamonds; the carbon had crystallized. The largest crystals he obtained, however, did not exceed ½ millimeter in diameter. Of all the numerous experiments made so far, if others have resulted in crystals or crystalline masses which were apparently either diamond or something very like it, unquestionably genuine diamonds have been produced by this method only, though I. Friedländer demonstrated, it is said, that graphite is soluble in fused olivine, and that it separates out as diamond on cooling.

Electric sparks passed through a vacuum with a carbon cylinder and a platinum wire as terminals, for over a month, coated the wire with microscopic octahedra which were said to scratch corundum. A crystalline mass containing ninety-seven per cent. carbon was obtained by placing lithium, paraffin and a little sperm oil in a sealed wrought-iron cylinder and subjecting it to a very high temperature.

While scientists at a cost of much time, labor and money, have patiently studied and experimented, in the effort to crystallize carbon, charlatans and rascals have been busy deceiving the gullible. Not many years ago a dealer in imitation gems was very successful in selling glass diamonds by adopting the idea of gold-plated jewelry. He announced with a great show of frankness, that his diamonds were not diamond throughout, but that a piece of very fine crystal glass was used for the body of the stone. This was dipped into a liquid made of melted chips of diamonds, whereby a coating of diamond was deposited on the surface. The finished product was therefore practically as good as solid diamond, though the cost was very much less. Having in mind the well-known process of plating the base metals with gold, many persons paid large prices for his pure glass diamonds, and not a few jewelers also gravely and innocently retailed the story with his high-priced glass gems.

Paste diamonds, or glass, as they really are, have been sold under many names. "Paste diamonds" or "white stone jewelry" are names used when there is no attempt to deceive, but many of the names given to these imitations, though unaccompanied by explicit false statements, are intended to aid the buyer to infer that they are better than they really are. Most of these, since the greater vogue of the diamond in this country, have fallen into disuse, as the "Lake George diamond," the "Colorado diamond," and the "Parisian diamond." A few years back, stores filled with cheap imitation diamonds with which pieces of so-called white topaz or rock crystal, cut like diamonds, were mixed and placed under effective electric lighting, were opened in most of the leading cities of the United States. Ambiguous signs carried an impression that the imitations were either real stones, or so superior that they were preferable to stones that were real. In some cases it was stated that real diamonds were placed among the imitations and if picked out by a customer, could be bought at the same price. The nominal price of the jewels displayed was one dollar each, but a customer willing to be enticed could easily pay much more for a piece of the same value, for some fancied superiority. So cleverly were these glittering displays managed, that sufficient profits were made out of a foolish clientele to pay the high rentals of stores in the most expensive locations, and leave a large surplus for the managers.

In the past, white sapphire, jargoon, white topaz, and rock crystal have all at times been sold occasionally as diamond, but of late years imitation diamonds, of whatever name, have been simply glass, for fine specimens of sapphire and jargoon excepted, glass looks better long enough to sell, than the other stones which though real, are not as deceptive.

As enormous quantities of them are used, much ingenuity has been displayed in the manufacture of glass diamonds and the art has been brought to a high state of perfection. The imitation of gems is as old certainly as Egypt, but the fine white glass composition which with some variations is used now, was invented in the seventeenth century by Josef Strasser of Strasburg, and was called after him "Strass." It was composed of silica, potash, borax, red-lead and sometimes arsenic. Of the different proportions used now, the following is given as a good example: 300 parts powdered quartz, 470 parts red-lead, 163 parts potash (purified by alcohol), 22 parts borax, 1 part white arsenic, by weight. This makes a dense white glass and is the mixture called strass or paste, from which the fine imitations are made. Great care is exercised in cutting the fine imitations, not only in the work of faceting, but also in shaping and cutting to proportions which will hide as much as possible the inherent differences of reflection, refraction, and dispersion. Though one familiar with diamonds cannot be deceived on inspection, under some conditions when worn, a fine paste will escape detection. The surface brilliancy is often very beautiful. Though it will not entirely hide the internal weakness and vacancy of glass when at rest, it is confusing when in motion. In order to hold the light entering the stone from passing out at the back, which gives a glass diamond its weak, lack-luster appearance when at rest, the back is sometimes entirely covered with foil. These are used for close-set jewels, in which the backs of the stones are not seen. For openwork setting, the foil is put on and just around the culet. But these are not popular except in cheap gold jewelry, as the foil at once betrays the imitation even to the inexperienced, and most of those who wear paste jewels are at least willing that the observer shall have a chance to believe them real gems.

Paste diamonds are not as ancient as imitation colored stones. The Egyptians, Phœnicians and Romans were adepts at manufacturing spurious emeralds, rubies, and similar stones, but they did not imitate the diamond. Perhaps no better evidence exists of the late recognition of the diamond as a jewel than the fact that it was not imitated prior to the seventeenth century. Since then paste has glittered on the persons of thousands who loved, but could not afford diamonds, and has shone from the buckles and belts of many who though rich, thought them good enough for certain purposes. Years ago the jewels of the stage were well-nigh all glass, but now popular singers and actresses wear gems both rich and rare.

Look into a paste diamond from the front, and it will be seen that the inner surfaces of the back facets lack the shimmer of light on them which is so noticeable in the real diamond. The surface of the stone nowhere looks so hard; the corners of the facets are not as sharp; the light from it is not as quick and sharp. Let a diamond and a paste lie together in the same temperature for a few minutes, and it will be found on touching them with the tongue, that the paste feels warmer than the stone. Touch the face of each with a point carrying water, and the drop left on the diamond will hold itself together like a globule; that on the paste will flatten and spread. The sharp edge of a file will bite the imitation, but glide harmlessly over the diamond.

Diamond Weights.

The weight of diamonds to-day is reckoned by the "carat," a term which means different quantities of mass in different countries, though it is practically the same in those markets of the world where most of the gems are handled. It is nowhere recognized by a government as a definite legal weight, but is an evolution, peculiar to the diamond trade, out of ancient and primitive conditions. According to Charles Edward Guillaume of the International Bureau of Weights and Measures at Sevres, as reported from the Commission of the National Bureau of Weights and Measures in France, during the late endeavor to establish an international decimal weight for the weighing of diamonds and other precious stones, there exists at present, the following variations in the milligramme weight of the carat in different cities and countries:

Alexandria	191.7
Amsterdam	205.1
Antwerp	205.3
Arabia	254.6
Berlin	205.5
Bologna	188.5
Brazil	192.2
Constantinople	205.5
East Indies	205.5
Florence	196.5
France	205.
Frankfurt	205.8
Hamburg	205.8
Lisbon	205.8
London	205.5
Madras	205.5
Moka	194.4
Spain	199.9
Turin	213.5
Venice	207.
Vienna	206.1
Pearl carat	207.2

The carat of 205.5 milligrammes, it will be noticed, is used in the chief centers of the diamond trade, and it is the weight in use in the United States. One of these carats equals four grains avoirdupois or 3.174 grains troy, and 151.42 carats equal 1 ounce troy.

With the extension of the diamond trade during the last twenty-five years, these variations have proved confusing, and an effort has been made in Europe to abolish the old system of carat weight with its divisions by two into $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $^1/_{16}$, $^1/_{32}$, $^1/_{64}$, and establish a decimal system on a base of 200 mgs. as the metric carat. The dealers in diamonds, however, feared that such a radical change would disturb trade, and the attempt failed. Governmental recognition of the carat as a weight was sought in Germany, but the proposition could not be entertained, as it was contrary to the laws in force regarding the metric system. It is now proposed to substitute for the carat now in use, one standard carat weight of 200 milligrammes, leaving the metrical divisions to be acquired gradually, as the trade becomes familiarized to the idea. On October 17, 1890, the Association of Diamond Merchants of Amsterdam, fixed the value of the carat on a basis of 1 kilogram = 4,875 carats, which is practically the same as the old Amsterdam carat value.

The origin of the word "carat" is obscure. It is said to have been derived from "kuara" (sun) an African tree whose fruit and blossom are of a golden color. As the bean when dried was always of about the same weight, it was used in Shangallas, the chief market of Africa in Galla-land south of Abyssinia, as a standard of weight for gold. Others trace it to the "keration," a word taken from the Greek by the Romans, which they described as the name of a very small weight or measure. An old book says, "Monardus writeth that he saw diamonds in Bisnager (Visnapour) that weighed one hundred and forty ceratia, and every ceratium weighed four grains."

Mr. Leonard J. Spencer, assistant in the Mineral Department of the British Museum, who has made a very interesting appeal for the adoption of the metric system, favors the theory that the word and weight are derived from the seeds of the Ceratonia Siliqua (carob or locust tree). He found that the seeds of this, and those of the Erythrina Corallodendron (Linn) averaged alike in grams 0.197, but that the seeds of the latter in the various species were not so constant as those of the former. Kuara is a native African name for a species of Erythrina or coral tree. The Greek κεράτιον refers to the horn-like shape of the fruit pods of the ceratonia, whereas "carat" is an obsolete English name for the seeds. It seems probable that the seeds of both had an influence in establishing a certain amount of mass as a quotable weight which finally became known definitely as the carat. According to writers of the seventeenth century, the carat was divided into four grains, but they were not the ordinary grains of standard weight, nor do they appear to have been reckoned as equivalents of any standard weights outside of the trade. In the eighteenth century, 150 carats were considered equal to about one ounce troy. In the early part of the nineteenth century, the weight was established more definitely in England as 151¼ to 151½ carats to the ounce troy. The weight decreased in value evidently as the things it weighed became more generally recognized as precious. The Greek weight κεράτιον (ceratium) and the Roman siliqua were a little heavier than our present carat (3,174 grains troy), as they were equivalent to $3^1/_3$ grains.

Whatever the origin, or however it may have been used in India or by Indian merchants in their trading with foreigners within or without the borders of their own land, the weight does not appear to have been adopted in India as a standard. Early travelers in India found the "rati" or "ruttee" and the "mangelyn," to be the weights generally used. The rati also had its origin in a seed; that of Abrus precatorins (Linn). Evidently weights bearing the same name varied materially in value in India, not only at different times, but at the same time in different principalities, as they do yet. The rati varied from about 1.85 grains to 2.49 grains. In Sambhulpur it was equivalent to about 1.86 grains. The ruttee of India now, for pearls, equals 2.85 grains, but in Delhi, for gems and the precious metals it is equivalent of 1.25 grains: in Surat = 1.95 grains; Bengal = 2.25 grains; Sindh = 2.49 grains. Tavernier rated a rati at 7/8 of a carat, which, if he used the French carat, would equal about 2.78 grains.

The "mangelin" or "mangelyn" of Golconda and Visapur was equivalent to 1 3/8 carats.

The oitava of Brazil equals about 17½ carats or to be exact, 55.34 grains. The grao is .77 grains, or about ¼ of a carat.

Engraved Diamonds.

The third stone of the second row in the Jewish High Priest's breastplate, according to the biblical translation, was a diamond, and in common with the others had the name of a tribe of Israel engraved upon it. The name given to this stone in the ancient writings, "Jahalom," may have represented the diamond. Some Hebrew scholars think it did. More, think the name stood for some other stone, probably agate. It is possible that the diamond was intended, though the stone used may have been another but similar stone, as the ancients undoubtedly confused different colorless transparent stones with the diamond. The supposed diamond might have been white zircon, topaz or rock crystal, though thought to be diamond. If the stone was really diamond, the art of engraving diamonds must be one of those ancient arts which were later lost, for conclusive evidence does not exist of engraved diamonds earlier than the sixteenth century. It seems probable that either the "Jahalom" of the breastplate did not signify diamond, or if it did, that the stone was one of similar appearance only and not what it was supposed to be, for all the engraved diamonds known, have come to knowledge since the date generally set for the discovery of the art.

It is said that Jacopo or Como da Trezzo, or his pupil, Clement Birazo, discovered the art of engraving the diamond at Milan in 1556. According to Blum, Ambrosius Caradossa was the first to sculpture it. A specimen of Jacopo da Trezzo's work, set in a ring, was exhibited in the Italian section of the Paris Exposition of 1867, and another by the same artist, on which the arms of Charles V are engraved, is in existence. Streeter says that the Duke of Bedford has one with the head of the philosopher Posidonius. He also mentions a portrait of the Spanish prince, Don Carlos, by Clement Birazo; the arms of Queen Mary of England by Jacobus Thronus; a signet of Mary of Modena, Queen of James II, with an interlaced cipher M. R. surmounted by a crown; five fine examples, of which four are signets, in a collection at Florence, consisting of one which belonged to Catherine de Medici, with the monogram M. C. and a coronet; one with the Medici shield crowned; one with the crowned arms of Portugal and another small one with a shield, arms and coronet. Three in the Hope collection have the portrait of a philosopher, the head of Emperor Leopold II and one with an engraved cross. A thin stone with the head of Napoleon was exhibited in the Paris Exposition of 1867. In the Streeter & Co. collection was an old marquise ring which formerly belonged to Marie Antoinette. On an oblong diamond in the center was engraved " Marie."

Old records show that on January 16, 1628–9, £267 was paid to Francis Walwyn for cutting, polishing and engraving the arms of Charles I with the initial letters of the Queen on each side, upon a diamond. This was the signet of Queen Henrietta Maria. There is another of Walwyn's, a signet ring of Charles I when he was Prince of Wales, in the collection of gems at Windsor Castle. It has the Prince of Wales' plume of feathers cut in it.

SORTING GRAVEL FOR DIAMONDS

CHAPTER XV

HOW TO BUY DIAMONDS

THE first thing that one should do when he intends to buy diamonds, is to disabuse his mind of the idea that he is about to purchase another form of current exchange with his greenbacks. Notwithstanding the elaborate advertising they have had as an investment, diamonds are not an investment, in a business sense, for the consumer, but a luxury. They are probably the most economical form of luxury in existence, for they do not wear out as sealskin sacques do, nor go out of fashion as fine clothes do, nor do they have to be fed like horses. They do not require chauffeurs and a good income for up-keep. They can be used as collateral without a search or a lawyer's fee, and will bring nearer cost at a forced sale, on an average, than any other form of wealth, except the stock of corporations in which the directors invest their own money. They raise a man several hundred per cent. in the estimation of the woman to whom he gives them, but their money value seldom rises above the price he paid for them. One wearing diamonds will be more generally recognized as a person of some means than he would by carrying about with him the price of them out of sight in his pocket, but if he thinks they will buy as much money as it took to buy them, he deceives himself.

In one sense they are an investment, for they are productive of larger returns in pleasure than most things. They will continue to pay interest in that way after a hundred fashions have come and gone, and after a hundred possessors have owned them and gone. So, as the principal use of money is to get what we want, and pleasure is what we most want, and diamonds will bring pleasure for an indefinite period, the man who advertizes them as a good investment may be right after all.

In order to buy diamonds well, one must have a good knowledge of the stones and values, or good judgment in selecting a dealer and faith in him. It is owing to the lack of these in the transactions of the general public, that so much poor material is marketed at unreasonably high prices, and that so much distrust exists.

It is a fact that many dealers take advantage of the general ignorance about values to get as much as possible for a stone, quite regardless of its value. It is also true that some, in order to make the sale, will represent the stone to be better than it is. Slightly imperfect stones are called perfect. Badly flawed stones are said to be slightly imperfect. White stones are termed blue; off-color stones, white; brownish stones, steel-white, and so on. Nothing is said of cut and proportion when a thick, or over-spread, or badly cut stone, is in competition with one that is well made.

All this is due, partly to the dishonesty of some dealers, and in part to the desire of many buyers, to buy for a lower price than a dealer can profitably sell at.

The influence of advertising is peculiarly great in this age. Untruths so glaring that they are ridiculous to the trade, if cunningly worded and audaciously and persistently stated in the columns of reputable papers, will draw custom from thousands. One might think that business on such a basis could not be permanent. It probably could not in many lines; nor in this, without constant use of advertising mediums and the one redeeming fact, that poor as they may be, the diamonds sold are really diamonds, and to the indiscriminate purchaser, serve the purpose of better stones. To illustrate the nature of this kind of business with an actual occurrence: some years ago, an acquaintance sat in the office of a jeweler, in a city of some size, who was noted for his extensive and shrewd advertising, and witnessed his methods. A man came in to complain that he had been "stung," as he expressed it, in the purchase of a diamond bought of him a few days previous. The dealer listened patiently until the irate customer had expended his wrath. Then in a genial, good-fellow kind of way, he began to expostulate and reason with him, finally offering as proof of fairness, to trade the stone for anything in his stock. Eventually, he got a hundred dollars extra for another stone in the exchange and the man left, smiling and happy. "You got out of that very well," said the acquaintance. "Yes," said the jeweler, "and the second stone is not much better than the first." "But how can you hold your customers that way?" asked the acquaintance. "My dear boy," was the answer, "I don't, but I do business just the same. There's a fool born every minute and I spread nets for them. If I catch them once, I'm satisfied. Let the others have a chance." That man is doing business yet, and has made much more money than many of his more scrupulous competitors. He never misrepresents goods except by inference, is one of the most affable and likable men in his city, and throws small bait broadcast.

To one of this kind, however, there are many who strive to be fair, and endeavor by fair dealing and moderate profits to secure the confidence and custom of a loyal clientele. It is not easy, as another actual occurrence will show. A man came to a diamond dealer in an eastern city and asked him what the diamond ring he wore was worth. The jeweler, not wishing to value the jewel, referred him to an importer of diamonds who was calling on him. This man said to the enquirer, "Have you bought this ring?" "Yes — bought it of a jeweler in the town where I live." "Is he a good man — good reputation? Has he a good trade and so on?" "Why, yes, as far as I know. He has been there a good many years. I don't think he's over rich, but he pays his bills all right, I guess." "Now, if you bought that ring of a good man that has lived in a small town a number of years and saved a good reputation, and is where you can put your finger on him any time, don't you think you might as well take his say-so as that of a man you know nothing about and may never see again?" "Well, looking at it that way, perhaps I might," said the man, taking his ring and walking out, evidently somewhat puzzled and only half satisfied. The home jeweler was paying the penalty of a general distrust created largely by the sins of the other type.

In examining diamonds, there are a great many unconsidered things which befog the judgment of inexperienced buyers. It is impossible to see a diamond at its best in some stores. One must know the light and the surroundings to judge the stone properly. In other stores, the light is so strong that the brilliant reflections hide faults. Oftentimes a strong sunlight will make a false color stone appear so blue that one could hardly believe it to be the same stone when seen under another light. The general character of the dealer's stock has an influence on the buyer's judgment. A fine stone in a stock where all the diamonds are fine, will not appear to as great advantage as one not so good, but better than the average in a stock of very poor grade. Unconsciously, the buyer is influenced more by comparison than actual appreciation of quality. In a small town of the middle west, were two typical stocks of jewelry. One of the jewelers was a very conscientious man, having a strong disinclination to buy or sell anything but the best of its kind. His jewelry was 14 karat fine and of the best makes. He carried no diamonds under top silver capes, and preferred to sell crystals only. The other carried low grade goods, and advertized bargains. A man entered the store of the first and asked to see diamonds. They were shown to him, and prices quoted which included a very moderate profit, so moderate that the net profit after deducting the expense of carrying stock and doing business, would necessarily be very small. The customer thought the prices too high, and expressed his opinion in terms that were more forcible than polite. The dealer had not much to say. He said, "I think I buy judiciously. I pay my bills promptly and deal with very reliable houses. I am asking but a very small profit and the stones are exactly as I represent them. It is the best I can do." The man was not satisfied, but left, and went into the other store, where he bought what appeared to him to be a finer stone than any he had seen in the first store, for a little less per carat. The fact is, the first man had nothing as poor in his stock, and did not ask as large a profit as the buyer paid, but the stone that was bought was so much better than most of the diamonds in the second stock, that the buyer unconsciously rated it as much better than it was.

Many persons have a large amount of misplaced faith in their ability to "carry color in their eye." They think that they can accurately gauge the comparative color and quality of two stones seen at different times and places. Dealers are not so confident, especially those of large experience. One constantly handling gems, will arrive at a definite conclusion about its value after carefully examining a stone, but he will be slow to form an opinion about the comparative color of two stones, unless he can see them side by side, or there is a very decided difference.

Surroundings and prejudices influence judgment much more than people think. A finely made mounting will incline most persons to think that the stone in it must also be fine. It is very difficult for some to believe that poor stones exist in fine and expensive stores, but they do. Good clothes cover much vulgarity. By the same process of subconscious reasoning, a really fine gem is rarely recognized if it is in the hands of a small dealer, or in an obscure store. The general public is apt to buy on impressions made by conditions and to be quite sure at the same time, that they are exercising judgment on the gem.

Many judge a stone by the price asked for it. This fact tempts some dealers to accommodate price to the ideas of the customer. A story current among traveling men some years ago will illustrate frequent conditions. A lady, customer of a jeweler in a city of fair size, wished to buy a diamond, larger and finer than any he carried in stock. As the representative of a New York importing house was in town, he sent for him and asked him to show his customer some of that character. The New York man did so, adding to his trade price a commission for the jeweler, as is the custom. One stone pleased her, but the price was less than she intended to pay and consequently she refused it because it "was not fine enough." It really was a very fine stone, and the best he had. Finding that he could not persuade her to buy, he said finally: "I have a stone about the same size which is extraordinarily fine, but I have left it in the hotel safe, as it is of a character not usually wanted in a town of this size. If you will come back later, I will be pleased to show it to you. If that does not please you, I must confess that I have nothing that will." An appointment was made; he showed her the same stone set in a little velvet jewel case made to display a single stone to advantage, and asked a little more than the amount she had decided to pay, with an air of one who could do nothing further. She expressed delighted appreciation of its quality and beauty, and promptly bought it. This man acted as some dealers do under similar circumstances. They intend to sell at a fair profit, but rather than lose business they will raise their prices to any point satisfactory to the buyer.

Of the public, women, as a rule, have the sharper eye for color, and the quality of color has a large influence on price. It should be remembered, however, that there are other things to be considered in connection, i. e., brilliancy, proportion, cutting, and perfection. If a stone has all the good qualities, each one has added to its value, and some of them at first sight may not be fully recognized. Many times, conscientious dealers lose a sale because they have selected a stone critically for an uncritical person who thought the price too high, though it was really very low for one so perfect in good qualities.

A sharp trader, or a good judge of diamonds, may sometimes buy to better advantage than others, but usually the person who selects a dealer of good reputation, tells him frankly what kind of a stone he wants, what he is willing to pay, and trusts him to do what is right, will on an average come out best. The dealer as a rule, however much the buyer knows about diamonds, knows yet more, and he has the advantage of knowing what the goods cost. If he has a customer who is willing to pay a fair profit and shows no inclination to beat down the price, he will ask only what he feels he ought to get for his jewel. If on the contrary he finds that he has a contest of wits on hand, he will prepare himself for concessions, and he has the advantage of knowing just where he must stop in the whittling of price.

Gem stones command good prices, for they are rare. Nevertheless they are not usually as high comparatively as they are better than the lower grades. If due consideration be given to the rarity of very fine stones, they are the cheapest ones sold.

Many jewelers have a very bad habit of underestimating diamonds bought elsewhere. This arises from two causes. One is, the desire to convince the owner that a similar stone could have been bought at a lower price of the jeweler estimating. One doing this generally destroys confidence and his own chances for future business. Sometimes, in the case of gem stones especially, it is done without ulterior motives; the jeweler is unacquainted with material of that character and has no adequate idea of its market value. If one has bought a stone of a reliable house and it is found to be all that the dealer claimed for it, and by comparison with others proves to be satisfactory, a judgment that may be prejudiced, should not weaken confidence in the man who made the sale. If the dealer's statements prove to be false in any particular, then he may be justly suspected at all points.

A willingness on the part of the buyer to pay a fair profit, will not generally militate against buying at a right price, for most jewelers are more afraid of competition than they need be. Only in exceptional cases will the dealer fail to make his profit. Whatever his asking or selling price may be, there is a profit in it, if he sell his diamond. A good understanding will incline one as a matter of business to pay a fair profit to a responsible dealer, rather than to take chances with an irresponsible one. Irresponsible men sometimes sell diamonds with a cloudy title. If the buyer has no one in the trade in whom he has sufficient confidence to say: "I want so and so and am willing to pay so and so much; do the best you can for me," it is worth something to him to have a good stock shown him by one who is responsible. It costs that man the interest on a large sum of money to carry that stock. It cost him years and money to establish his reputation. Stones break and chip sometimes in the setting; it is worth something to be ensured against loss in a case of that kind, as one is when dealing with a responsible man. Unfortunately there are a few men in the trade who will change stones if they have an opportunity. They will sell one stone and deliver a poorer one. Dishonesty of this kind is very rare, however. Perhaps no trade is more free from such rascals.

Large stores of good character have their advantages. The clerks do not always know much about the goods, but the jewels have been examined by men connected with the establishment who do, and they have passed on the grade and price. The buyer knows, without argument, just what each stone can be bought for. They may make a somewhat larger profit than the small dealer of equally good reputation, but usually they can also buy to a little better advantage, because they buy larger parcels and quantities, so that the price would be about the same.

A difficulty which the trade has to contend with, is the ancient Oriental idea still clinging to it, that to do business in precious stones, the public must be kept in ignorance of the real facts about them. That idea is the survival of an ignorant past. To-day the people of the United States know much more about them than the public of any other country. They also buy sixty per cent. of all the African diamonds mined. The American may be a little more difficult; he may want to know more about the thing he buys; be too exacting, and inclined to chaffer, but he buys. People here, of classes which in other countries never expect to own diamonds, buy a large part of the diamonds sold. In other countries the buyers are generally persons of inherited wealth, or the newly rich who, like ours, prefer obsequious service to low prices. Ignorance helps to sell trash at high prices occasionally, but knowledge increases the sales of fine goods at fair prices. It is the man who knows, that is willing to pay a good price for a good thing and does not expect the best for the price of the poorest. The ignorant buyer is usually suspicious. The only reason why the American people do not buy more of the many other precious and semi-precious stones is, that they do not very generally know of them. One cannot want a thing, of which he has not heard, nor to his knowledge, seen.

Unless one is confident that the dealer will be quite frank about the stone he offers, it is better to see the stone unmounted, to judge of color and perfection. A platinum mounting will hide a strong tinge of yellow; a gold mounting will sometimes throw an appearance of color into a white stone. The prongs of a mounting frequently cover flaws and breaks in the edge of the diamond. It is possible to be hypercritical in these matters, but it is only just that one should have all that he pays for. If a perfect white stone is wanted, it should be supplied, unless the buyer will not pay the price of such a stone. In that case it is better business, in the long run, for the dealer to be frank and state the facts. An observation of the methods of many dealers, covering a number of years, convinces, that whether one makes a specialty of white and perfect stones, white imperfect, lower grades, or any and all kinds, the most successful, eventually, and who grow to be foremost in their respective cities, are those who sell goods for what they are, and of them, the man who sells the best, is usually in the van. The great jewelers of the United States have not become so by robbery and misrepresentation. They may have been able to command large profits, but their business has been established on principle, and has been free from deception and chicanery.

There is a strong and general desire to buy under current rates. It is quite proper for one to buy as cheaply as possible, but the desire often leads the purchaser to do just the opposite. This is a bargain-counter age. A constant perusal of the morning papers leads one to infer that everything is now sold at a reduction. Inasmuch as the reducers grow rich, after spending many thousands of dollars to induce the public to buy their profitless wares, some preparation was probably made in the original price for the reductions advertised. Whatever the facts about dry-goods and other staples may be, dealers know that advertised bargains in diamonds are usually deceptive. Undoubtedly there are bargains, and for various reasons, diamonds are occasionally sold much under market price, but they are usually bought by dealers who know diamonds and their market value. The public generally get the "one-third off" goods, after the price has been marked up fifty per cent. If a diamond stock were offered at one-third off a reasonable price, dealers would not leave much of it for the public to buy. As a rule, "bargains" are undesirable goods. When they are really bargains, dealers buy them and pass them on with a small advance to acquaintances who will buy at a price out of season, to save money against the time when they will be in season. Many fine jewels are accumulated in this way by shrewd men of means, at prices much below those ordinarily paid for similar goods. There are wealthy connoisseurs in New York who have gems, bought thus, which they could sell to jewelers for much more than they paid for them.

Diamonds when mounted appear larger than when unmounted. Even men in the trade usually overestimate the weight of diamonds in a mounted piece, especially in cluster work, as the massing of the stones and the metal prongs, give them an enlarged appearance. Square, pear, and heart-shape stones are larger than those of the same weight in the brilliant cut.

Beyond a good knowledge of color, cut, proportion, and the ruling market price for the various sizes, the difficulties for a trade buyer are not so great as formerly, when parcels were not assorted as closely. Jagers, Wesseltons, top crystals, crystals, top silver capes, silver capes, capes, and by-waters, are now separated. He must, however, keep in touch with the market, as prices for sizes vary considerably with the demand. If there is great demand for two-grainers or any other size, there will be quick response in a rise of price all along the line of qualities in the particular sizes called for. Similarly, when the demand changes for another size, that will rise in price, and the others will correspondingly fall off. The shrewd buyer buys his sizes when they are not in demand. He holds them until the time of need comes, when he would otherwise have to buy at a high mark.

The dealer must also know color, to be a good buyer. Calling a lot "crystals" does not make them so, and it is not uncommon for goods to be rated higher than they really are. It should be remembered also that large parcels draw more color than small ones. To judge the comparative color of two lots, one much larger than the other, a cut from the larger one of a portion about equal in size to the smaller, should be made for comparison. Browns are very deceptive in lots. Some dirty-looking parcels separate to very fair stones, especially in Melees.

Since two, three, and four grainers have been in active demand, the importer is sometimes at his wits' end to supply lots of those sizes. To cover defects in his stock, he makes up lots averaging the size wanted. If the buyer is not mindful, he may when he wants four-grainers, buy for example, a lot of twenty stones weighing twenty carats, in which there will not be a half dozen one-carat stones. Nearly all will be over or under, so balanced that the lot will average one carat each. Beyond the fact that he does not want smaller or larger, he also loses on the transaction, as those weighing a little over one carat are worth no more, while those weighing under, are worth less. Say he buys twenty stones weighing twenty carats at a hundred and eighty-five dollars per carat, worth that price for carat stones, and gets six one-carat stones, and seven each of three-quarter and one and one-quarter stones:

He pays for 20 carats at............	$185.00	=	$3,700.00
He gets 14¾ carats worth..........	185.00	=	2,728.75
and 5¼ carats worth...........	160.00	=	840.00

In all, stones worth $3,568.75, or $131.25 less than if they were all four-grainers, and this calculation allows a full comparative valuation for the smaller stones. For a number of years past, and at present, the price of four-grainers in ordinary goods governs that of all sizes up to about six-grainers. Eight-grainers command five to ten per cent. more. They are higher, comparatively, in Europe; here there is less difference. As the stones become finer, the price for larger sizes increases with the fineness of the goods, so that large Wesseltons, Jagers and fancy-colored stones command either a very large per-carat price or a piece price which does not regard the price per carat. For instance, a white, recut Indian diamond of about six carats is held by the owner now, a Maiden Lane dealer, at five thousand dollars for the stone.

Three-grainers will range, according to the demand, from fifteen to twenty per cent. less than four-grainers, and there is about the same difference between quarters and halves, and halves and three-quarters.

The price of sizes declines down to eighths, after which the price increases at an inverse ratio with the size until a figure is reached in excess of the price of four-grainers.

The sizes most stable in value range from three-eighths to one and one-half carats. Melees from quarters down are more variable, as the large use of them depends upon fashions which come and go. When cluster work and fancy designs are in demand, the price of melee goes up, otherwise it is apt to be slow. The opening of the German Southwest African fields has thrown a large quantity of melee on the market, and though some of it is badly cut, it has seriously affected the price of stones ranging about eighths.

Few small buyers realize the value of good proportion and fine cutting. They often err in the same manner as the general public do, thinking that a parcel of the same quality as another is necessarily cheaper if it is a few dollars less per carat. A better knowledge of goods and a few figures would show the error. If stones are perfectly proportioned and cut, they will be very brilliant and effective. Suppose a lot of such stones is offered at two hundred dollars per carat, and another lot of the same quality but cut thick, is offered in competition at one hundred and ninety dollars per carat. One from the second lot, of the size of a carat stone out of the first lot, would probably weigh from one and one-sixteenth to one and one-eighth. The finely cut stone would cost two hundred dollars; the other, not nearly as desirable, would cost from two hundred and one dollars and eighty-eight cents to two hundred and thirteen dollars and seventy-five cents. As the poorer looking stones would cost more than the finer ones for the same size, the first lot would be worth much more than the difference of per-carat price. This applies to all sizes, and the fact is particularly important when applied to Melees, as weight is seldom considered by the consumer in cluster work, whereas it is, in larger sizes and single stones. Some dealers who know these conditions prefer to buy the heavier stones at a lower price, because their customers judge comparative value by the weights given. They can carry from one store to another the weight for comparison, but not the exact size.

Though it is quite true that lack of knowledge about diamonds among many small dealers and some large ones, enables cutters and importers to market a considerable quantity of not altogether desirable goods at profitable prices, it is also true that the customers of the uninformed dealer know less about them, so that the public pays for his errors.

The diamond dealer is often confronted with problems as ludicrous as they are difficult. One, a short time back, received in the morning mail, a letter from a retail jeweler, saying that he had a customer for a blue-white, perfect carat stone, and that he could pay a hundred and twenty-five dollars for it. "Kindly send one such on memorandum." As the dealer would have liked to buy such stones for twice that amount, he was somewhat disgusted. "What do you think of such an order as that?" he asked of an importer who was present, tossing the letter across the desk for his perusal. The importer, after reading it, handed it back, remarking quietly: "Of course the man knows very little about diamonds. Send him the best you can for the money and say nothing." The dealer did so. Shortly after, he received a check for the price of the stone with a letter thanking him for sending such a fine stone, and assuring him that the writer would certainly send to him any further orders he might have for diamonds.

Though diamond rough, during the reign of the London Syndicate, has had a definite price, from the time it leaves their hands and is cut, values begin to vary. Cutting, assortments, and prices differ. All cutters and importers have cheap lots and dear lots, the dealer, therefore, must have good judgment and use it, to be most successful. If he is successful as a poor buyer he would be more so if he were a good buyer. Usually, unless he has other lines which assist him in evading the results of injudicious buying, he cannot blunder all the time and withstand the keen competition of to-day, in the long run. Little as people know about diamonds, somehow it is the man who buys aright that succeeds best. If the consumer pays too much for a stone, it is a matter of little importance. He wears or gives one, a little poorer than he might otherwise, and that is the end of it. But to the dealer it is vital. The cost of his merchandise is the edge of the sword he wields in the struggle for existence. He should lose no opportunity to learn about the stones and their values. For him there is but one safe course, and that, to buy on his judgment. If that is bad, he will need great good luck.

To the consumer, the buying of a diamond is not a business, but a luxury. He has neither the experience nor the opportunity to gauge values closely, even though he has a natural ability, as many persons have, to appreciate desirable and undesirable qualities. He must, therefore, in any event, rely upon someone, to some extent. His judgment should be exercised in selecting the man or firm in whom he will place confidence. If the man with whom he deals is expert and honest, the more confidence the buyer puts in his statements, the more surely will he get a good stone and a reasonable price.

It is a common occurrence for an intending purchaser to take an adviser with him, or to submit a stone which he has under consideration to a friend for an opinion of its value. It is usually the old story of "the blind leading the blind," and the only variation in the result is, that not both, but the buyer only, "falls into the ditch."

Advisers usually know no more than the principals, so to sustain the role, they criticise and object, until the dealer, in despair, flatters the adviser and adds to the price of the stone, therefor, if he can. Advisers generally have notions and prejudices favoring dealers of their own acquaintance, and those prejudices are apt to be very much stronger than a disinterested desire to serve the friend, and greater than their knowledge of the stones under consideration. It is more satisfactory, and safer, as a rule, for a man to make his own errors than to adopt some one else's.

There are a few general rules which may be useful to the buyer. Brilliancy is the chief quality, because no stone of any color is desirable without it. Color is important, and in the staple stones, is gauged by its freedom from any tinge of yellow, brown or green, or by the degree to which it is tainted. Tints of blue, especially of a bright violet blue, on the contrary, increase the value. Decided colors are termed "fancy," and their values are speculative. Perfection is largely a matter of sentiment, but it also costs money.

Stated roughly, price declines from four-grainers, by quarter carats to one-grainers. Three-grainers average about ten to twelve per cent. less than 4s; 2 grs. are worth nearly twenty per cent. less than 3s., and quarter carats, twenty to twenty-five per cent. less than full half carats.

This rule, however, is subject to constant variations caused by the size demand of the moment. By-waters are worth a little more than half the price of crystals; decided browns that are not fancy, about one-third; intermediate shades in proportion. Light imperfections reduce the cost, according to degree, from ten to twenty per cent. Lumpy stones are worth twenty per cent. less than well-proportioned, finely-cut stones; over-spread stones, ten to twenty per cent. less. The value of large stones, and very fine quality stones, of two carats and over, is speculative. Perfectly matched stones are worth five to ten per cent. more than the single price; more, if very large or extraordinarily fine.

It is sometimes advantageous for a dealer who cannot use parcels of a size, to buy mélange lots or parcels of mixed sizes. Good judgment and discrimination are necessary, however. As all lots are now closely assorted for color, the dissection of a lot is comparatively easy. The sizes should be separated, and then again divided according to perfection. An estimate of value on each lot should then be made and the total amount of all divided into an average price per carat, for comparison with that asked. Size price rules to a sixteenth light. One's ideas may not be always quite correct according to general market value, but they will probably accord with his particular market.

An experience of some years suggests, that if a dealer may sometimes say too much about his diamonds, he cannot know too much. To the consumer, an old saying may be safely paraphrased thus: "Trust your jeweler and keep your powder dry."

WASHING-GEAR—KIMBERLEY

CHAPTER XVI

ORIGIN OF THE DIAMOND

IN olden times little was known about the diamond beyond the superficial facts that it was hard, brilliant, and crystallized in a certain definite form. In India, where it was first found and used as a jewel, imagination usually answered the questions of the curious, and if the answers were adopted by those in authority, they were universally received, for rulers did not tolerate differences of opinion. So it was that diamonds were believed to be the gift of heaven, crystallized in the earth by thunderbolts. The wise men of the day dutifully adduced as proof, the assertion that diamonds were abundant in mines where there were also thunderbolts.

As in these days, but to a greater degree, people received the statements emanating from high places without question, for it is easier to believe than to think, and so it was that for centuries of bookless, newspaperless years, these statements satisfied a world which had not yet learned to trouble itself much about the antecedents of things.

Generation repeated to generation the explanation, and when the gem began to drift from the old world of the Orient to the younger Occident, the same old story went with it, and was received with the respectful credulity to which such a grave and ancient source was entitled.

It is difficult and sometimes bitter, for a people or an individual, in age, to discard the imaginations of youth.

But after four or five thousand years, the growing light of knowledge acquired about other things, fell from a thousand lamps kindled about it, upon the diamond, and as the glamour which had enveloped it was dissipated, the need came to fill the place of the going fable with facts, for they only could bear the light. The prominence and preciousness of the stone attracted attention, but its value hindered experiments, so that there was little definite knowledge of the composition of it even, prior to the seventeenth century.

During the last two or three centuries, scientists have sought by careful research and costly experiments, to learn how Nature succeeds in isolating one of her elements in such a beautiful and enduring form. But while men have learned to measure the stars, and have conceived an idea of infinity; to harness electricity to wheels and engines and transmit thought on its ethereal waves; while they have filled their archives with a myriad discoveries of light, heat, force, and the whole kaleidoscope of Nature; established the natural rights of man and placed the compass of his mental horizon in the heavens among the gods; while this and more has been accomplished, all they have learned of the crystallization of carbon is, that it can be done by heat and pressure, and in a very small way to do it.

The Hindus believe to this day that rock crystal is transformed by lightning to diamond. This is a poetical fancy, but it may have some foundation in fact, for the power of electricity over the elements is great, and it is possible that under certain conditions, it could crystallize carbon as it can separate the component gases of water. Some have thought that diamonds grow. The Hindus noticed that they were often found, after heavy rains, in ground that had been carefully searched many times before. The rains undoubtedly washed away the clay which hid them from former searchers, but the finders said " No, they have grown since we looked last." There are men to-day, not ignorant or imaginative, who think it possible that diamonds grow by the slow precipitation of infinitesimal crystals to a nucleus.

Shrewd guesses have been made in the past, however, for Boetius De Boot, in the early part of the seventeenth century, arrived at the conclusion that diamonds would burn. Probably about that time there was considerable speculation and some experimenting, in the endeavor to determine the nature of the diamond. Robert Boyle, about 1670, showed that part of one subjected to a high temperature, was " dissipated in acrid vapors." The incomplete combustion was probably due to a lack of oxygen. In 1694 Florentine academicians succeeded in burning one in the presence of Cosmo III, Grand Duke of Tuscany, by exposing it to solar heat concentrated by a powerful burning-glass. The Emperor Francis I burned diamonds in 1751 in Vienna, by placing them in a smelting furnace for twenty-four hours. Twenty years later M. Macquer again demonstrated the combustibility of the diamond by burning a large one completely.

By these and other experiments, it was learned that the diamond was made of some combustible material, but what that material was, remained a matter of conjecture. It should be remembered here, that combustion as generally understood, is simply the rapid oxidation of the elements of things, accompanied by light and heat of which we are sensible. For instance, if a piece of coal is heated to the degree at which carbon combines with oxygen, the carbon leaves the coal, combines with the oxygen of the air, escapes with it in the form of gas, and we say the coal is burned. There were some at this time who still disputed the combustibility of the diamond: among others, M. Mitouard, a jeweler. In the presence of Lavoisier, the chemist, he took three diamonds and packing them in charcoal in an earthen pipe-bowl, fired them. Upon cooling, the diamonds were found unharmed. Knowing that they could be burned, Lavoisier was not satisfied, and after studying the matter, arrived at the conclusion that the powdered charcoal, by taking up all the oxygen of the air at the combining heat, had prevented any from reaching the diamonds to produce combustion. He further determined the fact that the product of the combustion of a diamond was carbonic acid gas. By experiments, Sir Humphry Davy proved in 1814 that the gem was practically pure carbon. In a practical way Sir George Mackenzie and others did the same, by converting iron into steel by the addition of powdered diamonds, steel being simply carbonized iron. Mr. Smithson Tennant went further and showed that the carbon dioxide produced by combustion, corresponded to the oxygen actually consumed, or in other words, the carbon dioxide evolved, equaled the weight of the diamond plus the oxygen used to consume it and form the composite gas.

Thus knowledge of the diamond was gradually acquired, until the fact that it was simply pure carbon was established beyond question or doubt. But it was a form of carbon only. Graphite, the other form in which it is found in Nature, to sight and touch distinctly different, is nevertheless chemically the same. Though it requires less heat, it combines with oxygen in the same way, the resulting carbon dioxide showing that the graphitic carbon and the oxygen consumed in uniting, exist without appreciable loss in the gas. In comparative tests it has been shown that the diamond burns more easily than foliated graphite, but compact graphite succumbs more readily to heat than the diamond.

Some experimenters claim that upon oxidation, the diamond leaves no residue whatever. Streeter says that in experiments made by Professor Pepper under his observation with about one hundred small stones, a very small amount of bluish ash remained.

When oxygen is supplied, diamonds burn slowly at about the temperature given as that of molten silver. If air is excluded they withstand the heat at which pig-iron melts, but at the temperature at which bar-iron melts, while retaining their form, they become coated with graphite. M. Moissan, using his electric furnace, found that the graphite resulting from the partial burning of diamonds, assumed irregular crystalline forms.

From the various experiments made by a number of scientists, it appears that diamonds at a very high temperature without access of oxygen swell up and are converted into graphite. In a current of air they gradually become smaller and finally disappear. If the supply of oxygen is insufficient for perfect combustion, they become coated with graphitic carbon and burn slowly. At a very high temperature in oxygen, the edges of the sharp angles are first rounded, the crystals split, lose their transparency and luster, and are eventually entirely consumed. During the process of combustion, successive black spots appear on the surface of the crystal and disappear. It also gives out bright red sparks. If the process is suspended, the diamond at once ceases to burn and shows a leaden surface. The inference is, that the heat first transforms the carbon of the surface to the graphitic form, which then combines with the oxygen and passes off as carbon dioxide, or carbonic acid gas.

Many interesting illustrations of the chemistry of diamonds have been given by scientists in their experiments. It has been shown that if one is sufficiently heated and then plunged into liquid oxygen, it burns brightly, and the carbonic acid formed by the combustion, becomes in the low temperature of the condensed oxygen, a solid which appears like snow. The gas from a burning diamond passed through clear limewater will cause it to become milky, and finally, an insoluble compound, calcium carbonate, will be thrown down. By filling a flask with oxygen and limewater, and placing within it a diamond held by a coil of platinum wire joined to the wires of a galvanic battery passing through the stopper, the entire process can be seen upon turning on the current; the platinum wire will become white hot, the diamond will burn, and the carbon dioxide created, will act upon the calcium hydroxide of lime. At an extremely high temperature, M. Moissan succeeded in volatilizing carbon.

Having settled definitely the question of the composition of the diamond, scientists next turned their attention to the methods or method by which Nature created the compact and beautiful crystal, and incidentally to enquire how and from what source she obtained the necessary carbon. As to the means by which the transformation was effected, they have succeeded so far that they can make the crystals in microscopic size, and thereby illustrate in a general way the larger methods of Nature; but whence she gathered the supply of material for her furnaces is still an open question.

The process of making diamonds as described by Sir William Crookes is to select pure iron free from sulphur, silicon, phosphorus, etc., and pack it in a carbon crucible with pure charcoal from sugar. This must be put into the body of an electric furnace. After heating for a few minutes to a temperature above 4,000 deg. C., at which heat the iron melts and volatilizes, the current is stopped, and the crucible plunged into cold water and held there until it sinks below a red heat.

The outer layer of iron, solidified by the sudden cooling, holds the molten interior in a rigid enclosure. The inner liquid expands as it solidifies, thus creating an enormous pressure, under the stress of which the dissolved carbon separates out in microscopic crystals which though small are veritable diamonds.

Crookes places the theoretical melting point of carbon at 4,400 deg. C. absolute, and the melting pressure as 16.6 atmospheres. He found what he believed to be diamonds, in residue obtained by exploding cordite in closed steel cylinders. This meant a pressure of 8,000 atmospheres and a temperature of about 5,400 deg. absolute.

Prof. Moissan first crystallized carbon artificially.

His method, which has been followed by other chemists, is almost identical with that of Sir William Crookes, except that he plunged the carbon-saturated iron into molten lead, to act as a binder for the expansion by cooling of the interior mass.

Carbon at a high temperature will seize on and combine with oxygen if it exists in any compound, air or what not, with which it comes in contact. It volatilizes at the ordinary pressure at about 3,600 deg. C. and passes from a solid to a gaseous state without liquefying, but as with other bodies of similar action, the addition of sufficient pressure at the necessary temperature is thought to produce liquefaction and with cooling, crystallization. The difficulties, therefore, which scientists had to contend with were, first, to secure the enormous temperature necessary to volatilize the carbon. This was obtained by the development of the electrical furnace. Second, to hold the carbon inert, and prevent its escape by combining with oxygen and flying off as carbonic acid gas. As it was known that molten iron will dissolve carbon, and that any excess of carbon beyond that which the iron can hold will separate on cooling in the form of kish, which are crystalline graphite plates, iron filings were used to enclose the charcoal, and the whole was packed in a carbon crucible. The problem of pressure was solved as described, by the expansion of a cooling interior mass within the rigid enclosure of a suddenly cooled exterior shell.

From these experiments the most generally accepted hypothesis has been advanced, that diamonds are a form of carbon produced by heat and pressure, but how

Nature obtained the carbon, held it inert from its affinities, and subjected it to the necessary forces, still keeps the world guessing.

The largest diamond made artificially was less than one millimeter across. Moissan several times obtained as many as ten to fifteen from a single ingot, of which the largest was 0.75 mm. long, the octahedra being 0.2 mm. With the transparent pieces obtained by artificial process are some that are black and some amorphous. Many are shattered, as if they had burst in pieces when released from pressure. Others break and splinter, weeks and even months after they are liberated, the fissures being covered with minute cubes. This tendency to explode occurs among the Kimberley diamonds, where it is not uncommon for one, on being released from the matrix, to burst asunder, especially when warmed by handling or carrying it on the person. Large stones are more apt to do this than smaller ones. It is said that in the old times of individual claims in Africa, miners would encourage responsible men to handle and carry large crystals just mined, thereby transferring the liability of loss at a critical period. It is also reported that it was a common practice in shipping large stones to England, to embed them in raw potatoes as a safeguard. Later and careful observation has shown that the stones which explode in this manner are always pale brown or smoky.

The fact that some diamonds taken from the African mines, burst after being released from the matrix, as artificial ones do, is accepted by many as evidence that they were formed under great pressure. Moissan claimed that the form of the carbon depends upon the amount of pressure existing at the temperature which permits transformation.

Some argue that these explosions are due to gas held under great pressure in the interior of the crystal. Mr. Williams declares that to be an argument against the theory of formation in an igneous magma at high temperature. Broken diamonds are frequently found in the diamondiferous pipes of South Africa. Though the cause of the fracture is unknown, it has been ascribed to the volcanic action by which the diamond-bearing clay was forced through intervening strata to the surface.

Many theories have been advanced as to the source from which Nature obtained the carbon. Newton and later eminent scientists believed it to be of vegetable origin, some basing their conclusions mainly on the microscopic study of the residual ash. Crookes on the other hand asserts that iron is the chief constituent of the ash, and uses that as an argument in favor of deep-seated masses of molten iron saturated with carbon, a larger process of the method employed in the laboratory by himself and Moissan. In opposition to this Mr. Williams states that many exhaustive tests which he has made with all kinds of diamonds for iron, metallic or oxidized, with powerful magnetic apparatus, indicated either an entire absence of iron, or infinitesimal traces only. Inasmuch, however, as the crystallization appears to depend largely on the complete segregation of the carbon from that with which it was previously combined, this argument against the theory of Crookes does not appear forcible. As science has made diamonds from saturated molten iron, Nature may certainly have used the same means, though the indications are that it could not have been the only method.

Liebig, Dana and others concluded that diamond is the product of the gradual decay of organic matter under influences at present unknown. The former opposed the theory of high temperature because under such the carbon would not have crystallized, but would have separated as a black powder. The experiments of Crookes and Moissan contravert this, as they did crystallize carbon under high temperature, though they employed another agency in conjunction which appears not to have entered into Liebig's calculations, i. e., pressure.

The theory advanced by the late Prof. Carvill Lewis, that the carbon was derived from carbonaceous shales decomposed by the action of an igneous magma forced through them by volcanic action, is considered disproved by the fact that there are no carbonaceous shales in the pipes near Pretoria, though they contain many diamonds. Such shales do overlay the lower strata surrounding most diamond pipes, and as the volcanic filling of the Pretoria pipes may have come from foreign sources, the theory is tenable.

Some have thought that diamond may have been formed from anthracite, possibly without passing from a solid state.

Eclogite deep in the earth was suggested by Professor Bonney as the possible matrix of the diamond, but Mr. Williams answers that eclogite is found in all the Kimberley mines and is thrown out in quantities as waste rock, and that he had over twenty tons of it crushed and carefully examined, without finding a diamond. The idea seems to have originated with the observation that eclogite bowlders were found with rock of the blue-ground type in Africa and the diamond region of New South Wales. Dr. F. W. Voit is reported, however, to say that both graphite and diamond have been found in the eclogite concretions of the Roberts-Victor mine.

Carbonic acid liquefied and held under great pressure deep in the earth, has been suggested as a probable origin of the diamond. The idea apparently is that the liquefied gas coming in contact with some form of carbon preëxisting, the carbon would be dissolved, and by the slow evaporation of carbonic acid, the remaining carbon would crystallize. If, however, by upheaval there was a sudden relief from pressure, a quick evaporation would precipitate the carbon in the compact form of carbonado.

Similar to this is the theory advocated by several eminent men, that pure carbon was separated by electricity from carbonic acid surrounded by reducing agents. Other chemists have thought that diamond may have been formed by the gradual decomposition of gaseous hydrocarbons, whereby the hydrogen escaping through fissures, by oxidation was converted into water, part of the carbon into carbonic acid, and the remaining carbon left in a free state, crystallized. It is said black diamond was obtained by Rousseau by subjecting acetylene to electric furnace heat.

It is reported that Dr. Burton of Cambridge has succeeded in crystallizing carbon by means which do not include very high temperature and great pressure. His method is founded on the idea that diamonds are simply a denser form of charcoal. He used an alloy of lead and metallic calcium to hold charcoal in solution. To separate the calcium he introduced steam into the fused mass, whereby part of the carbon crystallized. It is said that if the alloy is in a state of ignition when the steam is introduced, graphite crystals are formed, but if at a lower temperature, diamond crystals. The crystals obtained by Dr. Burton are said to possess an unusually high power of refraction. These experiments have strengthened the belief of some that Nature used some solvent for carbon, as yet unknown, which by evaporation left part of the carbon in the crystallized form, as the crystals of other minerals are.

Hasslinger and others claimed to have obtained microscopic diamonds from carbon dissolved in molten silicates, which crystallized as the mass cooled.

The conditions under which diamonds were found prior to the African discoveries afforded no clue to their origin. In Africa it is evident that they are of subterranean origin, though a full consideration of the conditions there suggests the possibility that diamonds were not always produced by exactly the same methods, or if so, that they were crystallized under somewhat varying conditions and were forced to the surface in material which, if the original matrix, has since passed through a process of alteration.

As scientific experiments have demonstrated that the various forms of crystallized carbon can be produced artificially by a combination of heat and pressure, and we find in Nature that they come from volcanic sources, also that they exist, in form identical with the terrestrial crystals, in meteorites, which are fused masses, heat and pressure appear to have been present in the laboratory of Nature during their production, though the experiments of Dr. Burton suggest that the degree needful depends on conditions. Some are inclined to think that in the presence of favorable accessories, pressure only is necessary.

The Kimberley mines of South Africa lie in a cluster within a radius of a few miles. These mines, together with others in what was the Orange Free State and elsewhere, come to the surface in a great plateau extending from the Transvaal to the Bokkeveldt mountains at the Cape of Good Hope. The plateau varies in elevation from 2,700 to 6,000 feet above sea level, being 4,000 feet above, where the four principal mines are situated at Kimberley.

Until the discovery of diamonds in Africa, in what is believed to be the matrix in which they were formed, there were few hints of its origin in the circumstances of the diamond's lodgment. It was found always in deposits left by the waters, and the beds in which it lay always showed the alterations of age and exposure. The gem, unscathed, rested in the decomposed fragments of the matrix that ages back had bound it. That the mountains were its original home is evident, for the diamondiferous deposits are on high plateaus, on the sides of the mountains, in the beds of old mountain water-courses, on the hillside banks and in the beds of the new streams, and sometimes far away in the plains below, where the mountain torrents have rolled them. And the crystals hold a record of the long, slow journey. In the mountains, their corners are sharp and clear, but as they get farther from home, they become more and more worn and rounded. Up in the hilltops, the big crystals, wedged in the crevices of the rocks and in the corners among the bowlders, resisted the drive of torrents which carried off the smaller ones with the sand, and held fast, each in turn, near or far, finding at last an anchorage where it could await the coming of man. So long have they lain, that in some places the débris of succeeding ages has buried them many feet deep from the surface. At every diamond deposit the world over, the signs all point to the headwaters of the rivers in the mountains, but there the clue fails, for the rocks beneath and the sky above are silent.

With the discovery of the African diamond chimneys came the conviction that Nature's laboratory for the crystallization of carbon was deep down in the earth, from which place she belched the product forth to the surface, to be weathered and washed and scattered hither and thither over the face of the earth, as successive cataclysms broke up the shielding walls of rock and exposed their precious contents to the surface elements.

This advance of knowledge gave rise to many new theories, occasioned many and varied experiments, and suggested not a few pertinent questions, most of which yet remain unanswered. Among these queries are several which bar a solution of the problem: 1, Whence and in what form did Nature draw the supply of carbon? 2. How did she crystallize it? 3. Is the kimberlite of Africa the material in which the carbon was crystallized and is that material necessary to its crystallization? Following these comes the question, "How were these vertical shafts or wells of Africa formed and filled with the diamondiferous earth? Before considering these questions let us review the conditions and circumstances attending the occurrence of diamonds.

In India, diamonds are found on a plateau four to six or seven hundred feet high, in thin alluvial deposits at or near the surface of the earth. There are two distinct deposits, forming strata in the Upper Vindyan series of the north, and in the Lower Vindyan section (Silurian) of the south.

It is also believed that diamonds exist in the older Paleozoic rocks in the Himalayas, and it is thought that the diamonds of the Mahanadi river have been washed down by the headwaters higher up. The diamonds are always accompanied by pebbles of a siliceous and ferruginous nature, and a variety of others, among them occasionally, corundum. The deposits in which they occur are so altered from their original form that they afford no clue as to the exact nature of the matrix in which the diamond was crystallized. That the matrix was formed long ages ago, then disintegrated and scattered over the earth, is about all we know of the origin of the diamond which was released from its bonds and strewn over the earth, in India during the ages succeeding.

In Brazil the sources of the diamond are extensive elevated plateaus the faces of which are broken up into abrupt, rugged hills and gorges, from whence the diamonds with their decomposed matrix have been carried from level to level, as the mountain torrents wore their channels, through the ages, many being carried by the rivers having their headwaters in the mountains, down to the plains below. Wherever diamonds are found they have come evidently from high places, but in Africa only have they been discovered in their elevation, unscattered by the waters.

The diamond chimneys of Africa are huge dykes or chasms, penetrating vertically the strata of the country known as the Karoo formation, to unknown depths, and filled evidently from below with a material quite unlike any of the strata which wall the pipes. These walls are the edges of the horizontal layers which form the crust of the earth in that section. In the Kimberley district, under a varying surface deposit of several feet of red clay and an underlying bed of calcareous tufa 5 to 20 feet thick, which covers the pipes and the surrounding strata alike, the layers consist of about 50 feet of pale shales of a grayish color, under which is about 275 feet of black bituminous shales. Beneath this are several hundred feet of melaphyr, about the same thickness as the black shale, and under that, is quartzite and olivine-rock. There are slight variations from this order owing to faults and intrusions, as for instance in the strata about the Dutoitspan mine, in which case there is a layer of quartzite above the melaphyr and 63 feet of diorite between them, but shale, melaphyr, quartzite, and granite or gneiss, is the usual arrangement of the Karoo formation.

The contents of these chimneys are in all cases similar. There are some small variations of little importance, but the general character of the contents of all the chimneys is the same, and in each chimney, except for an alteration of color and consistency in the upper part of the material filling it, due to weathering, the contents are precisely the same as far as they have been followed down. The "blue ground," as the diamondiferous material is called, at the 2,500 foot levels, is the same as that 1,000 feet down, and both are the same as the yellow ground which was found near the surface, except that exposure to the weather there had oxidized and turned it to a yellow color, instead of the greenish-blue it is below.

In most cases, the upper part of the contents of these chimneys formed small rounded hills or kopjes, ten or more feet above the surrounding level. The filling of the Wesselton only showed a depression. The diamondiferous material of the chimneys is quite unlike the surrounding reef. Without affecting the surrounding strata in any way, it usually fills the dykes to the walls, though there are intervals, in places, between the walls and the contents, and in these hollows are numerous calcite crystals. Nor do the walls show any signs of abrasion or heat, though the edges of the shales were bent upward slightly, as if by pressure from below.

The diamondiferous rock is a greenish-blue mineral, like dried mud with numerous inclusions. It carries many fragments of the surrounding reef, pieces of the shales being very noticeable. These foreign inclusions vary in size from very small pieces to one so large that it is called "the island." This is a block of olivine-basalt in the De Beers mine, having an area of nearly 3,000 square feet and penetrating to a great depth. Some inclusions must have been brought up from great depths, as they differ from any of the strata which compose the reef. Large blocks of gray sandstone, found at a depth of 250 feet, resemble the sandstone which in other localities forms part of the middle Karoo formation, and may be here an underlying stratum at great depth. These foreign inclusions, differing entirely in nature from the diamondiferous material with which they are mixed, are called "floating reef" to distinguish them from the walls of the funnels which are termed simply "reef." The inclusions which differ from the reef are called "exotic fragments."

The bowlders of floating reef, though occasionally rounded, usually have sharp corners and edges, showing no signs of attrition. They were more abundant in the upper levels of the pipes, but are found in irregular quantities at all depths. In places, the carbonaceous shales were met in such quantities that fire-damp, similar to the dangerous gases of the coal mines, was encountered.

The diamondiferous material filling the pipes has been variously termed "serpentine breccia," "volcanic tuff or agglomerate" and later, the name "kimberlite" was given to it by Prof. Henry Carvill Lewis, and as that is most generally used, reference to it will be made under that name. The kimberlite itself though comparatively soft, is harder in some places than in others. It takes twice as long to weather the De Beers kimberlite as it does that from the Kimberley, and much of the Premier kimberlite needs no weathering, but goes direct from the mine to the washers. It is somewhat soapy to the touch and it can be scratched with the finger-nail, but it has a quality which makes it difficult to work with the pick. It separates easily under an edge tool, however. The various analyses made, agree in the main, the differences being unimportant. One from the Kimberley mine by Prof. Maskelyne and Dr. Flight gave:

Silica (SO_2)	39.732
Alumina (A_2O_3)	2.309
Ferrous Oxide (FeO)	9.690

Magnesia (MgO)	24.419
Lime (CaO)	10.162
Carbon dioxide (CO_2)	6.556
Water (H_2O)	7.547
	100.415

Two of kimberlite from Africa by Prof. H. Carvill Lewis of which I was the least decomposed rock with few shale enclosures and II, the more decomposed rock with many shale enclosures (diamondiferous), are as follows:

	I	II
Silica, SO_2 (with some TiO_2)	33.00	34.80
Ferrous Oxide, FeO (including Al_2O_3)	12.00	14.40
Magnesia, MgO	32.38	30.76
Lime, CaO	9.60	2.70
Sodium monoxide, Na_2O	0.67	1.40
Carbon dioxide, CO_2	7.05	5.55
Water, H_2O (Carbonaceous matter)	6.00	10.60
	100.70	100.21

There are no horizontal layers in the kimberlite nor are there any beds of foreign rock in it, the floating reef being distributed throughout very irregularly, but there are very small vertical crevices in the kimberlite, filled with a foreign mineral resembling talc, which divide the kimberlite into vertical columns. These columns differ slightly from each other in color, composition and contained minerals, though each is the same in character throughout, and all are in general alike. The most important difference is that some of these columns are much richer in diamonds than others. The western end of both the Kimberley and De Beers mines were very poor, the richest part of the latter being in the center. Fifteen of these kimberlite columns have been observed in the Kimberley mine.

From the nature of the kimberlite, and the condition of the reef surrounding, it is evident that the dykes were not made by a volcanic eruption which forced the kimberlite through opposing strata of the earth's crust, but either existed prior to the filling, as open chasms, or the earth's crust was rent apart and the cavity simultaneously filled. A local volcanic upheaval of sufficient force to break a large funnel through thousands of feet of the earth's strata, would not stop placidly when it reached the surface, but would have scattered evidence of its eruption far and wide. No such evidence exists around the diamond chimneys. Nothing has been discovered in the neighborhood of the mines, suggestive of kimberlite. The Karoo strata are overlaid in places by basalt, and everywhere by the red clay and calcareous tufa, neither of which could be altered kimberlite, and in these deposits are no diamonds nor the minerals which accompany the diamond.

Having these facts in mind, it appears possible that in some past age there was a tremendous derangement of the earth's crust extending from the Bokkeveldt mountains at the Cape of Good Hope, far to the north, so extensive in area, and by a force so evenly distributed, that the strata of the plateau within the boundary walls maintained their natural horizontal trend in general, and which by the spreading of its surface, rent it in places and occasioned the huge funnel-like chasms now known as the diamond chimneys.

It is noticeable that all diamond fields of importance are within 30° north and south of the equator. They are situated, therefore, where vegetation is or has been extremely luxurious. Some of these sections in this age, elevated and denuded of soil, are almost barren, though the surface of the Karoos in South Africa, consisting chiefly of ferruginous reddish sands and clays which bake hard in time of drought, rests on a slaty rock which retains the rain water and keeps alive the bulbous and other alkali plants until the wet season transforms the country, with tropical rapidity, to oceans of blossoms. A large part of the South African plateau lying within the hills of the west coast, the Bokkeveldts in the South, and the Drakenberg mountains which skirt it on the east coast and turning westward form a northern interior frontier in the Transvaal south of the Limpopo river, probably held at one time lacustrine basins interspersed with great stretches of the rankest vegetation, which deposited during the ages immense stores of carbonaceous material. If by any means, vertical fissures were opened in such an area of the earth's surface, there would be a great in-pouring of this material into the cavities, sufficient one might think reasonably, to supply an abundance of the carbon necessary to produce the very small proportion diamonds constitute of the mass contained in the diamond chimneys.

As stated, this high plateau of the diamond-bearing part of South Africa appears to have been raised to its present elevation, from whatever cause or by whatever means, either by one uplift, or by a gradual exercise of force which did not break up and distort the trend of the strata. In Brazil and elsewhere, the strata in which the diamondiferous deposits occur are broken and often folded. In many places they are raised to a sharp angle, and occasionally set up vertically, but in South Africa the strata lie in their natural horizontal position, undisturbed apparently except for these vertical dykes which make a clean boring through the even, natural formation. Igneous intrusions exist in places among the strata, and a stratum of basalt caps the shale about some of the mines, but they are quite independent of the diamondiferous contents of the chimneys, and do not appear to have had any influence upon the kimberlite, or to have been acted upon by it.

It is evident that these chimneys are not the vents of sudden, local, igneous, volcanic, eruption. Not only is the crater formation absent, but there has been no overflow nor scattering of ashes or lava about the mouth of any one of them. The contents have apparently been raised to, or a little above, the surface of the surrounding land by a series of uplifts, or forced upward by the subsidence of the entire plateau. Nor do the edges of the surrounding strata forming the walls of the chimneys, show any sign of igneous action. The face of the quartzite stratum is even and unaltered; the highly inflammable black shale, though bent upwards at the edges as if by pressure from below and the expansion of the contents of the chimney, carry no signs of firing, and the horizontal trend of the strata is undisturbed. The composition of the kimberlite breccia also suggests the idea that it was not solidified from a molten condition. It contains large quantities of the black shale, and the diamonds are said to be most plentiful where the shale inclusions are most abundant.

Nevertheless, Henry Carvill Lewis, in "The Matrix of the Diamond," edited by Prof. T. G. Bonney, says:

"That the rock was a true igneous lava, and not a mud or ash, is indicated by the following facts:

1. The minerals and their associations are those characteristic of eruptive ultra-basic rocks.

2. The porphyritic crystals are idiomorphic as in volcanic rocks.

3. The corrosion cavities in the porphyritic crystals are due to solution by the hot magma.

4. The character of the bronzite and diopside is similar to that in meteorites and eruptive rocks, but not in metamorphic or plutonic rocks.

5. The occurrence of a ground-mass and of traces of glass.

6. The traces of a second generation of minerals (pyroxene?) in the ground-mass.

7. The occurrence of fragmentary enclosures of the adjoining rock and of deep-seated rocks, and the evidence of alteration by heat which these enclosures exhibit.

8. The traces of a fluidal structure shown on polished specimens.

9. The identity of the rock with one in Kentucky, which is a true eruptive dyke, and with others in the Vaal river, which also form dykes.

Undoubtedly the filling of these vertical dykes came from below. It is therefore an eruptive rock. It also appears from exhaustive examinations of its composition by Professor Lewis and others, that a part of the material at least has resulted from a molten condition. It does not appear possible, however, that some of the inclusions could have entered it while in that state, and in appearance it bears no resemblance now to the lava of volcanoes; its constituency suggests a dried and hardened mud. It has been said that the sharp edges of the diamond crystals found in the kimberlite would be impossible had they been formed in a molten mass, but as Moissan produced such diamond crystals, though small, from charcoal confined in fused iron, and diamond will not burn without a free supply of oxygen, the argument appears invalid.

Geologists assert that the center of the earth is solid, but that between the crust and that solid center, lies a mass of molten material. They also claim to have indubitable evidence that the earth's bulk is gradually shrinking, while at the same time by astronomical forces it assumes a somewhat elliptical form at the equator. In the process of shrinking, the uneven thickness and strength of the crust would produce uneven results. Some weaker parts of the area would settle lower, toward the center of gravity, leaving other stronger parts elevated above the general level, and they would become, thereby, mountain ranges where the buckling occurred, and high plateaus, if the area was large, within the mountainous border lines of greatest strain, marking the junction of the weaker sinking portions of the crust and the thicker and more stable part.

It seems reasonable to suppose that some such occurrence took place during past ages in South Africa, whereby the earth's crust seaward, east, west, and south from the mountains surrounding the diamond plateau, sank, leaving the plateau at an elevation, with undisturbed horizontal strata, except for occasional vertical rents in it extending probably to the underlying magma. This hypothesis seems more probable than that of a deep explosive or expansive force sufficiently extensive and simultaneous in its action to lift such a tremendous area with little or no derangement of the strata within its mountainous borders. It would also account for the absence of eruptions of a volcanic nature, and the steady pressure of the crust upon a molten interior, would explain the intrusion of igneous material, in places between the regular order of the strata, where the strain of rearrangement had left interstices.

There is always a period of strain before things as they are, break to a rearrangement. There must be a climax of power to produce results. The storm gathers before it bursts into thunder. For some time, when a volcano is in action, the internal pressure of gases must gather force before it is sufficient to burst asunder the old walls and cap of lava which held them pent up within. Then force with gathered impetus bursts forth and runs riot, and finding all the weaker spots in its path, vents itself there. It was probably so in the sinking of the earth's crust around the diamond plateau. When the earth, seaward of what are now the mountains, sank, and the earth's crust buckling made the mountains, the plateau, with rumble and roar, cracked in places to its foundations, and here and there over its wide face, the diamond chimneys were opened up.

These conditions being obtained by the pressure of gravity or weight from without the earth toward the center, effectual only over an area outside the boundaries of the plateau, the opening of these funnels to the interior would not necessarily produce violent eruptions of the molten material underlying, even if they penetrated the crust to it. Such eruptions arise from chemical reactions which change existing combinations into others requiring more space, as heat transforms water into steam. These being absent, the molten material would simply ooze into the funnels, and rise with the settling pressure of the crust of the plateau.

Another important factor would be introduced by the rending of the earth's crust. Immense quantities of surface material, including probably great volumes of water, would pour in, dislodging and carrying with it fragments of the earth's strata, from the surface down, which had been broken or loosened when the break occurred. At first this material would be assimilated on reaching the interior heat, but gases would be generated, steam evolved and a great cauldron of magma permeated with superheated steam, established. Huge bubbles would lift this mass in columns toward the surface; explosions would rend and dislodge protrusions of the reef about the walls of the chimney, and break up deep lying strata into fragments which would also be mixed and lifted with the mass. Probably very deep connections with similar funnels in the neighborhood would be established.

As the upper mass cooled, the fragments of the surrounding strata carried or falling into the cauldron would, in the inclusion, hold their original form and be recognized later, as the inclusions of the kimberlite are today.

Upon the character of this surface supply of material, the presence of diamonds in the agglomerate probably depends. There has been and is a general supposition that diamonds are always associated with kimberlite, but that the latter does not necessarily contain diamonds is demonstrated by the fact that it occurs in various places, notably New York State and Kentucky, without any, and in Arkansas though some diamonds have been found in a large body of it there, it is doubtful if that contains any considerable quantity. It is evident, therefore, that if the elements contained in kimberlite, under certain conditions, are requisite for the crystallization of carbon, the presence of carbon and its crystallization have nothing to do with the peculiar formation of kimberlite. The South African chimneys are also traversed by dykes of kimberlite which contain few if any diamonds. It is the breccia, or more decomposed kimberlite containing the shale enclosures, which is diamondiferous. This black shale in the stratum surrounding the chimneys is combustible, but the fragments in the breccia have lost their sulphur and carbonaceous matter. Few diamonds are found in purely igneous or metamorphic rocks, though Henry Carvill Lewis referring to kimberlite says, "Certain resemblances can be traced to the ground-mass of sundry decomposed basaltic or other basal rocks." Sir H. E. Roscoe found on treating "blue ground" with hot water, "an aromatic hydrocarbon could be extracted, and by digesting it with ether and allowing the solution to evaporate, this hydrocarbon was separated and found to be crystalline, strongly aromatic, volatile, burning with a smoky flame and melting at 50° C."

These facts remind one again of the probable surface conditions existing at the time of the opening of the diamond chimneys through the earth's crust. It is noticeable too, that beyond the trace of hydrocarbon in the ground-mass, and the carbon in the calcite, which is a decomposed product, all the carbon which entered into the original mass and remained, appears to have been segregated as diamond, though a considerable amount escaped probably as carbon dioxide.

The inference that the supply of carbon came from the surface seems justified also by the fact that the yield of diamonds in the chimneys was greatest in the upper levels. It is true that the surface yield of some of them was less than at a depth of several hundred feet, and that in one or two cases where the yield has been small from the beginning, the percentage continues very even, but generally there is a steady decline in the percentage of yield as the workings are carried to greater depths.

The sinking of the earth's crust outside the borders of the diamond plateau and the natural gravitation of the plateau itself, would establish a steady pressure upon the underlying molten material and force the magma up the vertical fissures and into and through the surface material draining into them. This would result in the heating of the surface supply, the cooling of the magma, and the amalgamation of both. The pressure, however, would not be constant. Occasional slips in the readjustment of the earth's crust would suddenly force columns of the cooling agglomerate upward, and this raising process would be repeated until the mass had become sufficiently solidified to resist the pressure from below. In this manner it is conceivable that the dykes could have been filled as we find them, by successive upheavals of separate columns.

Reviewing facts and inferences that may be fairly drawn from them, it seems probable that the diamond plateau of South Africa was left at an elevation by the shrinkage of the earth's crust surrounding it.

Vertical rents in the plateau were made in the process, into which a magma of ultra-basic rock exuded from the interior, and a mass of hydrocarbonated material poured from the surface, forming an agglomerate having the characteristic of an altered eruptive rock, yet differing from any other lava known.

Owing to the precipitation of carbonaceous surface material into the magma confined in the depths of the vertical fissures, processes ensued which segregated the carbon in the mass and crystallized it as diamond.

The cooling and cooled mass was raised in the chimneys by successive uplifts, occasioned by the generation of gases within the mass and the settlings of the earth's crust.

The yield of diamond will decrease as the rock passes from an agglomerate of igneous lava and surface material, into the underlying eruptive rock which was not reached by the surface admixture.

Inasmuch as it is the brecciated kimberlite only which contains the diamonds, and the breccia though somewhat altered, has not been fully amalgamated with the ground-mass, the kimberlite was not in a state of ignition when the diamonds were crystallized.

The chemical reactions whereby the carbon was crystallized, remains a subject for speculation and the experiments of scientists, but it appears probable that it was accomplished in the African diamond chimneys by the passage of superheated steam through an agglomerate of magma while being cooled by carbonaceous material and water poured into it from above. That the crystallization of carbon as diamond does not depend absolutely upon the geologic structure, during crystallization, of the matrix in which it occurs, appears evident from the fact that diamonds have been found in eclogite, itacolumite and an igneous rock. Professor Bonney found ten small diamonds embedded in a bowlder of eclogite from one of the Newlands pipes in Griqualand West. It is reported also that they are found occasionally in the Roberts-Victor mine in the same matrix. In Brazil though usually found in drift, they occur to a limited extent in the itacolumite, thought to be the original matrix, and which by decomposition furnished the diamondiferous quartz pebble drift. Some geologists think that the Semri sandstone of India was the matrix there, because many fragments of it are found with the diamonds in the quartzose conglomerate which is the diamondiferous material of some parts of India. A diamond was found embedded in hornblende diabase at Oakey creek near Inverell, Australia.

The sparse occurrence of diamond crystals in unaltered igneous rock, and their abundance in the kimberlite breccia, suggests that crystallization occurred during the metamorphosis by hydration of an igneous magma composed of favorable reducing chemical constituents. That the crystallization of carbon can occur under intense heat and pressure has been demonstrated by Professor Moissan, but that the heat and pressure was applied in the same manner in the diamond chimneys appears doubtful, for in them, the quantity of diamonds decreases with the approach of the diamondiferous material to the source of heat, and the associate minerals are chiefly silica and magnesia. A natural solvent for carbon with sufficient heat to cause the necessary chemical reactions, and pressure, is probably Nature's method of crystallizing carbon.

CHAPTER XVII

THE PLACE OF DIAMONDS IN LITERATURE

THOUGH with the appropriate use of them, there is also much vulgar display of diamonds, and an equally vulgar habit of decrying them as vulgar on that account, writers and poets continue to refer to the gem as one of the chief accompaniments of wealth and station, and as an illustration of the cardinal qualities of humanity, as they have done for ages. It is often employed also in the hyperbolical description of the beauties of nature and of the human eye, though some poets have found it inadequate for the latter purpose. Spencer in his search of heaven and earth for something with which to compare the eyes of chaste beauty, passes the diamond thus, " Nor to the diamond; for they are more tender." But Moore, when he sings of charms so ensnaring that even knowledge of the charmer's faithlessness could not prevail against their potency, enumerates among them:

> " Those eyes of hers, that floating, shine
> Like diamonds in some eastern river."

Thomson glorifies the gem in order to make it a second to the eyes of beauty thus:

> " The lively diamond drinks thy purest rays,
> Collected light, compact; that polished bright,

And all its native lustre let abroad,
Dares, as it sparkles on the fair one's breast,
With vain ambition emulate her eyes."

So also Emerson disparages its brilliancy in comparison with the human eye; he says:

"On prince or bride no diamond stone
Half so gracious ever shone,
As the light of enterprise
Beaming from a young man's eyes."

In "Dualisms," Tennyson speaks of one of the children as:

"Summer's tanling diamond eyed."

There is a somewhat obscure passage in "The Revolt of Islam," where Shelley, describing the three shapes sculptured about the throne of Laone, says of the third:

"The third image was dressed
In white wings swift as clouds in winter skies;
Beneath his feet, mongst ghastliest forms repressed
Lay faith, an obscure worm, who sought to rise,
While calmly on the sun he turned his diamond eyes."

Perhaps one reason for the fascination which the gem possesses for most people is that in its play of light one is unconsciously reminded of human passions as they are expressed by the eye. Imagination does not fly far to see in its scintillations, the hard glare of hate, the flash of scorn, or the ardent glances which Cupid sends as arrows from his bow. There is a compelling attraction in the fitful flashes that spring from its polished facets, even for those who profess to despise the bold gem. When the light-sparks leap from diamond clusters on fair hands or fairer bosoms, beauty is glorified, and if music reigns, slumbering memories are roused in a glamour of romance, for the houris of imagination all wear diamonds and their eyes are like them.

Imitations of its good qualities as a stone are used by the poets to illustrate undesirable ones in humanity. Bryant describes a faithless heart as a "False diamond set in flint." Tasso ennobles the quality of hardness, and likens a strong heart to the gem. Godfrey's choice troop, sent by him to get timber from the enchanted forest, return empty-handed and in terror of the demons infesting it. After reciting the horrors encountered there, they say:

"The heart that fearless ventures where they dwell,
Must be diamond, diamond to the core."

He several times refers to the hardness, stability, and strength of the stone, as do other poets, but its brittleness seems to have escaped recognition, for the figures wherein he refers to it, demand toughness as well as hardness. The two knights, sent to rescue Rinaldo from the Enchantress, are provided by the hermit-wizard with a shield of diamond. True, the chief purpose for which it was given appears to have been that it might be used finally as a kind of magic mirror. As a shield simply, it was of doubtful value, for a few sturdy blows rightly placed would have reduced it to splinters. He charges the knights:

"Then with the diamond shield which I provide,
Step forth, and so present it for a space,

That he may start at his reflected face,
His wanton deeds and ornaments survey."

Another recognition by the same poet, of the hardness of the diamond, in which he overlooked its cleavable quality, appears in the description of Sweno's valor in assaulting the barbarians:

"Not the plate they wore,
Although 'twere thrice refined, nor cap of steel,
Though into diamond charmed by wizard lore,
Might stand the strokes, his fire and fury deal."

Spenser, in "An Hymme of Heavenly Beautie," describes the throne of heaven as:

"More firme and durable than steele or brasse,
Or the hard diamond, which them both doth passe."

It is noticeable that poets do not vary much in their figurative use of a thing. Each places it in similar connections throughout his poems. One illustrates hardness in some form, by the diamond, another brilliancy. With it, one engraves a human quality, the other bedews the fields, or sprinkles water. Each, when it recurs to him, reproduces his former simile with little variation. Spenser almost always employs it to heighten the splendor of some building to which he would lift imagination. In "The Visions of Bellay" he says of the temple:

"On high hill top I saw a stately frame,
An hundred cubits high by just assize,
With hundreth pillours fronting faire the same,
All wrought with Diamond after Dorick wize;"

and the tomb is described thus:

> "Then did a sharped spyre of Diamond bright,
> Ten feete each way in square appeare to mee."

Shelley did the same. In "Alastor" he sees Nature's caves:

> "their starry domes
> Of diamond and of gold expand above
> Numberless and immeasurable halls."

Similarly the temple is described in his "Revolt of Islam":

> "We came to a vast hall whose glorious roof
> Was diamond, which had drunk the lightning's sheen
> In darkness, which now poured it through the woof
> Of spell-inwoven clouds hung there to screen
> Its blinding splendor."

These lines betray acquaintance with the Oriental belief that the penetration of the earth to its deep places by lightning, was the origin of diamonds.

Tom Moore apparently had a better knowledge of jewels, and connected them with a wider range of ideas than perhaps any other poet. He also beautifies his conception of a fairy palace with diamonds. In "The Sylph's Ball," the gnome takes his sylph bride:

> "to his mine —
> A palace paved with diamonds all —"

and he lays the image of Beauty's queen:

> "Upon a diamond shrine."

Reference to it as an adornment of the person excepted, the poets employ the diamond more frequently to heighten their description of water and light than in any other way. Nor could it well be otherwise, for as Bryant says in "Green River:"

"The quivering glimmer of sun and rill
With a sudden flash on the eye is thrown,
Like the ray that streams from the diamond-stone."

One who has reveled in the exquisite fairy dance of light and water, in which every movement of each, twins with the grace and beauty of the other to the joyous bewilderment of the onlooker, can understand the despair of the poet for words to carry the impression, and his desperate seizure of the most precious and beautiful thing known, to aid him.

In "After the Tempest," Bryant describes the landscape when Nature, drenched, the clouds and windstorm gone, basks once more in the hush of repose under a beaming sun. One hears in the lines, the momentary rustle of the flying bird, and feels the splash of liquid diamonds as they fall on hand and cheek:

"The raindrops glistened on the trees around,
Whose shadows on the tall grasses were not stirred,
Save when a shower of diamonds, to the ground,
Was shaken by the flight of startled bird."

The same poet creates about the gem a beautiful and pleasing fancy in "A Winter Piece":

"Oh! you might deem the spot
The spacious cavern of some virgin mine,
Deep in the womb of earth, where the gems grow,

And diamonds put forth radiant rods and bud
With amethyst and topaz."

Lowell, "Strewed moss and grass with diamonds bright," and one of Moore's angels, telling in his story of a maiden of Earth, says:

"While playfully around her breaking
The waters that like diamonds shone,
She moved in light of her own making."

Shelley too, saw:

—"Many a fountain, rivulet and pond,
As clear as elemental diamond."

The gem has place in a pretty conceit of Lowell's in "Beaver Brook":

"The miller dreams not at what cost
The quivering millstones hum and whirl,
Nor how for every turn are tost
Armfuls of diamonds and of pearls."

It is a recognition of the precious if vagrant beauties with which the sun delights the eye wherever waters are broken, or snows crust, and which, because they are without money and without price, are therefore dearer to the hearts of some than the costly gem which Nature has endowed with the same glories permanent and unassailable.

Schiller puts the flashlights of frosted snow in his descriptive posy, "The Lay of the Mountain," where he describes the everlasting avalanche as a queen:

"And wondrous the diamonds that blaze in the crown
That encircles her temples sublime."

In Tasso's gorgeous word picture of scenes discovered by the wizard to the two knights in search of Rinaldo, are two lines which embody in small space the highest conception of precious, gem-like beauty:

—" flashed the diamond white
In virgin state, on sparkling opals piled."

What greater magnificence could earth afford than a mass of virgin white diamonds radiating light from an opalescent bed of vivid, changeful color.

In his lines to the memory of Lord Talbot, Thomson, with a nice understanding of the gem, illustrates by it the perfection of a great soul in graceful fashion thus:

" How from the diamond single out each ray,
Where all, though trembling with ten thousand hues,
Effuse one dazzling, undivided light?"

The changing colors which the diamond's dispersive powers scatter from the white light rays falling upon it, were suggested to Moore by the brilliant plumage of a humming-bird, and he unites them so that each brings to the mind a realization of the beauty of the other:

" See him now, while diamond hues
Soft his neck and wings suffuse."

Mental brilliancy reminds him of the bright hard stone, and by the well-known qualities of the gem, he makes a clearer impress of the more subtle qualities of the mind, in this way:

" While Wit a diamond brought,
Which cut his bright way through."

Sometimes common misunderstandings of trade terms lead writers and poets into error. An instance occurs in Emerson's "Destiny." He says:

> Whether your jewel be of pure water,
> A rose diamond or a white."

Many suppose that the term "rose" as applied to the diamond, indicates the color of the stone. Evidently the poet thought so. It refers, however, to the cutting and may be any color. Nor is the "water" of a diamond quite definite. As a trade term it was never universally used, but it became a favorite with writers, probably as a poetical phrase and from the knowledge that some tested the purity of a gem's color by dropping it in water; the purer, so much the less observable was it. If quite pure, it could not be distinguished from the water surrounding it, and was therefore said to be of pure water. The term is now nearly obsolete.

Who has not watched with keen enjoyment the lighting up of misty dewdrops clinging to the grass blades of the meadow, or hanging tremulous upon shrub and bush, when the sun climbs over the eastern hilltop and fills the valley with cool sparks of purity?

Moore has indelibly fixed such a scene in his description of the maid in "Reuben and Rose":

> "Rose, who was bright as the spirit of dawn,
> When with wand dropping diamonds and silvery feet,
> It walks o'er the flowers of mountain and lawn."

All the varied forms of play in which water is seen under the sun have sometime reminded a poet of the diamond, and the gem has been linked with it in prose and poetry.

Tennyson saw it in the fountain:

> "Till the fountain spouted, showering wide
> Sleet of diamond drift and pearly hail;"

and in his "Recollections of the Arabian Knights," he says:

> "From the green rivage many a fall
> Of diamond rillets musical."

In "Maud," the great English poet, speculating over the humble life which had inhabited a little shell on the sea-shore, places the bright stone in a cluster of beautiful imagery:

> "The tiny shell is forlorn,
> Void of the little living will
> That made it stir on the shore.
> Did he stand at the diamond door
> Of his house in a rainbow frill?
> Did he push, when he was uncurled,
> A golden foot or a fairy horn
> Thro' his dim water-world?"

Blazing magnificence is pictured in another line by the same poet:

> "In diamond light upspring the dazzling peaks."

The spell of which the spirits sing to the Oceanides in "Prometheus Unbound," is likened by Shelley to the diamond:

"Like a diamond which shines
On the dark wealth of mines,
A spell is treasured but for thee alone.
Down, down!"

Moore illustrates the wisdom of pleasure in a line thus: "The diamond sleeps within the mine." And of the complaint of grief an old writer says:

"Such were the accents as might wound,
And teare a diamond rock in twaine."

Generally diamonds are thought to be more appropriate to age than youth; a more fitting adornment for the matron than the maid, but some of the poets appear to think otherwise; among these, Moore, who in his "Loves of the Angels" says:

"Then first were diamonds from the night
Of earth's dark centre brought to light
And made to grace the conquering way
Of proud young beauty with their ray."

To the wooer of a daughter of the Muse, Emerson gives this warning in his "Woodnotes":

"But if with gold she bind her hair,
And deck her breast with diamond,
Take off thine eyes, thy heart forbear."

Though the idea is metaphorical, it expresses also a feeling very general among the people of the Occident, that the self-assertive gem is out of place upon the person of youth, though a glorious and fitting crown for more mature beauty.

Reference to the diamond as a jewel is common among writers of prose, to give splendor to a scene, or importance to a personage, but poets seldom use it so. Usually they dilate not upon the adornments of the person, but upon the charms and beauties of the person itself. Occasionally, however, in describing a scene of regal magnificence, especially if it is laid in the Orient, the jewels worn by some of the characters are mentioned, to emphasize their wealth and power. For instance, Tasso, describing the great Egyptian King Califfe at the gathering of his forces, says of him:

> "Diamond and rubies grace his robes."

Two lines by Shelley in "Ginevra" convey an impression of stateliness:

> "And, as she passed, the diamonds in her hair
> Were mirrored in the polished marble stair."

Poets usually put diamonds in the robes of their heroes and in the hair of the heroines. Even Moore follows the poetic custom, for, in telling the story of Mary after she anointed the Savior's feet, he says:

> "And wiped them with that golden hair
> Where once the diamonds shone."

But few references are made to the stone in the Bible. It is mentioned in Exodus as one of the stones set in the High Priest's breastplate. Jeremiah speaks of it as a graver, and Ezekiel includes it among the precious stones worn by the Prince of Tyrus in his glory. Mention is not made of it by the Greeks until about 300

B. C., though Hindu legends disclose a knowledge of it centuries earlier. Pliny gathered what was known and surmised about the stone in his time, and recorded what to-day reads like a cluster of nonsense, though his example is emulated by instructors in the press of the twentieth century.

Probably no one thing has attracted more indiscriminate writing than the diamond. Since the qualities which make it precious became known, writers have used it to "adorn a tale" almost as frequently as fair dames use it to multiply their charms and oftentimes quite as grotesquely. In the early days, before its full brilliancy was developed by cutting, when the natural octahedron, or stones with a natural bright surface only, could be used as jewels, its "unspeakable hardness" was the principal theme upon which writers rung the changes, and about which they let imagination loose. Pliny asserted that not only was it so hard that it successfully resisted when struck by an iron hammer, but that the hammer and anvil were torn asunder by it. To fire, it was invincible and there was but one way to subdue and break it down and that, by first dipping it in fresh, warm, goat's blood. Poets of the first century, Juvenal particularly, allude to it, but not until the latter part of the fifteenth century, when the art of cutting and polishing it was discovered, did it attract writers as generally as other precious stones, better known, and more popular because of their color and greater brilliancy either in the natural state, or by processes to which the diamond would not respond.

When, however, the brilliant possibilities of the diamond were developed, and it became the desire of kings and nobles, then the glories of the great were glorified by telling of the diamonds they wore, and the glory of the diamond was glorified by the fables and superstitions of Pliny and those who followed him. Fable, magic and superstitions, enlarged by reiteration, crept into print, and were established for generations and centuries. The searching light of the first decade of the twentieth century has not yet quite dissipated them, though goat's blood and the hammer and anvil test have been abolished.

Fables about the origin of the diamond are not many. In India it was said that lightning penetrating the earth generated them; it is also believed there that they continue to grow and may be later found in ground which has been already worked over. This idea of slow growth by accretion has appeared in print quite lately and comes from high authority. Pliny wrote that it was engendered in fine gold.

From the first to the fifteenth century little was written of the diamond but fable, and that a development of Pliny with nonsensical outcroppings of belief in its magic influences. The principal writers were Isidorus, Bishop of Seville in the seventh century; Marbodus, Bishop of Rennes, in the eleventh century, and Mohammond Ben Mansur in the twelfth.

During this period, the imaginations of ignorance and folly, fostered by those who profited by them, crystallized into various forms of superstition. Following the idea of stones in the Jewish High Priest's breastplate representing the twelve tribes of Israel, the Romish Church was awarded twelve Apostle Stones. The diamond not being amenable to the uses of Apostle Stones, was not included in the list, but it was given a place in the more generally applicable lists of birthstones, of which several came into existence, the more widely accepted being what are known now as the Polish and the Jewish. These in turn have been welded of late for business reasons into one, and a new modern list formed, in which the cheaper stones are discarded or combined with others more expensive and ancient authority is made to countenance the more precious varieties which jewelers prefer to sell. To give effect to the idea, a string of doggerel, bad enough to be ancient, has been bound to the months and stones, and it has been so widely circulated of late as to be established in the trade and the popular mind as authoritative. Behind every superstition somewhere, interested motives are to be found hiding.

Of these birthstones, the diamond is awarded to April, and is said to typify purity and to preserve peace. Undoubtedly it has preserved peace under many threatening conditions.

Various magic powers and medicinal virtues have at different times been ascribed to the gem. One said it warded off mania; another that it was an antidote for poisons, though the exact method of applying or administering it has not been preserved with the prescription. One writer claimed that if it were placed upon the forehead of a woman while she slept, it would cause her to reveal the secrets of her heart. One less imaginative, but wiser and more practical, said that, placed upon a woman's hand it brought felicity. Some probably confounding the ancient superstition about the pearl, averred that the diamond brought tears to its possessor, but of all the absurd things which have been said and written about it, purity, peace and April, as the proper accompaniments of the gem, have survived and remain a popular fancy to-day.

With the cutting and polishing of the stone in the fifteenth century, a new place was found for it in literature. As a gem it became more valued and far more generally desired. With its increased importance came greater interest in it. Chroniclers of events among the great gave it more attention. Scientists were attracted to speculate upon its nature, genesis, and qualities. Artisans sought to improve it. Men of commerce gave more regard to it as a thing pregnant with profit. The newly developed beauties awakened the imagination of poets and romancers, and all of them began to include it more frequently in their writings.

A jeweler often hears from those who bring to him old gold jewelry for sale, the commendation, "I know this is good because it is very old." If he is experienced, this amuses him, for he knows that the jewelers of old cheated their public to an extent impossible now. Their gold chains, many of them, had barely enough gold in them to save the name, they were of such low grade. But that did not suffice; the ends of the chain were decorated with lion's heads, or other fancy designs which could be swelled out to hold much lead, for the trimmings, as they were called, were made of very thin shells of gold and filled with the cheap and heavy metal. So also were the bars and swivels. Thus equipped for profit, the loaded chain was thrown into the scale and weighed as gold. In all ages, the measure of the seller's honesty has been the knowledge of the buyer.

Where ignorance abounds, rascality thrives, and there was abundant ignorance in the olden times about jewelry and jewels.

Most of our current newspaper and magazine literature about precious stones, is a rehash of ancient fables written by men who knew little of the things they wrote about. They gathered their information largely from the advertisements of dealers, who endowed their wares with any virtue which might assist in selling them. And these dealers were doubtless assisted by men in authority and high place. Even in these days, if one would place a spring-water on the market, he must first secure the recommendation of a physician, and that is to be had for a fee. The vendor of every nostrum has letters by the thousand from grateful dupes, who think they have been benefited by swallowing it, and know they would like to see their letters of acknowledgment in print. Ministers have been known to sing the praises of gold mines in which they had an interest that cost them nothing. Lords of high degree and smaller fry are constantly lending their names to doubtful enterprises, for a consideration. It is but fair to presume, therefore, that in a stage of the same old human race, where ignorance was even more rife than now, apostle and birth stones, charms, amulets, and antidotes, were established in the public faith, not by an apparent demonstration of fact, but by the reiterations of those who were seeking profit, aided by others whose place or profession inspired confidence.

After the days of oral tradition came the writer. Naturally imaginative, desirous of supplying that which the people would read, and therefore inclined to elaborate, rather than try out a tradition long fondly received, he gathered the fables and superstitions of his time, endowed them with a halo of mystery and romance, and without asserting the truth of manifest absurdities, presented them so linked with age and the ghosts of past knowledge and wisdom, that the people received at their hands as facts, fables which had not even a foundation in fact. Oftentimes he went farther, and himself declared the grotesque little images carved out of immature imaginations by wily traders, blatant astrologers, venal priests, and the like, to be veritable living truths. And the people, seeing that they were awkward wooden things without similitude or the breath of life, nevertheless believed. They do yet, for now, one may read that diamonds live and will sweat in the presence of poisons; not given as an example of the marvelous effrontery and credulity of past ages, but with the assertion that it is a fact which has been many times demonstrated. If one breathes upon a cold diamond, a mist will immediately appear upon the surface of it, whether poison be present or not. It is yet told that the diamond in Aaron's breastplate became dark when a guilty man charged with crime was brought before him, and sparkled more brilliantly if the prisoner was innocent, and that it became the color of blood when the sins of the people should be punished. Of old, churches were responsible for many of the lies which masqueraded as truth. Wretched priesthoods, more interested in maintaining a subservient laity than in spreading the sublime truths of their churches, sought by every means to frighten and lure. Precious stones, having a strong hold on the imaginations of people generally, were used among other things to intimidate and awe, and so to the stones in the High Priest's breastplate, teachers of the law ascribed magic powers. Priests and saints of the Roman Church founded legends of the emerald cup of the last supper, and the miraculous virtues of the sapphire, etc. To uphold the tyrannical power of rulers, jewels of kings were endowed with the power to heal, as for instance, the Sapphire of Edward the Confessor. It seems probable, however, that these beliefs were of gradual growth, becoming more influential as time and constant repetition and enlargement of the story gave force to the claim. Any absurdity continually asseverated will finally be accepted by a large number of people as a matter of fact.

But not alone are ulterior motives blamable for the foolish superstitions about precious stones. As there are individuals in every age who in attempting to grasp the mysteries of existence lose their hold on facts within the compass of their understanding, and floundering, clutch myths as answers to their unanswerable questions, so in the ebb and flow of thought throughout the ages, mankind passes again and again by waves from the depths of gross and brutal unreason to mysticism. As a comet passing myriads of miles away, back through its sublime orbit to infinite space, was a writing on the wall of this poor Earth's domain to the ignorant, so the change of color in the turquoise by chemical reaction was accepted as a sign of approaching calamity. These are the imaginations of ignorance. From this stage men passed to one of greater enlightenment, in which the beautiful qualities of precious stones reminded them of spiritual things, and they made of them symbols. To the poetic imagination, the ruby symbolized the blood-red passion of love, and the emerald, chastity. So qualities of the mind and person, months in the year, sacred names and religious ordinances, were associated with the different beautiful stones which came to be accepted as their symbols. But the wave swept on to the mysticism of the Jewish Cabala and gnosticism. By the influence of that age, stones were invested with occult powers; diamonds conferred spiritual insight and promoted peace and purity; the topaz, by quenching the hot blood of sensuality, preserved its wearer from lustful desire, and so on.

With the eighteenth century came a succeeding wave of calm reasoning and scientific research. Since then it is dawning upon us that the wonders of fact are greater than the imaginations of ignorance; that the marvels of Nature's processes are more delightful than the magic of the esoteric.

Now the diamond has a large place in the literature of commerce and science. Because it came to prominence and general knowledge later than most other precious stones, and after the age of superstition and gnosticism, not as much reference to it is bequeathed to us from the dark ages. Talismans, amulets, and occult powers are connected with other stones which were more widely known and traded in when the diamond was yet the companion of the lords of men only. Newly invented stories of magic cannot long survive twentieth century light; the mummified beliefs of past ages alone can be safely exposed occasionally to vivify trade, and satisfy the child-craving of the human heart for fairy tales. Were a dealer to recommend the purchase of a diamond because it would perspire in the presence of poisons, the prospective customer would leave him in disgust, but the same statement in a daily paper, endorsed by the name of some wise (?) man of an unwise age centuries back, would not be without influence. Print has been so clothed with authority that, yellow journalism notwithstanding, the public still fail to recognize a lie in that garb.

Although the wide diffusion of the knowledge of facts now, will not permit the old time recklessness of misstatement in one direction, it has opened a new opportunity and another form of credulity, of which sensational writers are taking advantage. The wonderful developments of science of late have prepared the public mind to believe any wild statement if given as a scientific fact. Let a scientist state that radium affects the color of precious stones, and in a few weeks, magazines, trade journals, and the daily papers, teem with articles describing in detail the process by which rubies, sapphires, emeralds, topaz, can, by association with radium, be made out of ordinary corundum. In a month they have changed the simple transformation of a few colors, into the transmutation at will of minerals, for many elements of which some of these stones are formed do not exist in corundum. So also if one announces that he can make diamond out of something other than the one thing (carbon) which a diamond is, the absurdity is hawked from San Francisco to St. Petersburg; chiefly between the first place and New York.

The literature of advertising is sufficiently extensive and important to be worthy of notice. The character of it in the Middle Ages was in accordance with the age.

When a dealer advertises diamonds to-day he appeals chiefly to the commercial instinct. In the old days appeal was made to superstition. But withal, there was infused in it an element of poetry entirely lacking now. And there is evidence that poets were hired to sing the praises of his beautiful treasures, by the old time dealer. After descanting upon the natural glories of the stone, its magic virtues were enumerated with such liberality, that no disease of the body or the mind could entirely escape. To surround it with a rosy mist of romance, he told, without caring much for facts, of the mysterious far-away lands from which it came. One great writer informed his readers that the most precious sapphire came from the land of the Turk and an inferior kind from Libya, which was the Africa of the Greeks. The diamond, being uncommon and little known in those days, escaped much of the puffery given to other gems, but when later it came to more general knowledge, many of the virtues hitherto ascribed to others were transferred to it. Many pages would be filled were all the things it could do enumerated. It would banish bad dreams due to stomach trouble; promote purity and peace; ensure harmony between man and wife; strengthen wedded love. In all this there was doubtless an element of truth, for men find to-day, that the sage advice with which the ancient dealer in precious stones closed his homily, "to give the diamond freely," is conducive to peace and harmony.

Jewelers were the quacks of the Middle Ages. For about every ill that human flesh is heir to, they had a specific, and as the claims they made were founded entirely upon imagination, it often happened that one stone was advertised by various dealers as a remedy for many ills, and each disease had as many stones which would surely cure. This was pleasant for the sick, as they could have a choice of beautiful remedies for their money and it is convenient for the writer of to-day for he can attach almost any fancy to a precious stone, and be sure of warrant for it somewhere in ancient lore.

Now romance and poetry have faded from the advertisement. With swarms of young men and women, barely out of their teens, parading our streets with dress-suit cases plastered over with marks of Cairo and Calcutta; with newspaper columns carrying the prosaic facts of output, prices, and values of diamonds and diamond-mine shares; with fast steamships linking the cities of the west with the ports of the tawny east, and railroads taking a traveling world through the jungles of India and Africa, the haze is lifted, and the things we see are shorn of the dear imaginings old-time eyes thought they saw in its sunny vaporings. India, Africa, and Cathay, are pounds, shillings and pence to the Englishman; dollars and cents to the American now, and they who deal in the things which came therefrom have taken the cue. There is little variety in the song they sing; the refrain is always the same, "The diamond I offer you for one hundred dollars is worth one hundred and ten, and when the syndicate raises the price of rough five per cent., it will be worth so much more." The description one dealer gives of the stone he is offering to sell for one hundred dollars, if true, would make it cheap to an importer at twice the amount; another, oblivious of several profits added to the first cost, writes his diamond up as a good investment; all alike ignore the poetry and romance, the beauty of the wonderful crystal, the exquisite adaptation of art to Nature's requirements in the cutting and polishing of it, and degrade the companion of royalty and beauty to the sign of dollars.

And because the diamond-advertising literature of the day reeks so with the spirit of the bargain counter, and the gem flashes so commonly from the unclean hands of politics, vice and graft, the noblest product of Nature's gigantic laboratory is by association, oftentimes made vulgar.

CHAPTER XVIII

AN EXPENSIVE FARCE

THE first decade of the twentieth century has brought to light the greatest diamond and the most audacious swindle in the history of diamonds.

In May, 1905, a Frenchman named Henry Lemoine approached Sir Julius Wernher, of the London firm Wernher, Beit & Co., a large diamond house, with a scheme for making diamonds synthetically. He claimed that he could produce diamonds by means of an electric furnace, which could not be distinguished from natural ones.

He had already had some experience in fishing with his tempting bait among smaller fry, and it is known that he had gathered in a few thousands here and there, in amounts of from one to three thousand dollars, from his dupes. It may be that greater successes had rewarded his efforts, for most men who have been swindled dislike publicity and would rather suffer the ills they have, in the solitude of their own knowledge, than expose them for the amusement of their friends; it was sufficient to embolden him to carry his scheme to a place where one might think there was the smallest possibility of success and the greatest certainty of exposure for a fraud, the heart of the diamond business. Perhaps the audacity was a convincing argument in favor of his ability to do what he claimed. The stakes were large; millions of dollars worth could be sold, the stock market could be manipulated for millions, or the formula would be worth millions to the men who controlled the natural supply.

Whatever the arguments or apparent proofs submitted, Sir Julius became sufficiently interested to go to Paris and visit Lemoine's house in the Rue Lecourbe to see what could be done. There, Lemoine convinced his visitor that he had actually manufactured some diamonds which were found in the furnace at the conclusion of his experiments. Lord Armstrong was also invited to be present at another seance and was equally certain that they were diamonds which were produced in the furnace, and that no trick had been performed. It has been said since, that a person has been discovered who supplied Lemoine with fusible plugs, in which it is supposed the diamonds afterwards found in the crucible, were concealed.

As a result of these demonstrations Sir Julius Wernher gave Lemoine $320,000 for the establishment of a laboratory at Pau.

Previous to approaching Sir Julius in the first place, Lemoine had deposited in the Union of London and Smith's Bank, a sealed envelope which he claimed contained the formula for making diamonds.

Time moved along at its usual rate, but the pace was too fast for the diamond magician. The diamonds did not materialize with the same speed; indeed, they were altogether wanting. Doubts followed impatience and finally developed full-fledged and active suspicions, which culminated in the arrest of Lemoine in Paris in January, 1908, at the instance of Sir Julius Wernher, charged with fraud. The mysterious envelope was called for. Sir Julius offered Lemoine an additional $80,000 for it, but the prisoner, assisted by his counsel, Maitre Labori, strenuously resisted every attempt to obtain possession of the envelope, and Mme. Lemoine was sent to London to stop the Bank from giving it up. Sir Julius followed post haste to secure it if possible, before she got an injunction preventing. Lord Armstrong defended the Frenchman by saying that the crystals he made were certainly genuine diamonds. It looked like a fight for millions between an inventor and capital.

The newspapers exploited the matter, and though the affair was covered with the earmarks of fraud, many believed that the envelope in London contained the great secret. In the trade, the claim had little if any influence.

Revelations came with the trial. Lemoine accused Sir Julius of conspiring with him to sell the secret to the De Beers Company for $25,000,000. The Frenchman was said to be preparing to buy De Beers shares when they dropped on the publication of stories about his success. There seemed to be more need for a press-agent and a broker, in the scheme, than a laboratory.

Lemoine was held prisoner for two months, during which the contest for the envelope was transferred to London. The Bow Street magistrate refused to allow anyone to remove it. The Court of King's Bench reversed his decision on April 30, and authorized the Bank to hand it over to the French court. Before that decision, Lemoine maintained the attitude of a man fighting desperately to hold a valuable secret. The

Paris correspondent of the *Daily Telegraph* sent the following to his paper:

"M. Lemoine has had a slight attack of influenza. He has, however, made some further statements which are worth noticing, and one is that the sealed envelope deposited in the London bank does not contain the formula for making diamonds, but concerns the manufacture of bort. As regards this, he says that the truth has never before been made public. There were two distinct contracts, one concerning the manufacture of bort, and the other that of diamonds. The second contract was never carried out. M. Lemoine offered no further explanation on this point.

"Regarding his future experiments, he will not let the public, and especially the newspapers, into the secret as to the time and place, though he allowed it to be understood that the time would most likely be in July. He does not wish to be disturbed by troops of reporters hanging about his door when he is engaged in the manufacture of diamonds. Of course, he will have to install an entirely new workshop before he can resume operations."

The release of the envelope to the French Court drove Lemoine to an extremity. He was equal to the situation. He said he had no objection to prove his ability to the Court by actually manufacturing diamonds, but would not consent to have his secret formula read and published. That appeared reasonable. He was afforded every facility and given until June 9 to make his claims good. On the 9th he appeared in court and said that unforeseen circumstances had rendered his experiments abortive, but with the greatest confidence asked for and obtained another week's time. He did not appear then, and it was announced that he had fled. The envelope was then opened and the formula read. It was lengthy but the gist of it was "Place powdered carbon and sugar in a crucible in an electric furnace. Use a current of from 1,500 to 1,800 amperes under a tension of 110 volts, and so heat to 1,600 degrees. Then put pressure on the cover of the crucible and diamonds should be found therein." It was another, "should be," which does not happen.

The judge, after stating that he had received a letter from Lemoine, saying that he had failed at his St. Denis factory, but intended to continue his studies elsewhere, ordered the case to be sent before the Correctional Court, by which Lemoine would be given the maximum penalty of twenty years' imprisonment by default.

So ended another lesson.

IMPORTATIONS OF DIAMONDS INTO THE UNITED STATES FROM 1867 — YEARS ENDING JUNE 30.

	Rough.	Cut.
1867		$ 1,317,420
1868		1,060,544
1869		1,997,282
1870		1,768,324
1871		2,340,482
1872		2,939,155
1873	$ 176,426	2,917,216
1874	144,629	2,158,872
1875	211,920	3,234,319
1876	186,404	2,409,516
1877	78,033	2,110,215
1878	63,270	2,970,469
1879	104,158	3,841,335
1880	129,207	6,690,912
1881	253,596	8,320,315
1882	449,513	8,377,200
1883	443,996	7,598,176
1884	367,816	8,712,315
1885	371,679	5,628,916
1886	332,822	7,915,660
1887	262,357	10,526,998
1888	322,356	10,473,329
1889	195,341	11,466,708
1890	202,853	12,180,482
1891	804,626	12,466,976
1892	1,096,587	12,354,420
1893	1,066,586	15,168,746
1894	566,267	4,844,809
1895	562,890	6,863,288
1896	113,888	6,598,527
1897	47,865	1,937,944
1898	2,517,759	4,438,030
1899	3,678,266	8,497,284

	Rough.	Cut.
1900	3,891,226	7,890,945
1901	6,574,630	11,680,823
1902	6,154,853	12,732,670
1903	10,933,188	15,574,598
1904	8,776,418	10,028,452
1905	10,390,917	17,019,530
1906	10,579,654	24,282,897
1907	11,154,152	23,965,438
1908	4,452,320	9,312,095
1909	4,761,166	19,313,585
FOR 10 MONTHS TO APRIL 30, 1910.		
1910	8,936,112	25,594,018

The foregoing figures do not give an absolutely exact statement of the importations of diamond in all its forms, but it is very close to facts. The items are from data furnished by the customs authorities who tabulate the dutiable and nondutiable items without regard to the precise nature of the articles, and as there have been several changes in the tariff, the various kinds have been shifted and differently combined. Uncut diamonds of the jewel class were first specified by our customs in 1885. From 1890, "rough" includes miners, glaziers and engravers diamonds, and also jewels for watches and clocks up to 1897. Under the same heading all other uncut precious stones not specified, were included prior to 1895. Under "Cut," all precious stones including pearls, and imitation stones were included until 1897. (Imitation stones were included until 1899.) By that time the demand for pearls and what are termed "fancy stones," had grown to be an item of importance. The importations of that class amounted in 1897 to \$686,789. Uncut diamonds for jewels were tabulated with "cut" during the operation of the Wilson tariff. Since 1897 "cut" stands for unset cut diamonds only.

The Wilson tariff was passed in 1894; the Dingley tariff in 1897. The amounts given during that interval do not represent all that were imported, but those only which came through the customs; undoubtedly many were smuggled in. Nor do the amounts in value give an adequate idea of the comparative yearly quantities. So great has been the advance in price that the number of carats imported in 1888 was probably twice that of 1908.

Dust or bort has increased in addition, from $140 in 1869 to $447,575 in 1905. Since then the importations have declined as follows:

1906	$133,725
1907	189,121
1908	71,503
1909	$181,721
1910 (10 mo. to April)	36,286

Prior to and since the Wilson tariff, rough diamonds were nondutiable and there was and is a duty of ten per cent. on unset cut diamonds. During the Wilson tariff the duty was ten per cent. on rough, and twenty-five per cent. on cut diamonds.

DIGEST

Hardness, 10, Moh's scale.

Specific gravity. 3.48 to 3.52. (Carbonado, 3.14 to 3.41.)

Index of refraction. 2.439.

Singly refractive, reflective and dispersive.

Total reflection from inner facets at 24° 15′.

Composition: pure carbon.

Crystallization. Isometric.

Cleavage perfect, parallel to the facets of the octahedra.

Fracture, conchoidal.

Streak, gray to black: the finer the material the darker the powder.

Luster, adamantine. Transparent.

Phosphoresces in the presence of radium; occasionally after exposure to heat or solar light.

Electric in the rough. Though a nonconductor, it becomes positively electric, by friction.

Infusible, not acted upon by acids or alkalies, but burns in oxygen under intense heat without appreciable residue to carbon dioxide.

Colors, white and with tints of blue, yellow, brown, green, and pink. Also in red, green, blue, yellow, brown, and orange of decided color.

Common imperfections, carbon spots, inclusions of titanic iron, etc., fractures, feathers, bubbles and white specks.

Occurs in South Africa, Brazil, India, Borneo, Sumatra, British and Dutch Guiana, Australia, Russia, China, and the United States.

Bort comes principally from Africa, and carbonado from Brazil only.

Symbolizes purity, preserves peace, prevents storms; the month of April.

Third stone of the second row in the Jewish High Priest's breastplate.

GLOSSARY

Bahias.— Brazil diamonds from the Bahia district.

Bizel.— The upper portion, above the girdle, of a brilliant-cut diamond.

Blue ground.— Unoxidized rock of the diamond chimneys.

Bort.— Diamonds fit for mechanical purposes only.

Bruting.— Polishing diamonds by rubbing them together.

Bubbles.— Small, hollow-appearing specks in the body of the stone.

Bywaters.— Decidedly yellowish diamonds.

Capes.— Yellowish white diamonds.

Carat.— An unofficial weight used for weighing precious stones.

Carbon spots.— Opaque black spots in diamonds.

Cascalho.— Diamondiferous gravels, Brazil.

Chips.— Cleavage under three-fourths of a carat.

Clatersal.— Small diamond splints from which diamond powder is produced by crushing.

Clean.— Free from noticeable flaws.

Cleavage.— Diamond crystals which require cleaving, also pieces cleaved, and large fragments.

Clouds.— Flat, subtransparent blotches along the grain of the stone.

Close-goods.— Diamond crystals requiring no preparation for cutting.

Color-play.— Prismatic colors produced by dispersion.

Compound.— An enclosure at Kimberley in which the natives are held while they work in the De Beers Consolidated Mines.

Crystals.— White diamonds.

Culet.— Small flat facet at the bottom of a brilliant-cut diamond.

Diamond drills.— Cylindrical iron pipes having carbon or bort set in the edge as teeth, for drilling.

Dop.— Device for holding diamond during the process of cutting and polishing.

Estrellada.— Decomposed stratified rock showing starry white points. A diamondiferous deposit of Brazil.

Exotic-fragments.— Inclusions of foreign rock unlike surrounding reef, found in diamond chimneys.

False color.— Diamonds showing different tints of color in different lights.

Fancies.— Diamonds of fine and decided colors.

Feathers.— White, subtransparent lines in the body of the stone.

Fish-eye.—Diamond cut too thin to secure the angle of total reflection from the interior facets.

Flats.— Thin diamond crystals or parts of crystal used for draw-plates.

Floating-reef.— Inclusions of surrounding reef in the rock of the diamond chimneys.

Floors.— Level stretches of ground on which the diamondiferous rock of the African Mines is weathered.

Girdle.— Edge of brilliant-cut diamond at junction of pavilion and bizel: greatest circumference edge.

Glassies.— Transparent diamond crystals.

Glassy.— Diamonds lacking sharpness of brilliancy.

Glaziers' diamonds.— Small diamonds or corners of diamond crystals, used for glass cutting.

Glessen.— Semi-transparent fissures in diamonds. Feathers.

Golcondas.— Indian diamonds, as generally applied.

Gorgulho.— Diamondiferous quartz and clay gravel of Brazil.

Grain marks.— Lines on the facet surfaces due to imperfect polishing.

Grupiaras.— Shallow deposits of diamondiferous gravel on the river hills of Brazil.

I. D. B. Act.— A law passed in Cape Colony, South Africa, making illicit diamond buying a criminal offense.

Jagers.— Fine white diamonds, tending to a blue tint.

Kimberlite.— A serpentive breccia named after Kimberley, where it was discovered as a diamond-bearing rock.

Knife-edge.— The girdle of a diamond cut to a sharp edge.

Kopje.— A small hill in the Boer country of Africa.

Lumpy.— Said of stones cut too thick.

MACLES.— Twinned crystals in which the junction is not distinct.
MAHABHARATA.— Hindu epic.
MANGELIN.— Hindu weight equal to 1⅜ carat.
MELANGE.— Mixed sizes.
MELEE.— Small diamonds.
MUDDY.— Lacking internal brilliancy.

NAATS.— Thin flat crystals.
NAIFES.— Hindu name for shapely uncut diamonds.
NYF.— Outer part or skin of the diamond crystal.

OFF-COLOR.— Having a tint of undesirable color.
OLD-MINE.— Old-cut diamonds of good color.

PAGODA.— Hindu money worth eight shillings British.
PAVILION.— Under part of brilliant-cut diamond.
PREMIERS.— Diamonds from the Premier Mine; as commonly used, diamonds having an oily luster or false color.

RATI.— Hindu weight, variable in quantity of mass according to use, time and place.
REEF.— Strata of earth surrounding diamond chimneys.
REJECTIONS.— Diamonds thrown out of the mixed lots as undesirable.
RIVERS.— Diamonds from the rivers or wet diggings of Africa.
ROUGH.— Uncut crystals.
ROUND-STONES.— Diamond crystals with curved facets, and roundish or water-worn crystals.

SECUNDINA.— A clay schist which usually overlays the diamondiferous deposits of western Minas Geraes, Brazil.
SHARPS.— Thin, knife-edge pieces of diamond crystal.
SIGHT.— Opportunity afforded buyers by the Diamond Syndicate to view the original parcels of rough.
SILVER-CAPES.— White diamonds with a slight tint of yellow.
SPECIFIC GRAVITY.— Relative weight of bulk as compared with distilled water at 60° F.
SPLINTS.— Sharp-pointed diamond splinters, or cleavages less than one carat.
SPREAD.— Surface in proportion to the depth of a cut stone.

TABLE.— Large flat facet on top of brilliant-cut diamond.

TAUÁ.— A breccia of the Agua Suja district, Brazil, particularly rich in diamonds.

TORN-END.— Three-cornered pyramid from the point of a wassie; a corner.

TWINNED.— Crystals formed conjunctively.

TWINS.— Crystals which show the junction of the crystals distinctly.

WASSIE.— A large cleavage split for cutting.

WELL.— Dark center of a diamond cut too thick.

WESSELTONS.— Fine white diamonds supposed to come from the Wesselton Mine.

YELLOW-GROUND.— Upper part of the diamondiferous rock in the African chimneys; oxidized blue-ground.

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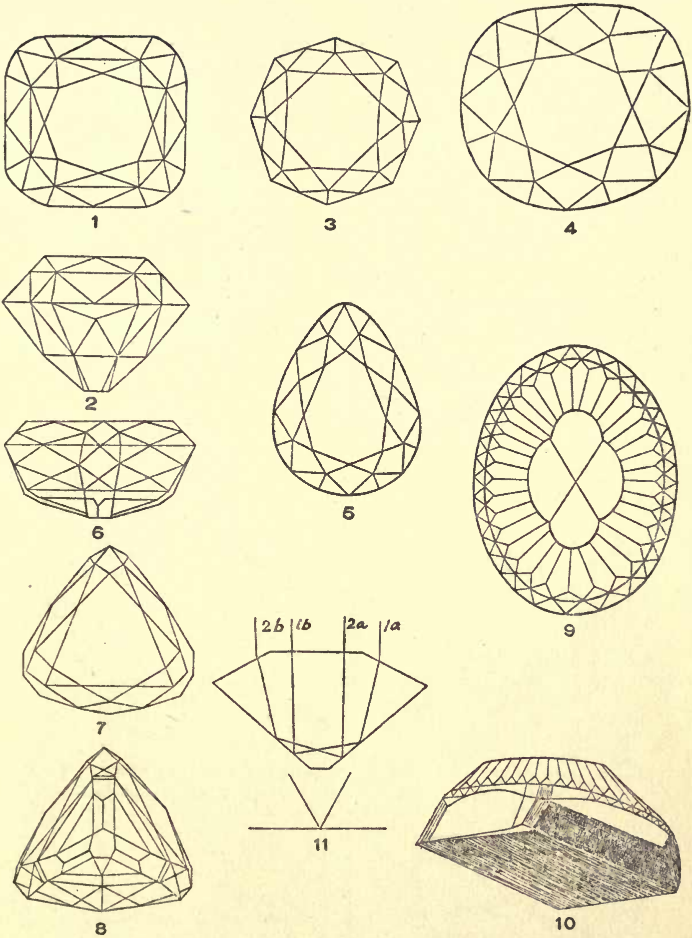

PLATE I

1, 2, Tiffany diamond, 125 3/8 carats; 3, the Pacha of Egypt, 40 carats; 4, the Stewart, rough 288 3/8 carats, cut 120 carats; 5, Star of South Africa, 46 1/2 carats; 6, 7, 8, Nassac, recut 78 5/8 carats; 9, 10, front and side of Koh-i-noor before recutting; 11, angle of total reflection; 1*a* to 1*b*, course of a refracted and reflected ray through an American-cut brilliant (1*a*, entrance; 1*b*, exit); 2*a* to 2*b*, course of a perpendicular ray (2*a*, entrance; 2*b*, exit).

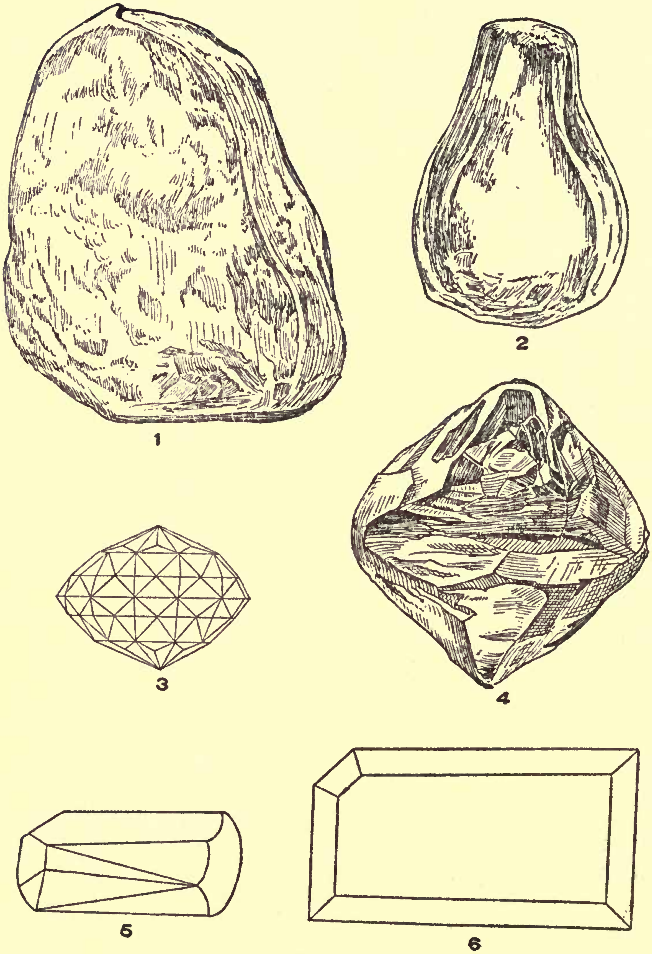

PLATE II

1, the Jagersfontein Excelsior (rough), 971 3/4 carats; 2, the Mattam, 367 carats; 3, Florentine, 133 1/8 carats (Florentine weight, 139 1/2 carats); 4, Victoria (rough), 457 1/2 carats; 5, the Shah, 86 carats; 6, Great Diamond Table of Tavernier, 242 3/16 carats.

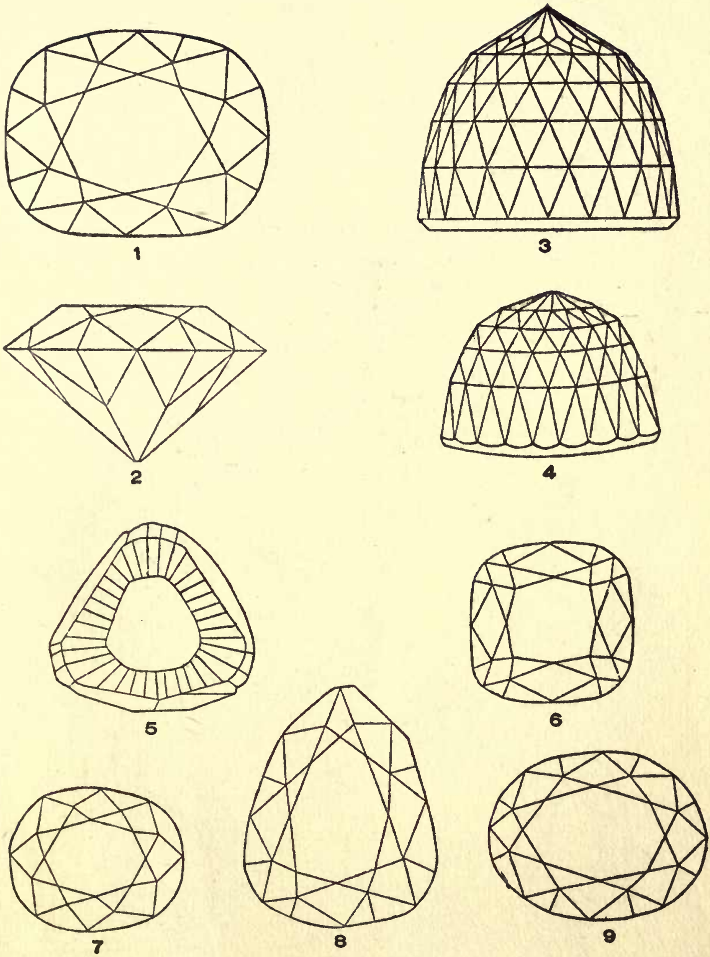

PLATE III

1, 2, the Imperial or Victoria, rough 457 1/2 carats, cut 180 carats; 3, the Great Mogul, 188 carats (variously estimated, size and weight uncertain); 4, the Orloff, 194 3/4 carats; 5, the Nassac, 89 1/2 carats; 6, the Polar Star, 40 carats; 7, the Eugénie, 51 carats; 8, Dresden Brilliant, 76 1/2 carats; 9, the Piggott, weight uncertain, quoted as 82 1/4 and 81 1/2, but according to Mawe 49 carats.

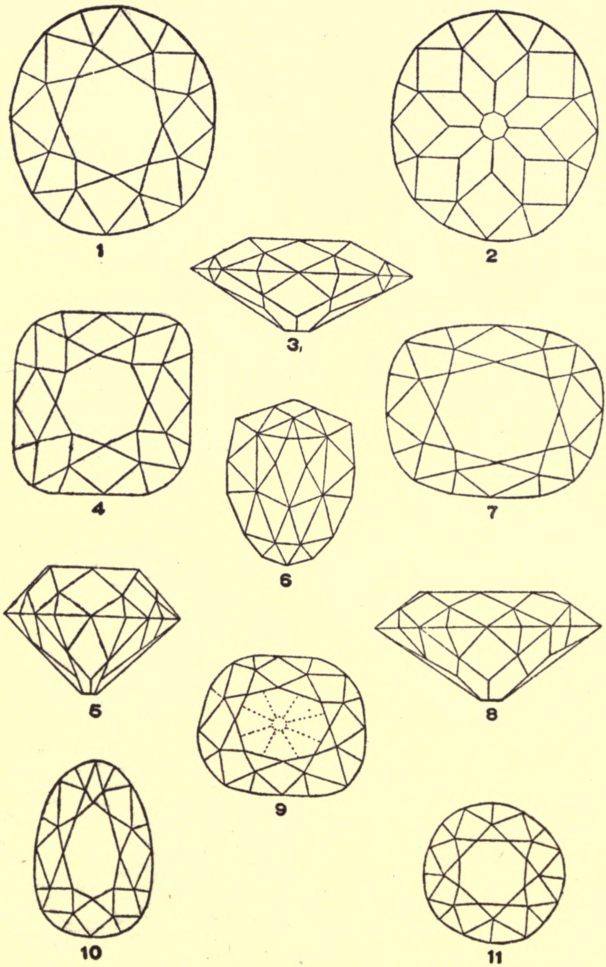

PLATE IV

1 (front), 2 (back), 3 (side), Koh-i-noor, 106 1/4 carats; 4 (front), 5 (side), the Regent or Pitt, 136 7/8 carats; 6, Sancy, 53 3/4 carats; 7 (front), 8 (side), Star of the South, 125 1/2 carats; 9, the "Hope" Blue Diamond, 44 3/8 carats; 10, Dresden Green Brilliant, 40 carats (some say 48 1/2 carats, others 31 1/4); 11, the Cumberland, 32 carats.

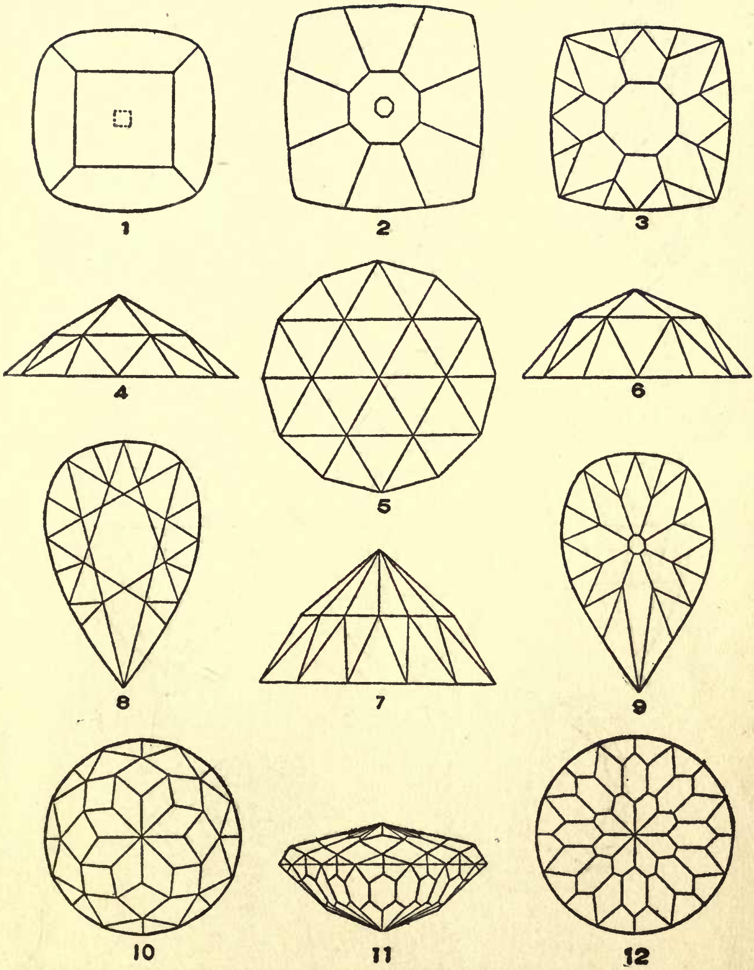

PLATE V

1, 2, 3, old brilliant cuttings; 4, 5, Holland rose; 6, Brabant rose; 7, rose recoupée; 8, 9, pendeloque; 10, 11, 12, twentieth century brilliant (80 facets).

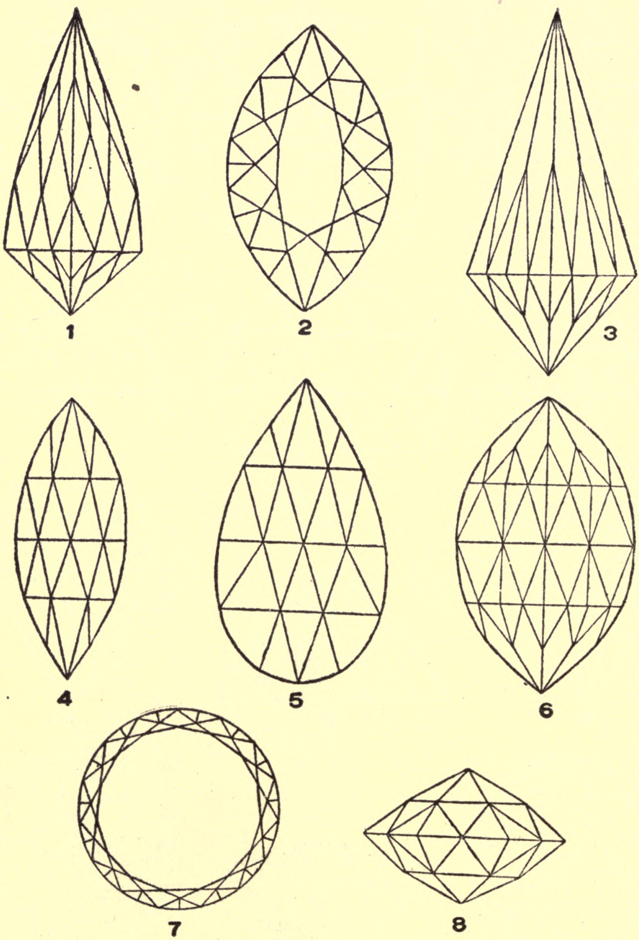

PLATE VI

1, briolette brilliant, 88 facets; 2, marquise brilliant, 72 facets; 3, briolette brilliant, 48 facets; 4, marquise rose, 24 facets; 5, pendeloque rose, 24 facets; 6, briolette brilliant, 88 facets; 7 rondelle, 128 facets; 8, double rose, 48 facets.

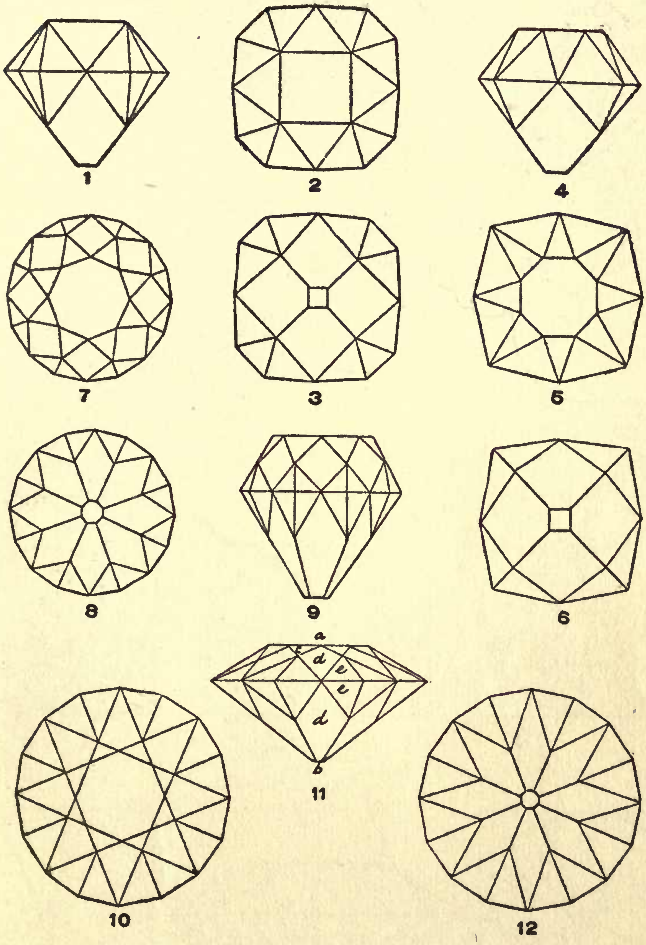

PLATE VII

1, 2, 3, old square-cut brilliant; 4, 5, 6, old English square-cut brilliant; 7, 8, 9, English round-cut brilliant; 10, 11, 12, American-cut brilliant, **11*a*,** table; 11*b*, culet; 11*c*, star facets; 11*d*, top and bottom main facets; **11*e*,** top and bottom corner facets.

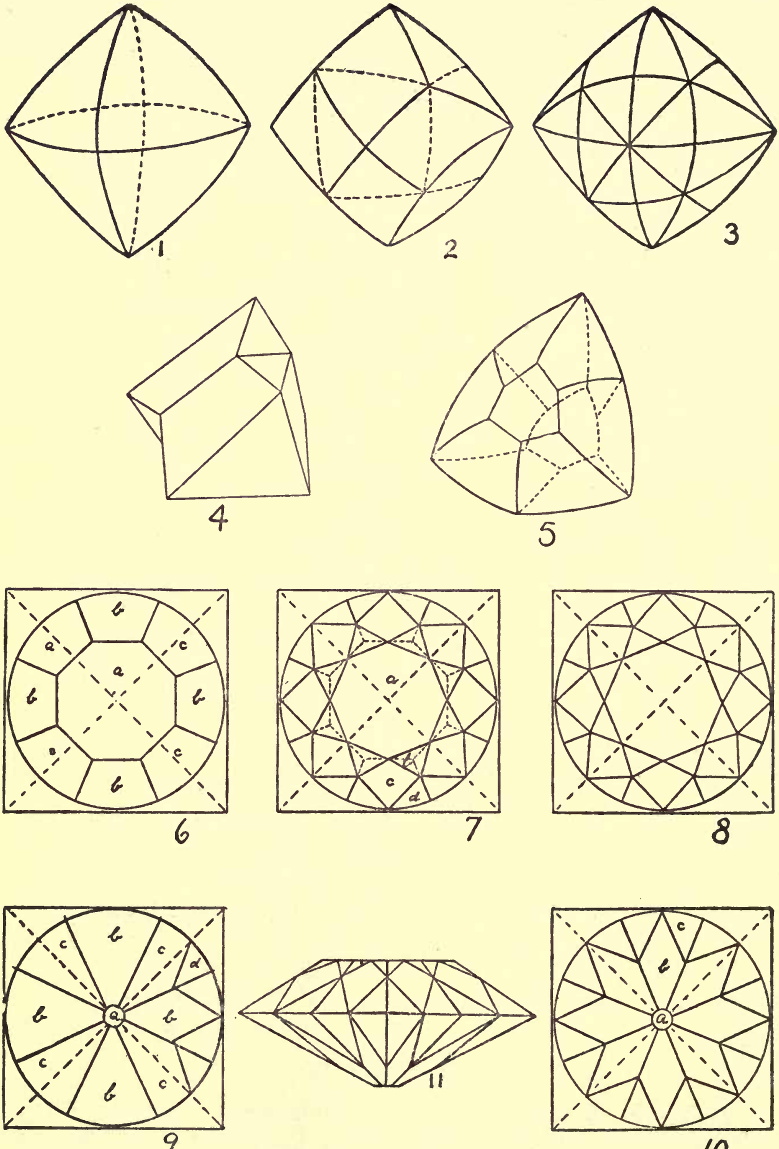

PLATE VIII

1, 2, 3, 4, 5, forms of diamond crystals: 1, octahedron; 2, dodecahedron; 3, six-faced octahedron; 5, modification of 3; 4, twinned-crystal. 6, 7, 8, 9, 10, stages of cutting a diamond crystal: 6, 7, 8, bizel facets—6*a* table, 6*b* bevel or bezel, 6*c* corner or hooky; 9, 10, pavilion facets—9*a* culet, 9*b* pavilion, 9*c* corner or hooky; 11, shallow stone with elongated lower corner facets.

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