THE CULLINAN DIAMOND CENTENNIAL: A HISTORY AND GEMOLOGICAL ANALYSIS OF CULLINANS I AND II

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The year 2005 marked a century since the discovery of the largest gem diamond ever found: the 3,106 ct Cullinan. Eight decades after it was mined, a team of gemologists conducted the first modern examinations of the two largest diamonds cut from the rough, the 530 ct Cullinan I and the 317 ct Cullinan II, which have been part of the Crown Jewels of England since their presentation to King Edward VII in 1908. This article traces the history of this famous piece of rough and its source, South Africa's Cullinan (formerly Premier) mine, which has yielded more significant diamonds than any other single locality. It also presents the full details of the examination and grading of these two approximately D-color, potentially flawless historic diamonds.

The huge rough diamond known as the Cullinan was found a century ago, when the British Empire was at the apex of its power. Its discovery, telegraphed around the world, also brought fame to the then newly opened Premier mine near Pretoria, South Africa. For many years, the great diamond was a symbol of the world's mightiest empire. At 3,106 ct, today it remains the largest gem diamond ever discovered, and two of the diamonds cut from it lie at the heart of the Crown Jewels of England (figure 1). Although much has been written about the original piece of rough and the diamonds fashioned from it, this article offers previously undocumented details about the famed Cullinan diamond, including the first comprehensive report on the gemological examination of the 530 ct Cullinan I and the 317 ct Cullinan II.

THE PREMIER/CULLINAN MINE

Located on a former farm 25 km east of Pretoria, the Premier mine (figure 2; renamed the Cullinan mine for its centennial in 2003) began full operation in 1903. The Cullinan was discovered less than two years later, the first extremely large diamond from a mine that, in its 100+ years of operation, has yielded more rough diamonds over 100 ct (300+) than any other single source, including more than 25% of all the 400+ ct diamonds ever discovered (De Beers Group, 2006).

Among the other legendary diamonds that have come from the mine are (all weights are for the rough): the Taylor-Burton (240.8 ct), Premier Rose (353.9 ct), Niarchos (426.5 ct), Centenary (599.1 ct), and Golden Jubilee (755.5 ct). The Fancy Vivid blue Heart of Eternity (27.64 ct polished—rough weight not disclosed) and the other 11 large blue diamonds that formed De Beers's Millennium Collection also came from this mine (L. Hori, pers. comm., 2005).

The Premier mine ceased operations several times during the past century and weathered a critical redevelopment project. It first closed in 1914 at the outbreak of World War I and reopened two years later shortly before De Beers acquired a majority

See end of article for About the Authors and Acknowledgments.
GEMS & GEMOLOGY, Vol. 42, No. 2, pp. 120–132.

Figure 1. The Cullinan I and II diamonds are focal points in the Crown Jewels of England. The 530 ct Cullinan I is set in the Sovereign's Sceptre with Cross (left), and the 317 ct Cullinan II is set in the Imperial State Crown (above). Also shown in the crown is the Black Prince's "Ruby" (actually, a red spinel; 170 ct) and St. Edward's Sapphire. Photo of scepter by Alan Jobbins. Top photo, Crown ©/The Royal Collection © Her Majesty Queen Elizabeth II.

stake. The Great Depression, which brought a precipitous drop in world diamond sales, forced it to close again in 1932. The mine did not reopen until after World War II. De Beers acquired full ownership of the Premier mine in 1977 (De Beers Group, 2006). At the time, continued operation seemed doubtful because excavations were nearing a 70-m-thick sill of volcanic rock that protruded through the entire kimberlite pipe at the 550 m mark. Because the mine remained so productive, De Beers ultimately determined that the expense of driving an underground shaft through the sill to excavate the pipe from beneath would be economic. When open, the mine has consistently produced well over a million carats yearly. In 2004, the renamed Cullinan mine yielded 1.3 million carats (De Beers Group, 2004).

Current mining is 763 m below the surface, and De Beers is investigating the extension of mining below 1100 m. This would add 20–25 years to the life of the mine (Fernandes, 2005).

BACKGROUND OF THE CULLINAN DIAMOND

On January 26, 1905, the manager of the Premier mine, Captain Frederick Wells, retrieved the large crystal (figure 3) from near the rim of the shallow pit

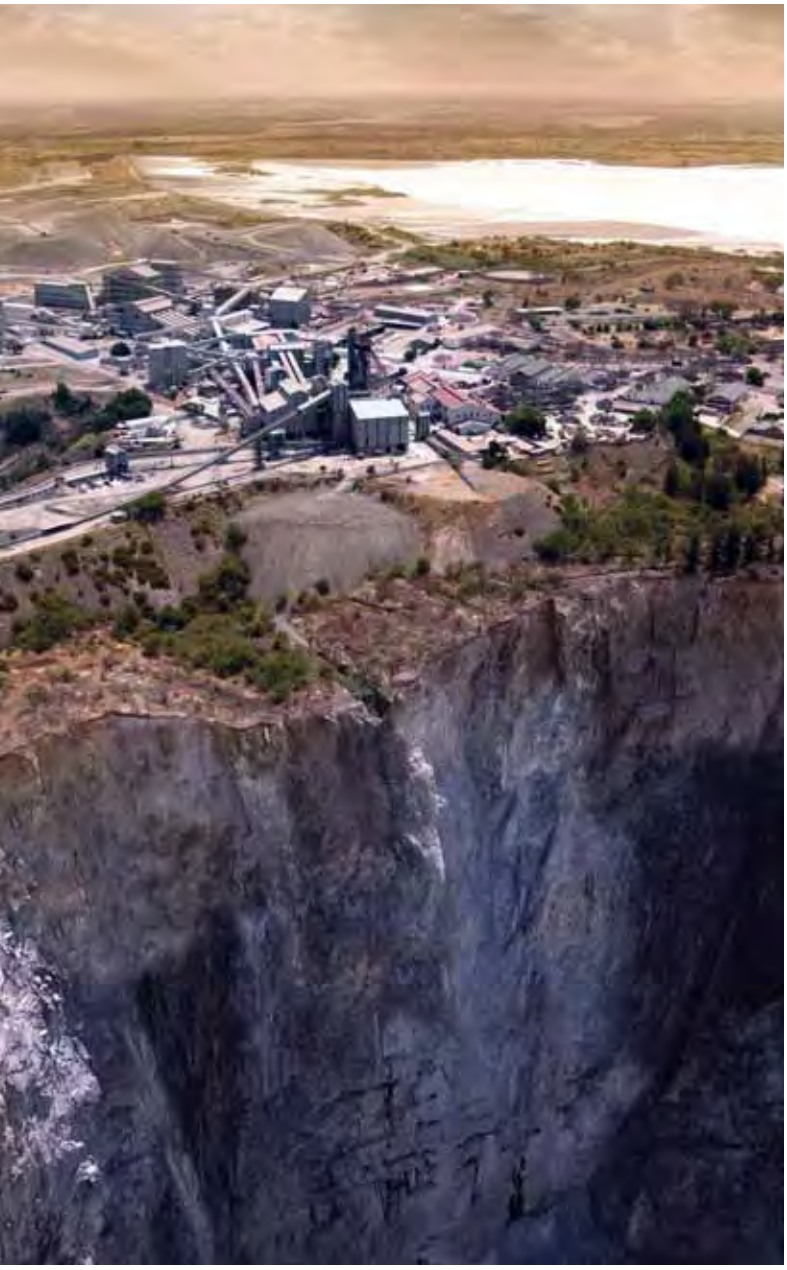


Figure 2. The Cullinan diamond mine (renamed from the Premier mine in 2003) has yielded more large diamonds than any other source in history. The Cullinan diamond was found on the opposite side of the rim shown here. Photo courtesy of Diamond Trading Co.

("Some facts . . . ," 1905). Announcement of this discovery touched off an immediate torrent of press reports that offered estimates of its value ranging from US$4 million to $100 million, and caused an 80-fold jump in the share price of the Premier (Transvaal) Diamond Mining Company Ltd. ("The largest diamond," 1905). Local newspapers began referring to the great crystal as the "Cullinan Diamond" in reference to Sir Thomas Major Cullinan, the chairman of the company and discoverer of the mine (Helme, 1974).

T. M. Cullinan settled in gold-rush Johannesburg in 1887. Within several years, he became one of the town's most prominent builders—a lucrative enterprise during a period when the settlement grew from a collection of gold miners' tents and shanties to a full-fledged city. The great Kimberley Diamond Rush had occurred years earlier, some 500 km to the south. In 1892, however, reports of sporadic diamond finds prompted Cullinan and several associates to form a syndicate to prospect locally for diamonds. The venture, the Driekopjes Diamond Mining Company, made several small diamond discoveries but was forced to cease activities when the South African War (also known as the Second Boer War) broke out in October 1899 (Helme, 1974).

During the 1890s, prospectors found scattered alluvial diamonds within the Dutch-ruled Transvaal near Pretoria and traced their origins to springs on a farm called Elandsfontein that was owned by Willem Petrus Prinsloo. Although a number of prospectors made offers, the elderly Prinsloo consistently rebuffed them (Helme, 1974). However, the end of the war in May 1902 left the Transvaal under British rule and the Prinsloo family destitute. The elder Prinsloo had died and the war had devastated the farm.

Cullinan offered the three Prinsloo heirs £150,000 for prospecting rights, to be paid out over an unspecified period of time, or £45,000 in cash for outright purchase. Prinsloo's heirs accepted the latter option, after negotiating the price up to £52,000. Cullinan formed the Premier Diamond Syndicate to buy and develop the property and signed the transaction on November 7, 1902. At this point, the syndicate was renamed the Premier (Transvaal) Diamond Mining Company. Among the company's shareholders was Bernard Oppenheimer, elder brother of Ernest Oppenheimer, who would later become director of De Beers Consolidated Mines (Helme, 1974).

Sampling commenced within days of the signing. By year's end, 187 carats of diamonds had been collected, and reports circulated that the "true pipe of the Pretoria formation has been found" (Helme, 1974, p. 52). In July 1903, as reports of the full scale of the Elandsfontein deposit began filtering out, the Transvaal legislature imposed a tax of 60% on the operation's profits. By the following year, the Premier reported a yearly production of 749,653 carats and profit of £667,738.

Following the Cullinan's discovery, the company displayed the great diamond at the Standard Bank in Johannesburg. An estimated 8,000–9,000 onlookers crowded the building to view it, though the company had issued only 3,000 visitor passes. The local newspaper, the *Transvaal Leader*, referred to the stone as the "Cullinan Diamond" in a February 2, 1905, report on the exhibition. The article also proposed the idea of purchasing the large piece of rough for £500,000 for presentation to King Edward VII of England who, because of the South African War, had extended his imperial rule to the Transvaal.

The discovery also touched off a mystery that has never been solved. An interview with Dr. Molengraaff of the South African Mines, Commerce and Industries Commission shortly after the big diamond was found noted that it was but a portion of a much larger stone, because only a relatively small section of the crystal had its "original natural surface" ("More about . . . ," 1905, p. 71). He added that "four pieces of this original stone have been broken off along cleavage planes . . . each of these fragments must have been of considerable size" ("More about . . . ," 1905, p. 71). This conclusion was disputed later on, but most of those who disagreed had not examined the rough stone. No identifiable pieces have ever been found (R. Walker, pers. comm., 2006).

In April 1905, the rough gem was dispatched to the Premier (Transvaal) Diamond Mining Company's London sales agent, S. Neumann & Co., where it remained for more than two years while the Transvaal Legislative Assembly debated whether or not to buy it. By this time, Afrikaans leaders General Louis Botha and Jan Smuts had pledged to support British rule and thrown their influence behind the purchase. After the intercession of then-Colonial Under-Secretary Winston Churchill, the Transvaal legislature approved in August 1907 a resolution to purchase the diamond for £150,000 and made the offer formal in October.

The monarch replied through the Secretary of State for the Colonies, Lord Elgin, that he would accept the diamond "as a token of the loyalty and attachment of the people of Transvaal, to his throne and person." King Edward VII also promised that the diamond would be "preserved among the historical jewels which form the heirlooms of the Crown" (Helme, 1974, p. 86). He received the rough diamond on November 9, 1907, the occasion of his 66th birthday.

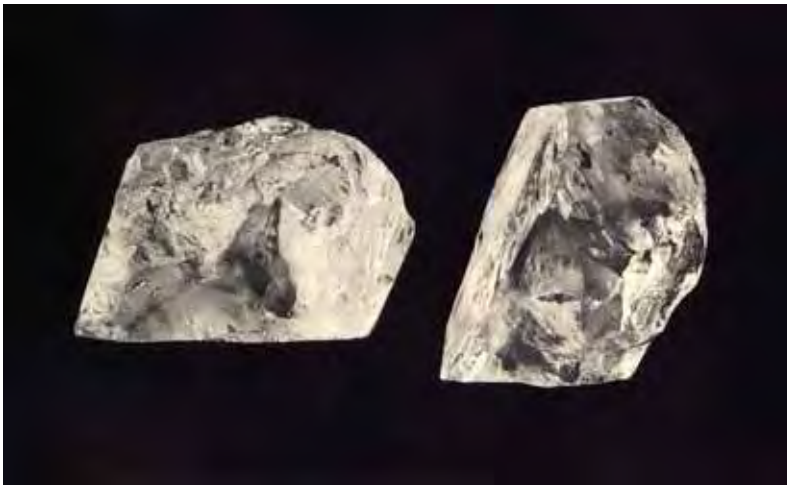


Figure 3. This model illustrates the Cullinan rough from two angles. Some geologists, based on the relatively small surface with naturals, had the opinion that the Cullinan rough was only part of a much larger crystal that had been cleaved by natural forces. Photo courtesy of the Diamond Trading Co.

Following the Discovery, Controversy About the Weight. Although the Cullinan is perhaps the most documented diamond in history, reports of its actual weight varied because of inaccurate scales and the lack of standardization in carat weights. A "British carat" was equivalent to 0.2053 g while a "Dutch carat" equaled 0.2057 g; both differed from the metric carat, 0.2 g. The now-accepted weight of 3,106 ct was based on the metric carat. The differences prompted demands to create an international carat weight standard (Spencer, 1910).

Initial press reports cited the weighing at the mine as 3,032 ct. The Premier Company's Johannesburg office weighed the diamond at 3,024¾ ct, while the London office gave a reading of 3,025¾ ct. These differences, all in British carats, were attributed to the fact that the brass weights used to counterbalance the scales were not uniform (some having been worn after a great deal of use) and to the variation in altitude between Johannesburg and London.

The man selected to cut the diamond was Joseph Asscher of Amsterdam. His firm, I. J. Asscher and Company of Amsterdam, had cut the 995 ct Excelsior diamond in 1903. Asscher weighed the diamond at 3,019¾ Dutch carats.

The Cutting of the Cullinan. Even before the Transvaal legislature had enacted its resolution, Cullinan had engaged I. J. Asscher to polish the approximately 10 × 6 × 5 cm diamond. Ian Balfour's *Famous Diamonds* (2000) offers a vivid, detailed

account of the cutting process, summarized here.

On February 6, 1908, Asscher commenced examining the diamond, which had two visible inclusions (Helme, 1974). Four days later, he began the cleaving operation (figure 4). The first blow broke the knife and left the diamond intact. The second blow, using a new cleaving knife (figure 5), split the stone into two sections; one weighing 1977.5 Dutch carats and the other weighing 1040.5 Dutch carats (now given as 2029.9 and 1068.8 ct, respectively). On February 14, he cleaved the larger piece into two. The polishing fell to his staff, overseen by Henri Koe, a 20-year veteran. Polishing of the Cullinan I began March 2, 1908. Asscher's staff started work on May 29 on the section that would become the Cullinan II.

The Cullinan yielded a total of nine major stones (see text below and figure 6), 96 smaller gems, and 9.5 carats of unpolished "fragments."

Figure 4. Joseph Asscher reenacts the cleaving of the 3,106 ct Cullinan rough. Photo courtesy of the Diamond Trading Co.

Figure 5. The hammer and knife used to cleave the Cullinan diamond. The knife is seen here spanning two models of the rough Cullinan. Photo by Alan Jobbins.

Work on the Cullinan I was completed September 12, 1908, and with three polishers working 14 hours a day, all of the gems were finished by early November. On November 21, the two largest gems, Cullinan I (530.2 ct) and Cullinan II (317.4 ct), were presented to King Edward VII at Windsor. The king named the large diamond the Great Star of Africa, though the Cullinan appellation has remained (Balfour, 2000).

The Cullinans I and II (figure 7) were retained by the monarch for the Crown Jewels. Most of the other stones (with the exceptions noted below) were given to Asscher for his fee. King Edward purchased the Cullinan VI for his consort, Queen Alexandra. The people of South Africa purchased the other six major diamonds and presented them to Edward's daughter-in-law Queen Mary (consort of George V, and an avid jewelry collector) in 1910, the year her husband acceded to the throne. These now belong to her granddaughter, Queen Elizabeth II.

The major gems are:

- **Cullinan I** (also called the Great Star of Africa)—a 530.20 ct pear shape set in the Sovereign's (or Royal) Sceptre with Cross on display in the Tower of London.
- **Cullinan II** (also known as the Lesser Star of Africa)—a 317.40 ct cushion-shaped brilliant set in the Imperial State Crown on display in the Tower of London.
- **Cullinan III**—a 94.40 ct pear shape that is set with the Cullinan IV (nicknamed "Granny's chips") in a brooch currently in the private collection of Queen Elizabeth II. In 1911, they had

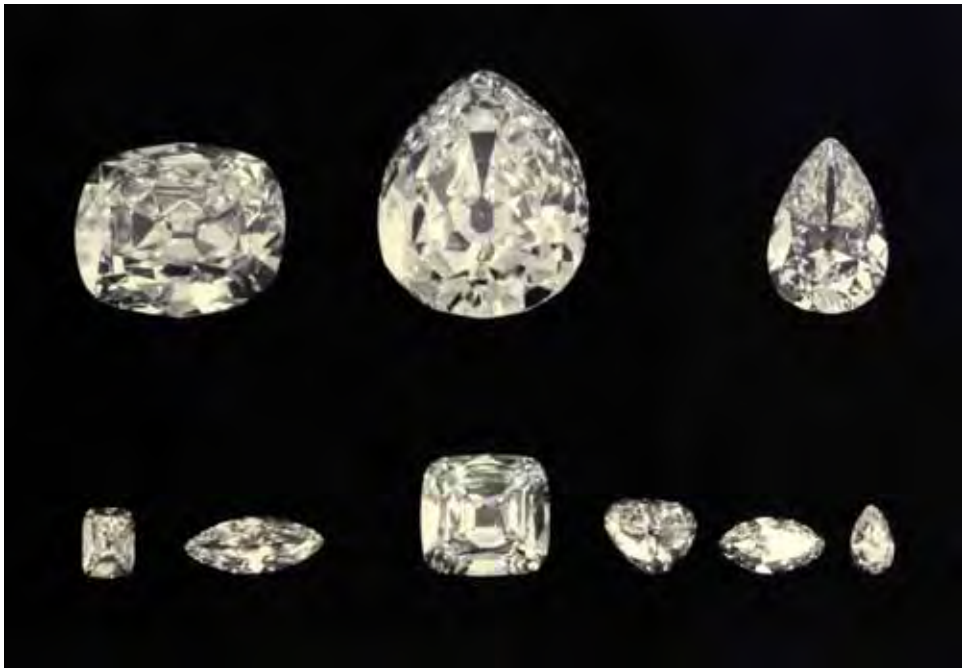


Figure 6. These are replicas of the major polished stones cut from the 3,106 ct Cullinan rough. Top (left to right): II, I, III. Bottom (left to right): VIII, VI, IV, V, VII, IX. Photo courtesy of the Diamond Trading Co.

been set in a detachable setting in Queen Mary's crown, but she removed them and replaced them with replicas (Balfour, 2000).

- **Cullinan IV**—a 63.60 ct square-cut brilliant that is set with the Cullinan III (see above).
- **Cullinan V**—an 18.80 ct heart shape set in a brooch for Queen Mary that is now owned by Queen Elizabeth II.
- **Cullinan VI**—an 11.50 ct marquise that was originally presented to Queen Alexandra by King Edward VII, and is now mounted in an emerald and diamond necklace owned by Queen Elizabeth II.
- **Cullinan VII**—an 8.80 ct marquise set with the Cullinan VIII in a pendant now owned by Queen Elizabeth II.
- **Cullinan VIII**—a 6.80 ct modified cushion shape set with the Cullinan VII (see above).
- **Cullinan IX**—a 4.39 ct pear shape mounted into a ring for Queen Mary that is now owned by Queen Elizabeth II.

The remaining 96 polished diamonds with a total weight of 7.55 ct were sold by Asscher to various clients (Spencer, 1910). Two were purchased by Gen. Louis Botha, then prime minister of South Africa. Several small stones went to Arthur and Alexander Levy, the London diamond merchants chosen to oversee the cutting operation.

GEMOLOGICAL EXAMINATIONS OF THE CULLINANS I AND II

Each February during the 1980s, a team from Garrard & Co., The Crown Jewellers, visited the Jewel House in the Tower of London to clean and, if necessary, repair the many crowns, scepters, and other items in the English Crown Jewels. These annual visits necessitated that the Jewel House, which is normally open for public viewing, be closed for the duration of each visit.

When it was recognized that the descriptions of the Regalia (Holmes, 1937, 1959; Holmes, 1974; Mears, 1986) were outdated and needed to be

Figure 7. The Cullinan II and I diamonds are shown here with a 1 ct round brilliant-cut for scale. Photo by Alan Jobbins.

revised, the annual cleaning periods were also used to conduct a thorough examination of the jewels, including a detailed gemological examination. These took place each February from 1986 to 1989.

This effort originated when Alan Jobbins, curator of minerals and gemstones at the Geological Museum of London from 1950 to 1983, was asked by Claude Blair, formerly keeper of metalwork at the Victoria & Albert Museum, to organize the gemological portion of the Regalia's examination with a view toward the production of a book (catalogue) on the subject. Jobbins then approached the senior author (KS, at the time head of the Gem Testing Laboratory of Great Britain [GTLGB; now the Gem Testing Laboratory of Gem-A]) and Dr. Roger Harding of the Geological Museum of London and asked that they join him in this endeavor. Subsequently, other gemologists were occasionally asked to be present during these examinations, including Nigel Israel (gemologist and appraiser) and Eric Emms (GTLGB), as well as Dr. Chris Welbourn of DTC Research, Maidenhead. The two-book set, *The Crown Jewels: The History of the Coronation Regalia in the Jewel House of the Tower of London*, was eventually published in 1998 (Blair et al., 1998). The work, of which only 650 were printed by the Stationery Office, London, at £1,000 per set, did not include details of the spectra, images of the diamonds in the spectrometers, or the color grading images, which are included in the following report.

With the exception of the George IV diadem, which was examined in 1989 on the premises of the GTLGB, all the gemological examinations of the Crown Jewels took place in the vault below the Waterloo Barracks in the Tower of London. Described here is the examination of the Cullinan I and II diamonds. The smaller Cullinan diamonds, which are in the Queen's personal collection and not part of the Crown Jewels, were not examined.

MATERIALS AND METHODS

The Cullinan I and II diamonds were graded for color and clarity in accordance with the normal CIBJO diamond grading practices in place at the time of the examination. First, both diamonds were thoroughly cleaned (figure 8), which was particularly important since both were still encased in their basket settings. Color grading was carried out within a standard light box, and the diamonds were compared against masterstones belonging to the GTLGB. Clarity grading was conducted using both a 10× loupe and a GIA GemoLite microscope set at 10× magnification. Due

Figure 8. The Cullinan II diamond is cleaned by Alan Jobbins prior to examination. Photo by K. Scarratt.

Figure 9. The Cullinan II diamond, still in its basket setting, is positioned with Blu Tack in the beam of the Nicolet 510 FTIR to measure its infrared spectrum. The inset provides a closer view of Cullinan II in the sample chamber. Photos by K. Scarratt.

to security restrictions, a temporary laboratory had to be set up within the vault housing the Crown Jewels, providing an environment that was less than ideal for diamond grading.

For the other visual examinations, gemological and mineralogical microscopes with magnifications ranging from 10× to 70× were employed. Fluorescence observations were made using a standard desktop long-wave (365 nm)/short-wave (253.7 nm) ultraviolet (UV) lamp in the total darkness of the central core of the display units in the middle of the vault.

At the time of these examinations, UV-visible and Fourier-transform infrared (FTIR) spectrometers were not found in most gem laboratories, so it was common practice when documenting diamond data to take a short-wave UV transparency image of each stone. These images were recorded by immersing photographic paper in a dish of water (emulsion-side up), placing the diamond table-down on the paper so that the water covered the entire stone, and then exposing the film to short-wave UV radiation by holding the same lamp used for the fluorescence observations about 30 cm directly above the paper. Once the paper was developed, if the center of the stone appeared dark (allowing for surface reflections from some facets), there was a good possibility that it was a type II diamond (i.e., transparent to short-wave UV); if the center was white, it was probably a type I diamond (i.e., opaque to short-wave UV). This procedure was performed on the Cullinans I and II using the underside of a workbench, a cardboard box, and a blackout curtain as a makeshift darkroom.

Note that this technique is only rarely practiced in gem laboratories today, as FTIR spectrometers are commonly available and produce definitive data on a diamond's type classification. Although infrared spectroscopy was also carried out on the Cullinans I and II (see below), the decision was made to conduct both tests to accommodate those gemologists who were not familiar with IR spectra.

Both OPL (diffraction grating) and Beck (dispersion) handheld spectroscopes were used to examine the visible-range spectra.

UV-visible spectra were recorded between 220 and 900 nm at room temperature using a Pye-Unicam PU8800 spectrometer with a scan rate of 0.5 nm/s and a bandwidth of 0.5 nm. Mid-infrared spectra were recorded between 7800 and 400 cm^{-1} using a Nicolet 510 bench at a resolution of 4 cm^{-1}. The diamonds were too large for any of the standard sample chamber accessories, such as a beam condenser, so none were used. To acquire the spectra, the diamonds were held with the aid of the putty-like adhesive Blu Tack (figure 9), and the stones were aligned so the beams entered the table and exited the culet or vice versa. Note that, with diamonds of this size, such "parallel windows" are likely to be large enough to permit the collection of fairly good spectral data without the use of a beam condenser.

Figure 10. This front view of the head of the Sovereign's Sceptre with Cross with Cullinan I removed shows the screws that hold the basket setting in place. The scepter, which dates to 1660–1661, had to be slightly reworked to accommodate the Cullinan I diamond. Photo by Alan Jobbins.

RESULTS

Cullinan I. *General Description and Grading.* The Cullinan I diamond is mounted in a yellow gold basket setting that is held in the head of the Sovereign's Sceptre with Cross (also known as the Royal Sceptre with Cross) by means of a series of screws (figure 10).

Figure 11. Cullinan I and Cullinan II, both in their basket settings, are being compared with masterstones and other diamonds of known color using a standard viewing environment. The pear-shaped diamond in the foreground had previously been color graded as "D". Photo by Alan Jobbins

The scepter dates to 1660–1661, but it has had various alterations that culminated with the addition of Cullinan I by Garrard & Co. in 1910 (Blair et al., 1998). The basket setting designed for Cullinan I has a hook attachment at its narrow end that connects to a ring attachment on the basket setting of Cullinan II, allowing both to be mounted in a pin fitting and worn as a single brooch (figures 7 and 11).

Cullinan I is cut as a pear-shaped brilliant with 41 crown and 34 pavilion (including one extra) facets; it measures 58.9 × 45.4 × 27.7 mm and weighs 530.20 ct. The girdle is faceted.

While it was possible to remove Cullinan I from the scepter, it was not possible to remove it from its basket setting. Therefore, grading for color and clarity was restricted by the presence of the yellow gold setting. However, when the stone was placed next to diamond color masterstones (in the ±1 ct range), Cullinan I compared well with the one of least color, indicating that it approximated a D on the GIA color scale (again, see figure 11). Despite the reflections from the setting, the overall opinion of those examining the stone was that it is very probably a D color.

Affecting the clarity of Cullinan I were a number of surface imperfections: a small cleavage ("gletz") on the pavilion and two further cleavages on the crown, an extra facet, and an area of colorless graining (figure 12). Cullinan I appeared to be free of any other clarity features, indicating that it warranted a clarity description of "potentially flawless." Given the historical significance of this very attractive diamond, though, it will likely never be recut.

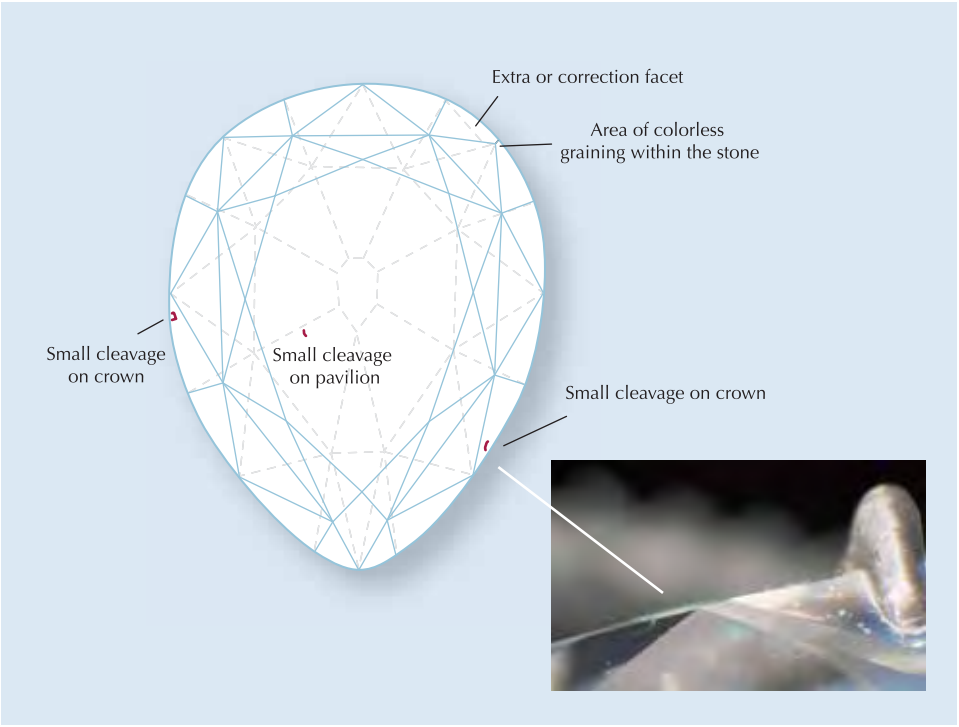


Figure 12. In this plotting diagram of Cullinan I, several clarity characteristics are shown, including cleavages on the pavilion and crown (see also inset) and some graining within the stone. Photomicrograph by K. Scarratt.

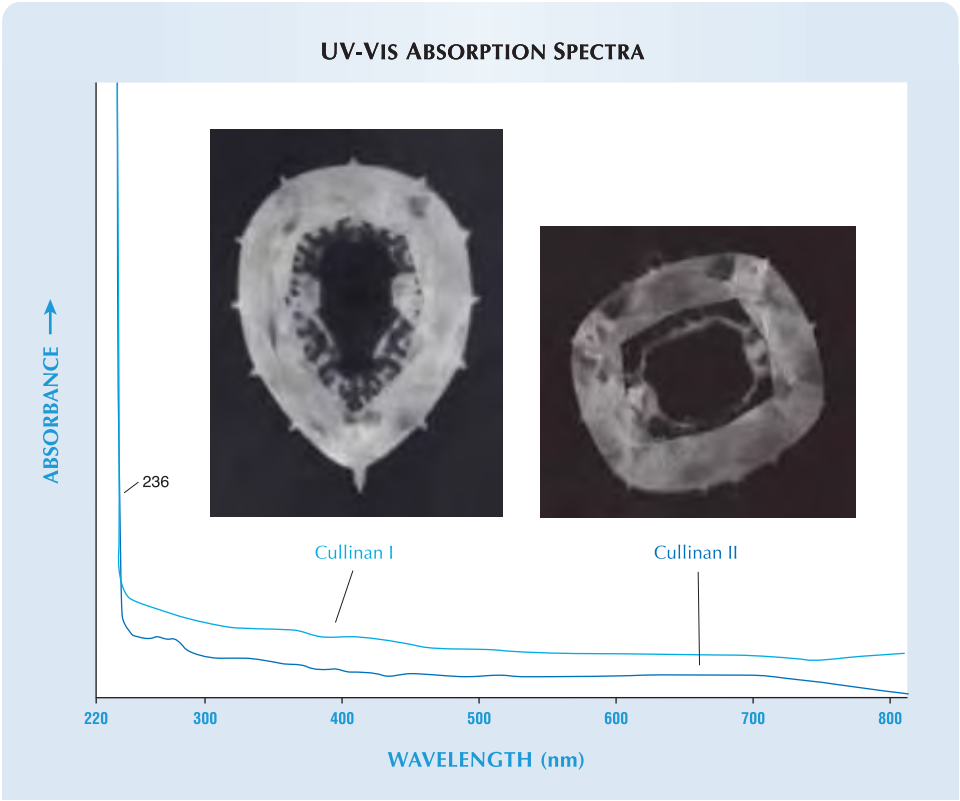


Figure 13. The UV-visible spectra recorded for the Cullinan I and Cullinan II diamonds are consistent with type II diamonds. This was supported by the dark centers in the short-wave UV transparency images also shown here.

Fluorescence. Cullinan I was inert to long-wave UV radiation, but fluoresced a weak greenish gray to short-wave UV. After the short-wave lamp was turned off, the diamond showed a weak green phosphorescence for at least 18 minutes.

UV-visible Spectroscopy. The UV-visible spectrum of Cullinan I (figure 13) revealed a featureless curve that rose slightly toward the shorter wavelengths, with total absorption occurring at 236 nm. This spectrum is consistent with that of type II diamonds (Wilks and Wilks, 1991).

The dark center of the short-wave UV image obtained on Cullinan I also indicated a strong possibility that it was a type II diamond (again, see figure 13).

Infrared Spectroscopy. The infrared spectrum for Cullinan I (figure 14) is normal for a diamond with an extremely low level of impurities and is consistent with that of type IIa diamonds (see, e.g., Fritsch and Scarratt, 1992).

Cullinan II. *General Description and Grading.* Cullinan II also is set in a yellow gold basket setting (again, see figure 11) that is held in the center front of the Imperial State Crown by screws (figure 15). Much of the content of the Imperial State Crown dates to 1838, with Cullinan II added in 1909, but

Figure 14. The infrared spectrum of Cullinan I is quite similar to the spectra of other diamonds with low quantities of impurities, which are designated type IIa.

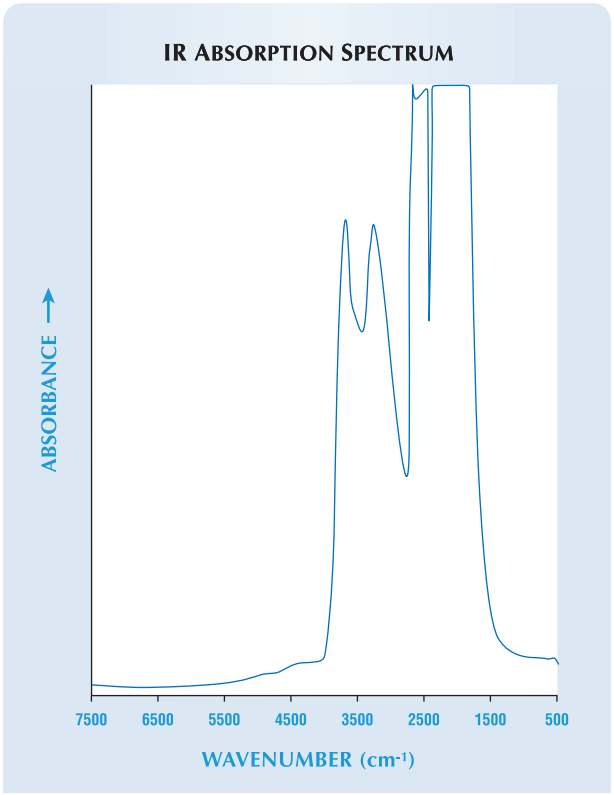


Figure 15. The front of the Imperial State Crown with Cullinan II and the large spinel known historically as the Black Prince's "Ruby" removed for this examination. These settings are flanked by two emeralds and two sapphires. Photo by K. Scarratt.

the crown in its present state (again, see figure 1) was executed by Garrard & Co. for the Coronation of George VI in 1937; the arches were lowered for Queen Elizabeth II in 1953 (Blair et al., 1998). As with the Cullinan I diamond, the basket setting designed for Cullinan II has a ring attachment that allows the two diamonds to be connected and worn as a single brooch (again, see figure 7).

Cullinan II is a cushion-shaped brilliant with 33 crown and 33 pavilion facets (including the table and culet, but excluding one very small extra facet on the pavilion). It measures 45.4 × 40.8 × 24.2 mm and weighs 317.40 ct. The girdle is faceted.

As with Cullinan I, grading for color and clarity was restricted because the diamond could not be removed from its basket setting. However, when the stone was compared to the same diamond color masterstones, Cullinan II compared well with the one of least color, indicating that it approximated a D on the GIA color scale (again, see figure 11), despite the reflections from the gold-colored setting.

The examination for clarity revealed a number of surface imperfections: a small chip at the girdle, a tiny pit with associated small "feathers" on the table, and a similar feature at the edge of a star facet. There are two small parallel cleavages on a star facet and two more near the girdle on a pavilion facet, as well as a small extra facet. A series of scratches runs diagonally across the table facet (figure 16). Cullinan II appeared to be free of any other imperfections. Like Cullinan I, the diamond is certainly potentially flawless, though, again, its historical significance would likely prohibit recutting.

Fluorescence. Like Cullinan I, Cullinan II was inert to long-wave UV radiation (figure 17), but fluoresced a weak greenish gray to short-wave UV. After the short-wave lamp was turned off, however, Cullinan II displayed only short-lived phosphorescence, in contrast to that of Cullinan I. The reason for this discrepancy in two diamonds from the same piece of rough is still unknown.

UV-Visible Spectroscopy. As might be expected (again, given that the two stones were cut from

Figure 16. This plotting diagram of Cullinan II shows the general locations of some imperfections, including small pits with feathers, small cleavages, faint scratches, and a small chip and natural at the girdle.

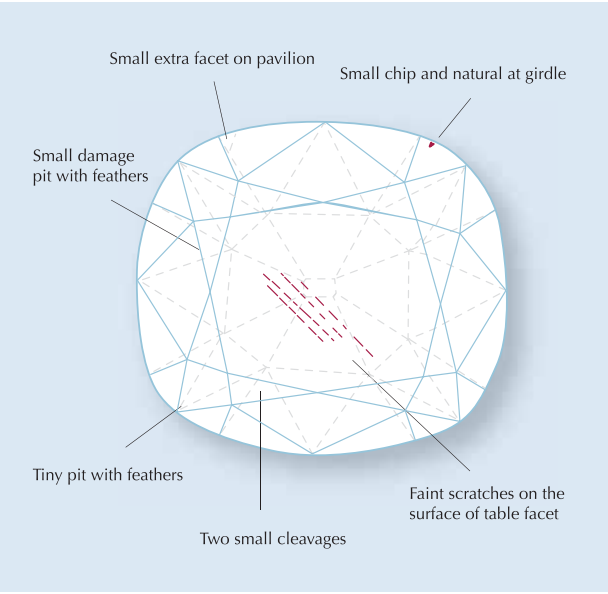


Figure 17. The Imperial State Crown with Cullinan II in place is shown during exposure to long-wave UV radiation. Note that the Cullinan II is inert under these conditions. A ruby inset in the red spinel (the Black Prince's "Ruby," which had been pierced during medieval times to be worn as a pendant) located above the Cullinan II and two rubies set in fleurs-de-lis *show red fluorescence; several other diamonds show blue fluorescence. Photo by Alan Jobbins.*

the same rough), the spectrum produced was similar to that of Cullinan I (again, see figure 13). It revealed a curve that rose slightly toward the shorter wavelengths, a low absorbance band at 265 nm (not present in the spectrum of Cullinan I), and total absorption occurring at 236 nm. As with Cullinan I, the dark center of the short-wave UV image for Cullinan II indicated that it was UV transparent. These results are consistent with type II diamonds.

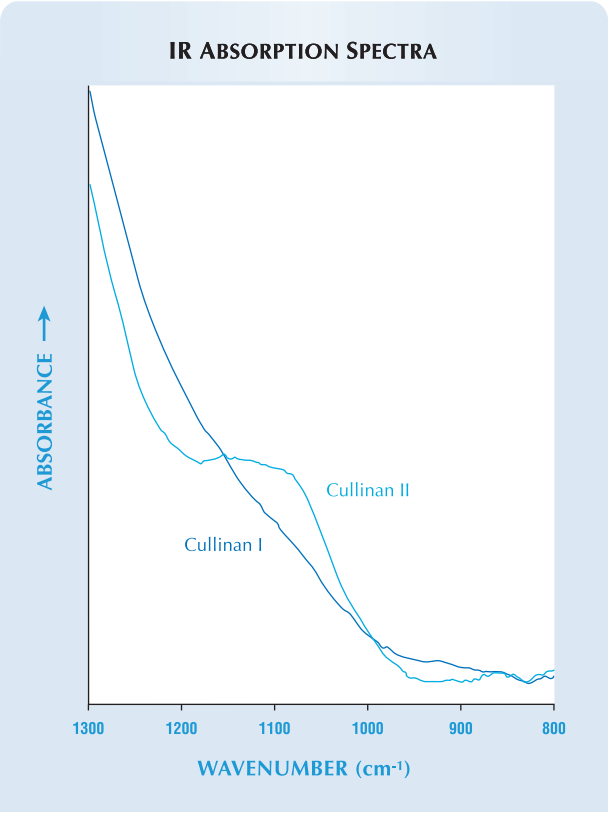
Infrared Spectroscopy. The infrared spectrum for Cullinan II was recorded between 7800 and 400 cm^{-1} at room temperature. The spectrum is normal for a diamond with an extremely low level of impurities, consistent with type IIa diamonds, and similar to the infrared spectrum of Cullinan I (figure 14). A slight hump centered near 1100 cm^{-1} present in the spectrum of Cullinan II was the only difference detected in the spectra of the two diamonds (figure 18).

CONCLUSION

To date, the original Cullinan diamond is, at 3,106 ct, the largest rough diamond on record. Last year, 2005, marked the centennial of its discovery, and 2008 marks the centennial of the cutting of this historic piece of rough by Joseph Asscher. Although the 530.20 ct Cullinan I has been surpassed in size by the 545.67 ct Golden Jubilee—a brown diamond cut in 1990 from rough that was also found at South Africa's Premier mine—it remains the largest colorless cut diamond and one of the world's most legendary gemstones, on view to millions of visitors each year in the Tower of London. It is a cornerstone of the Crown Jewels of England and, because of the period and circumstances of its discovery and acquisition, it remains a powerful symbol of the British Empire at its zenith.

Despite its legendary status, a complete published gemological report on the diamond was not available until this article. These gemological examinations, which found the polished diamonds to be D color, potentially flawless in clarity, and type IIa, serve to enhance the Cullinan's legendary stature.

Figure 18. The infrared spectra of Cullinans I and II are expanded here to show the "nitrogen region" at 1300–800 cm^{-1}. The slight hump in the spectrum for Cullinan II occurs at ~1100 cm^{-1}.



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ACKNOWLEDGMENTS
The authors are grateful to the following for providing information: Lynette Hori, Diamond Trading Company, London; Brig. Kenneth Mears, former keeper of the Crown Jewels, London; Robin Walker, former manager of technical information, De Beers, London; and E. Alan Jobbins, president of Gem-A, London.

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