Gems & Gemology

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Inclusions as a Means of Identification

by

EDWARD GÜBELIN, Ph.D., C.G.

Lucerne, Switzerland

(Continued from Page 244, Fall Issue)

A most interesting feature, which was omitted then, has been the subject of recent and more extensive studies, the preliminary results of which may be described herewith. The halos are built up by brown concentric rings of which the outmost is brimmed by a margin of discoloration of the host gem. Such pale margins are illustrated in Figure 17. In addition to garnets and corundums they have also been noted in other gems, such as cordierite, fluorite, quartz, and spinel. The width of the discolored rings depends upon the reach of the emanated α-particles which are responsible for these discoloration rings. The reach of the α-particles is ruled by the atomic brake-power which depends upon the nature of the crystal-lattice. This perception leads to the conclusion that the breadth of the discolored margins varies in accordance with the mineral species and, hence, becomes characteristic for any gem within which halos are formed by radio emanative process.

This is a most interesting phenomenon, which, some time in the future, might bestow upon gemologists an additional and positive means of distinguishing similar-looking Ceylon gems carrying radioactive zircons. Though this will most probably always remain an affair of academic diagnosis and will hardly ever turn into a method universally applied by gemologists, there exists an urgent necessity to further investigate radio halos, to note and evaluate all indications, so that we may learn still more about the dependence of the reach of emanated α-particles.

Within almandites found in the hornblende-schist near Trincomali on the northeast coast of Ceylon coarse hornblende rods or shingles are densely packed, which give these almandites a dull and unassuming appearance. Figure 18 gives an example of this singular kind of interior paragenesis, which is readily discernible if it be viewed through a lens of moderate power.

It also happens—a rare but thrilling occurrence—that a garnet supposed to be hessonite proves on examination to be a totally different member of the great garnet family, namely the manganese aluminum garnet called spessartite, which contains typical inclusions exclusive to this variety. These consist of wavy and irregularly placed feathers formed by minute liquid drops, which

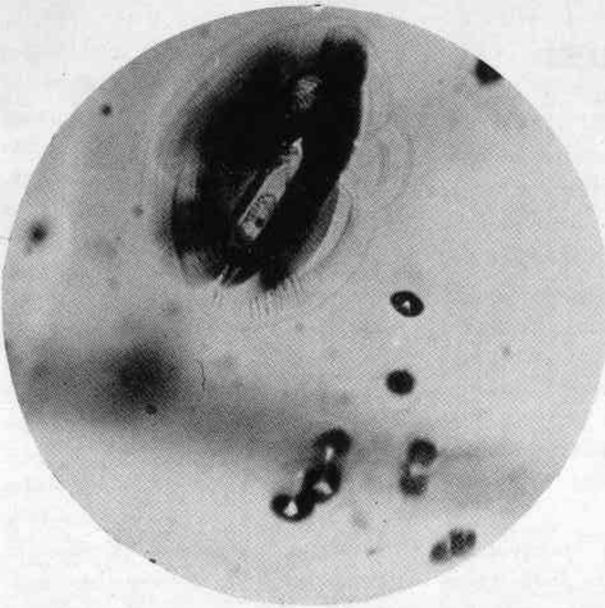
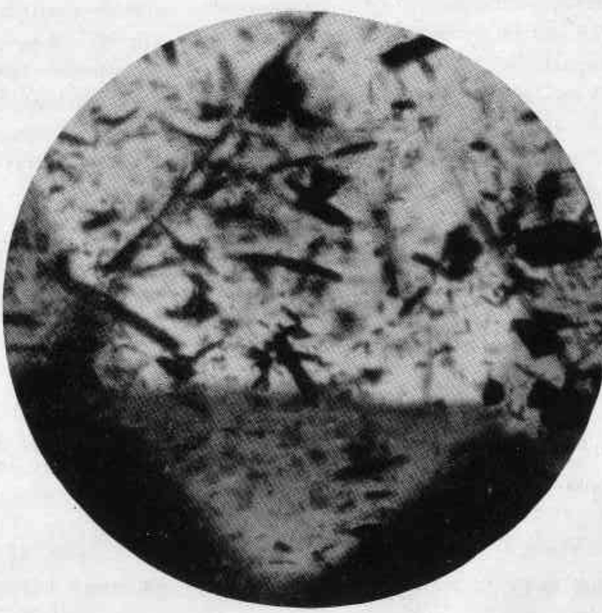


Photo by Dr. Gübelin

Figure 17
Group of included zircons with concentric radio halos in a Ceylon almandite. The small zircons are surrounded by clearly marked discoloration rings. 100x.

Photo by Dr. Gübelin

Figure 18
Hornblende strewn through an almandite from Trincomali. 40x.



can best be compared with the liquid feathers in rubellites.

These flaws, as depicted in Figures 19 and 20, either are embedded singly in the spessartite, or else, combined in bundles, swarm in every possible direction. No other variety of garnet, nor indeed, any other precious stone resembling spessartite, such as diamond, zircon, sapphire, and chrysoberyl, ever shows this peculiar type of liquid inclusions. This is another case in which the interior paragenesis offers valuable and certain identification marks of a garnet.

The accompanying microphotographs illustrate better than words the appearance of the above-described characteristic inclusions in the varieties of garnets most frequently met with in the trade. It is obvious that the internal paragenesis can not be determined in all garnets, especially when they are flawless. When, however, inclusions are present, they are a definite means of identifying and differentiating their host-gems.

It is naturally an advantage to possess a polarizing microscope, or if you are favored with a G.I.A. Diamondscope, use it in combination with a polariscope, as this offers the additional possibility of observing under the polarized light the grill-like extinction caused by anomalous double refraction by tension, which is characteristic of garnets. This typical pattern of extinction, as it is well shown in Figures 21 and 22, has never been observed in any other gem. However, in order to be armed for every possible emergency, it is a good idea to become sufficiently familiar with the inclusions in garnets and to attempt to recognize them with an ordinary jeweler's pocket loupe as well. Errors in diagnosis will, in consequence, happen less often.

This method of recognition (by inclusions) is astoundingly rapid, as most garnets can be identified with reliable accuracy by their inclusions. Anyone accustomed to examining gems under the microscope soon becomes acquainted with the above-described internal peculiarities of the various garnets, and is thus in a position to determine with certainty, by this method, any transparent garnet containing inclusions.

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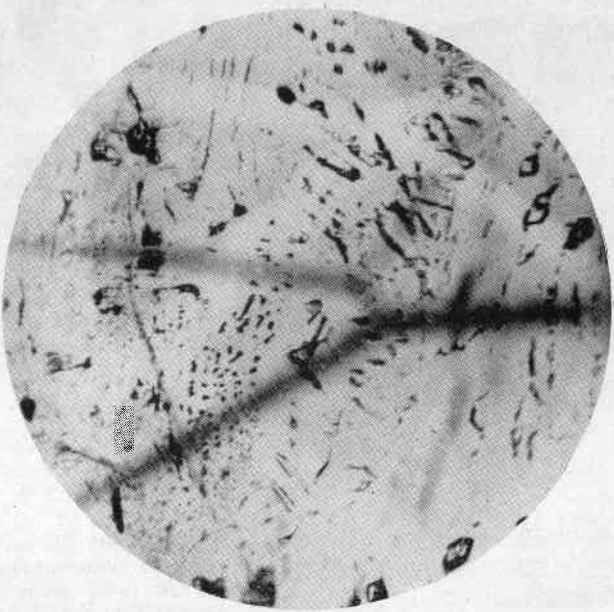


Photo by Dr. Gübelin

Figure 19
Typical feather of liquid drops as usually included in spessartite. 50x.

Photo by Dr. Gübelin

Figure 20
Typical flaws in spessartite. 30x.

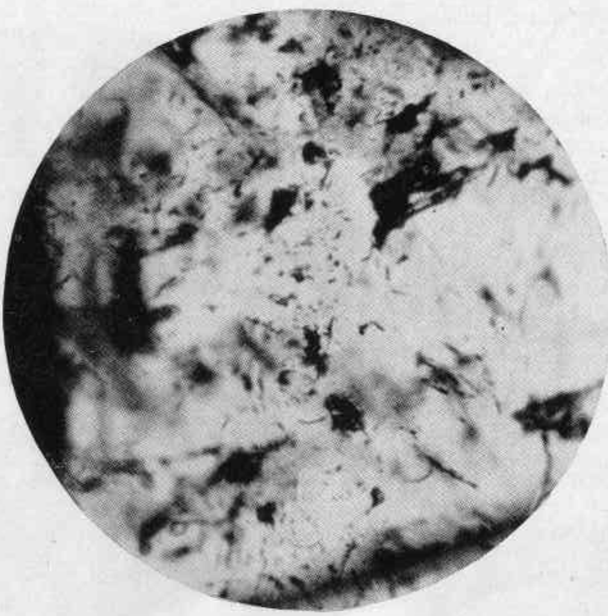


Photo by Dr. Gübelin

Figure 21
Typical grill-like extinction caused by anomalous double refraction by tension. 20x.

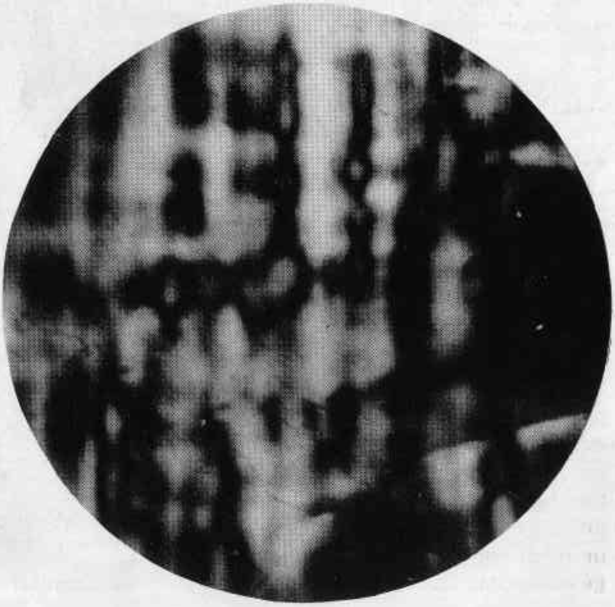


Photo by Dr. Gübelin

Figure 22
Characteristic grill-like pattern of extinction in garnet caused by anomalous double refraction by tension. 20x.

Dr. Kraus Accepts Presidency of Institute

Announcement that Edward Henry Kraus, Dean Emeritus of the University of Michigan's College of Literature, Science and the Arts, had accepted the presidency of the Gemological Institute of America was made at the January 18th G.I.A. Board of Governors' meeting in New York.

Dr. Kraus, long known to members of the Institute as one of its first and most interested advisers, is exceptionally well qualified for the office in which he will serve in an advisory and consulting capacity in the Institute's educational program. In his position on its Examinations Standards Board, he has contributed invaluable suggestions and articles to the organization and its publications since the Institute's earliest days. He was elected an honorary member of the G.I.A. in 1943 in appreciation of his contributions to the furtherance of gemology.

He is recognized both in this country and abroad for his outstanding studies and writings in an unusual number of scientific fields. Especially through his studies in mineralogy and crystallography he has earned international recognition amongst gemologists. In these two fields he has authored over seventy-five papers, and with Chester B. Slawson he co-authored *"Gems and Gem Materials,"* and with Walter F. Hunt and Lewis S. Ramsdell wrote *Mineralogy.* On educational trends and policies some fourteen of his writings have been published.

For his outstanding contributions in the field of mineralogy over a period of forty-five years, Dr. Kraus was awarded the Roebling Medal in February of 1945. To Dr. Kraus had been granted the honor of delivering the first presentation address for award of the medal which has been presented only five times since its establishment in 1930.

A native of Syracuse, Dr. Kraus received his elementary and his university education in that city. For three years following his graduation from Syracuse University, class of '96, he instructed in German and mineralogy, receiving his Master's Degree in '97. In Germany two years later, he began studies at the University of Munich in crystallography, mineralogy, geology, and chemistry, and in 1901 received the degree of Doctor of Philosophy. Followed a

(Concluded on Page 282)

The Scarcity of Fine-Color Flawless Diamonds

by

HANS J. BAGGE, C.G.

Throughout the course of World War II and in the immediate postwar period it has become increasingly apparent to the jewelers that there is a real scarcity of fine-color flawless diamonds. Many fine stores are finding it extremely difficult to replenish their stocks of gems, even at the most exorbitant prices.

For many years, I have personally advocated that the Registered Jewelers should begin to educate their customers to accept slightly imperfect diamonds.

In my extensive study of the diamond, I have found that even in normal or abnormal years the existing supply of flawless fine-color diamonds has been very limited; that is, if we are to accept the standards of the American Gem Society and the Federal Trade Commission.

My suggestions are irrefutable figures of diamond grading at the source of diamonds. Many A.G.S. members and students who attended the conclaves of the Central Division a few years ago will possibly recall my lecture.

It is true that the output of the alluvial fields and the few operating mines has been definitely curtailed because of the wartime labor and machinery shortages. My charts and figures, however, are representative of the last normal years before the war, and so are indicative of the diamond output under peacetime conditions. I am sure that even the most conservative diamond merchant will be startled at the percentage my figures reveal.

It is a well-known fact that 98 per cent of the rough diamonds are sold through the Diamond Trading Corporation, which has its offices in London. This corporation is capitalized at £2,000,000 and maintains a stock equivalent to that amount at all times. As various qualities and quantities of diamonds are sold, the stock is filled in as soon as available. Showings are made periodically by invitation only. Single sales may amount to from £8,000 to £10,000 up to £150,000 to £200,000 sterling. All diamonds imported by this corporation from South Africa are subject to a 10 per cent duty.

Previously, it was the policy of the Diamond Trading Corporation to show sights of rough diamonds from the Wesselton or Jagersfontein Mines as Wesselton or Jagersfontein sights. Fundamentally, the diamonds from each source are types with which a cutter is familiar. He is able, to some extent, to tell what type of goods he will finish. Some years ago this procedure was changed. All of the diamonds from the mines and alluvial sources now pass through the leading diamond organization in South Africa . . . the Diamond Producers Association. In turn, the Diamond Corporation, the parent organization of its subsidiary, the Diamond Trading Corporation, purchases all of the rough from this concern.

At the South African offices, the diamonds from all mines and alluvial sources are assembled in one lot and then sorted. The cutter, or broker, purchasing a lot of goods may get stones from the Bultfontein and Wesselton mine and Namaqualand Alluvial Fields in one series. In this way, both the alluvial and mine diamonds are marketed simultaneously.

If we are to understand thoroughly the method of grading diamonds at the source, we must first familiarize ourselves with the terminology used; that is, the colors, crystal structure and qualities. Chart No. 1 shows the grading at the offices of the Diamond Producers Association. There are ten colors and the classification "frosted." Opposite each I have listed the trade gradings for the colors.

COLORS

Rough grading classification	Trade Grades
Collection	"Blue-White"*
Extra Color	(so-called)
1st Color	Fine White
2nd Color	White
3rd Color	Silver Cape
4th Color	Cape
5th Color	Light Yellow
Yellow	
Brown	
Green	
Frosted	

CHART NO. 1

*Many merchants in the American trade include also 1st and 2nd color.

Charts No. II and No. III illustrate what is meant by close goods, irregulars, cleavage, macles and flats. With the colors and qualities of diamonds in mind, let us proceed step by step to break down an original lot of rough diamonds into the various categories.

Assuming, in Chart IV, that the lot is 100,000 carats, we must first segregate it into two parcels. Fifty per cent (approximately) will be gem material and the other 50 per cent will be common goods; that is, rejection stones, cleavage, industrials and bort. We are primarily concerned with gems, so, with only the mention of common goods, we will pass on to the first classification.

Gem material is divided into two assortments, "Stones" and "Cleavages."

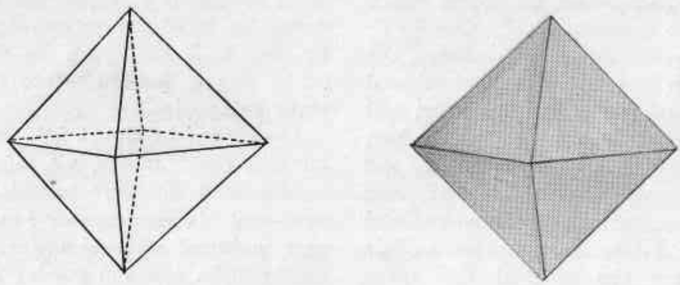
"Stones" are that type of rough, symmetrical in shape, from which a good percentage of finished diamonds may be obtained. Only 40 per cent of the gem material are "Stones" (which amounts to 20,000 carats of the original lot). The remaining 60 per cent, or 30,000 carats, of gem material consists of "Cleavages."

"Stones" are divided into four large categories (Chart No. V): close goods, irregulars, spotted goods and spotted shapes, and the colored classifications, such as yellow, frosted, greens and browns, each represent 5 per cent of the total, or 4,000 carats of the 20,000 carats.

Our first group to be considered is close goods, that is, "Stones" which are apparently free from flaws. Ten per cent of "Stones" are close goods, or 2,000 carats. These are divided, or sorted, into collection, extra color, 1st, 2nd, 3rd, 4th and 5th colors.

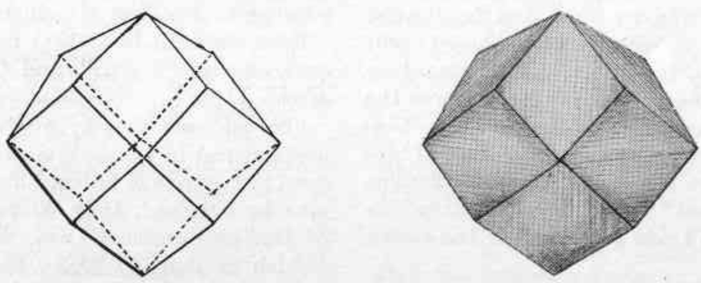
Irregulars, that is, stones slightly off shape, but pure, comprise 2,000 carats, or 10 per cent of the total.

CLOSE GOODS AND SPOTTED GOODS

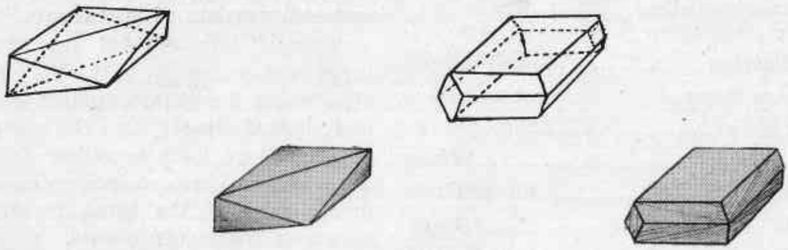


Close goods are free from all spots, flaws or fracture observable under good eyesight.

Spotted goods contain internal spots or flaws.



IRREGULARS AND SHAPES



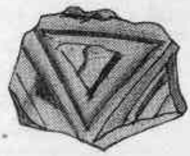
Irregulars and shapes are flattened crystal shapes free from spots and flaws.

CHART NO. II

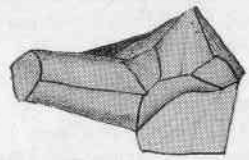
The irregulars run proportionate in color to close goods.

By far the largest percentage of "Stones" are of the spotted variety —spotted goods and spotted shapes. Spotted goods comprise 37½ per cent, or 7,500 carats; and spotted shapes (similar to irregulars) 22½ per cent, or 4,500 carats; making 12,000 carats in all. Is it not apparent that even the finer qualities of spotted material must be scarce, BLOCKS

(Best Cleavage)



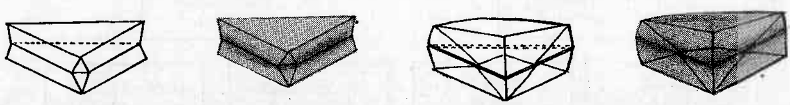
CLEAVAGE



Cleavage is the category which includes not only broken stones (no great proportion), but irregulars that are likely to lose a great deal of their bulk in cutting.

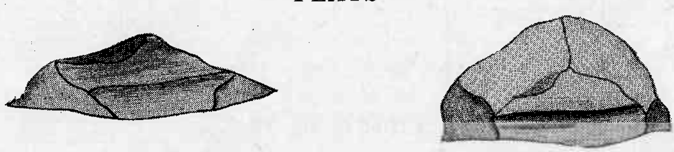
MACLES

(twin crystals)



Macles are twinned crystals more or less triangular in shape.

FLATS



Side View *Top View*

Flats are crystals more or less tabular.

CHART NO. III

since these groups are divided into so many categories (8 colors and 5 qualities)?

We now move to "Cleavage," Chart No. VI, which represents 30,000 carats, or 30 per cent of the original lot. Like "Stones," "Cleavages" are separated into four important categories. This group represents not only broken stones (no great proportion), but also stones which are likely to lose a great deal of weight in cutting.

Blocks, or "Bulky Cleavages," are pure, like close goods. They represent 12½ per cent, or 3,750 carats, and, like "Stones," are graded into various colors.

The "Cleavage" group proper is not graded as closely as spotted goods, although we have quite a number of gradations. Eleven thousand, two hundred and fifty carats of the total are represented here.

"Macles" and "Flats" are graded alike. Each comprises 7,500 carats of the 30,000 carats. Like the other categories, they are pure, various colored and spotted.

Study the figures in Chart No. IV and the boxed portions of Chart V again. As we are concerned mainly with good-quality stones which can be easily cut, for the purpose of this calculation we must consider only close goods and irregulars. Remember, these categories are divided into seven different qualities, of which collection and extra color will cut into so-called blue-white goods. These two colors represent 20 per cent of the entire lot of 2,000 carats of close goods, or 400 carats of supposedly blue-white and flawless diamonds. As the irregulars are graded the same as close goods, we must add 400 carats to this total, making 800 carats out of an original lot of 100,000 carats. Statistics show that only one-third of close goods and irregulars are flawless when cut. One-third of 800 carats gives us the amazing total of 266 carats out of a possible 100,000 carats as supposedly blue-white and flawless gems.

On a basis of five tons of blue ground to every one carat of rough diamond, 500,000 tons must be mined for 266 carats of flawless diamonds.

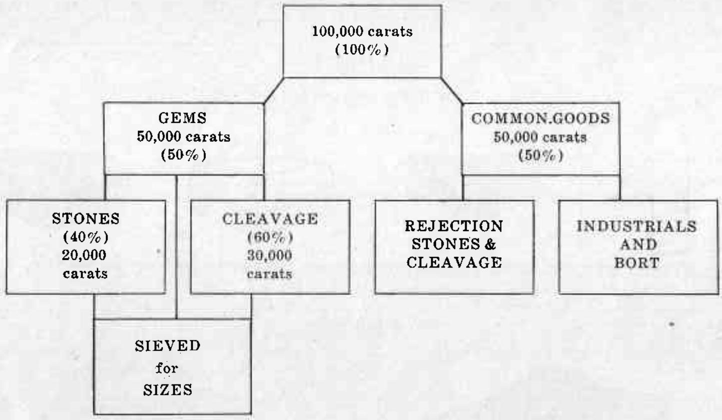


CHART NO. IV

On the same basis as we computed the fine so-called blue-white diamonds in close goods and irregulars, 20 per cent of 50,000 carats equals 10,000 carats, or 10 per cent of each original lot are fine colors.

The percentage of .266 per cent certainly reveals that there never has been an over-abundance of fine-color flawless diamonds.

Jewelers in the United States have stressed quality and perfection in diamonds for many years, so that a good portion of the public has become educated to this fact. Even in normal times, when diamond production is high and many fine cutters

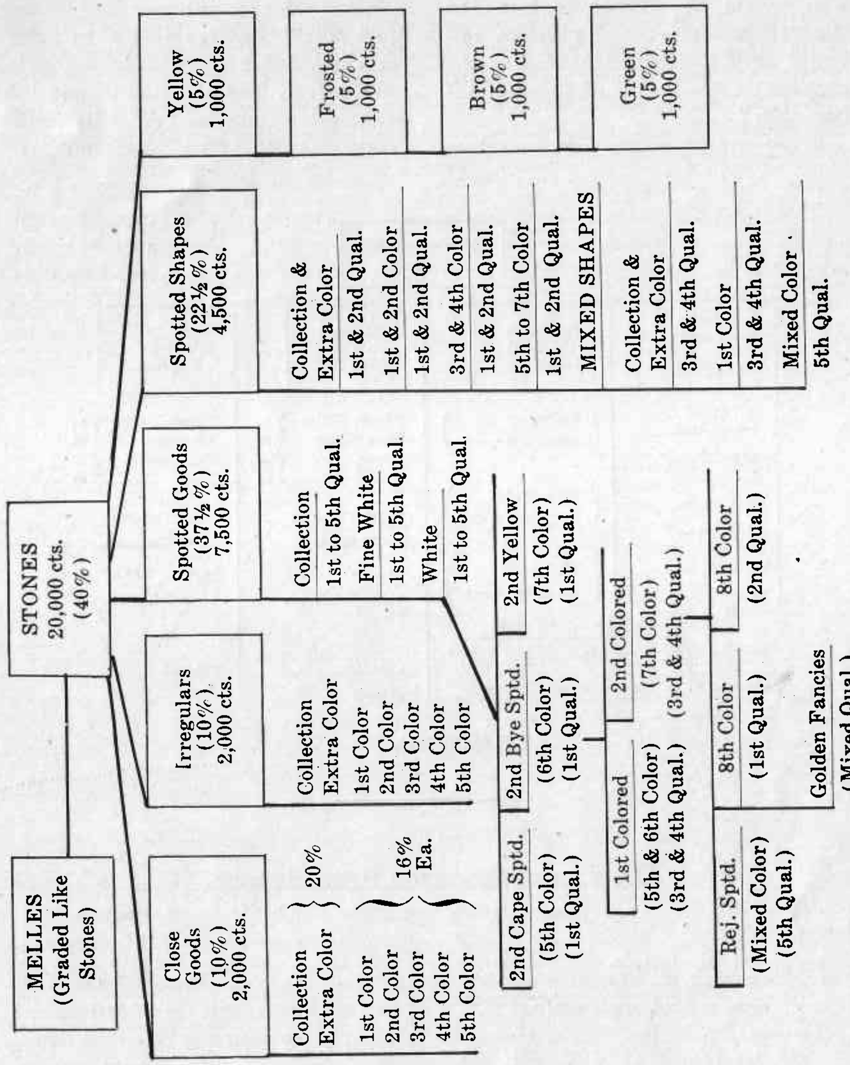


CHART NO. V

are working, it is sometimes difficult to procure a full stock of all sizes of fine-color diamonds which are free from imperfections. Under wartime conditions, or for the first few years thereafter, with a shortage of fine rough and cutting wages so high that finely cut goods are prohibitive in cost, any attempt to maintain this stock is a herculean, if not an impossible, task.

Has not the education of the public, therefore, been faulty? Is there not a great portion of that public who would be willing to buy the slightly imperfect and medium colors if they could be educated to the excellent values some of these qualities offer?

If we are to secure for ourselves a share of the postwar dollar, we must think constructively to offer for that dollar more than we ever have before. The question is, can the progressive jeweler do this with *scarce* fine-color flawless diamonds?

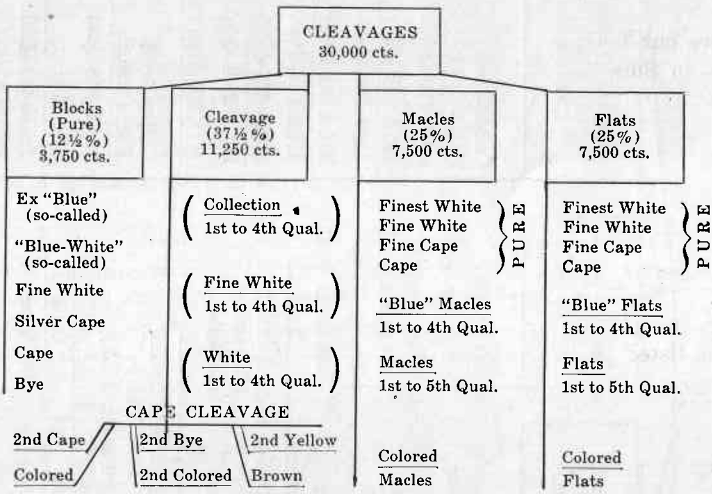


CHART NO. VI

Dr. Kraus Accepts Presidency

(Continued from Page 275)

year's teaching at Syracuse and two years' high school instructing.

He was first called to the University of Michigan as assistant professor of mineralogy in 1904, and following a rapid succession of advancements became full professor of mineralogy and petrography in 1908.

Preceding his appointment as Dean of Literature, Science and the Arts, Dr. Kraus' many administrative posts had included eight years as Dean of the Summer Session, and ten years as Dean of the College of Pharmacy. His retirement after twelve years in his last deanship closed a faculty career marked by unusual service in both teaching and administrative capacities.

His many affiliations in scientific organizations include past presidency of the Mineralogical Society of America, membership in the American Association for the Advancement of Science, and Fellow, Geological Society of America.

GEMOLOGICAL DIGESTS

Jonker No. 1, Weight Correction

Since our first mention of Jonker No. 1, in Summer of 1937, the gem has been reduced in weight by a recutting to remove a flaw and improve its proportions, and by a subsequent repolishing to remove a slight scratch.

A record but recently furnished us of present weights of the twelve fashioned gems produced from the Jonker rough was in error in the weight listed for the largest.

Throughout our material on the great rough and its fashioned gems we are correcting the present weight recorded for Jonker No. 1. Those who retain the Diamond Glossary section of each issue as a separate reference source should make the following correction:

Fall 1943 issue, *Gems & Gemology*, page 107: The last line of the paragraph at the beginning of the page should read *125.65 carats*.

New Colorscope Tested

The Gemological Institute of America Laboratory has tested an instrument recently available in the jewelry trade under the name of Colorscope.

The instrument is in the form of a folding pocket magnifier, made of plastic and mounting two circular sheets of smoked glass about ¾" in diameter, between which there is a small colorless lens of about 2x power. This lens and the two sheets of smoked glass are separated by rings of plastic. When viewed from the outside the mounted combination of glass and plastic appears to be one solid piece of glass.

Instructions accompanying the instrument state: That it is an aid in distinguishing differences in color of ordinary trade grades of diamonds (this assistance is said to be more pronounced in daylight or other strong light); that Premier diamonds may be distinguished by a distinctive purplish color under the instrument; and that "doctored" diamonds reveal their true color under it.

The G.I.A. reports that the Colorscope does aid in distinguishing colors of ordinary trade grades of diamonds, but neither as efficiently nor as accurately as an ordinary colorless magnifier of the same magnification, while a colorless magnifier 3x or 4x is still more efficient. Still further efficiency is obtained by use of the Diamolite, or under other controlled and diffused light of the type most often used by experienced diamond graders.

In sunlight the Colorscope is more efficient, as the smoked glass tends to reduce strong surface reflections.

Here, a colorless magnifier of the same power as the Colorscope proved *almost* as efficient.

Tests made upon diamonds of Premier grade which were available did not reveal a characteristic purplish color. When observed under the instrument, diamonds coated lightly with indigo stain revealed that particular type of "doctoring." Other types of "doctored" stones have not yet been available to the G.I.A. laboratory.

***Conclusion:** Except in sunlight the color grading of diamonds proved less efficient with this colored hand magnifier (Colorscope) than with good quality hand or head magnifiers of the same power.*

The Battershill Diamond

A new diamond, weighing 67 carats, is reported in *The Gemmologist* for July, 1945. Picked off the screens of the Williamson Mines near Mwanza the day the new Governor of Tanganyika, Sir William Battershill, visited the mines, the diamond, second largest from the area, has been named in his honor.

Gifts to the Institute

The family of the late Dr. Edward Wigglesworth, of Boston, has presented his library of gemological books to international headquarters of the Gemological Institute of America at Los Angeles.

For students of the Institute's courses, and for the staff members at headquarters, there will be unusual educational and sentimental value in using the books of the late president of the G.I.A. and director of its eastern laboratory, who earned the deep respect and sincere affection of the students and members of the Institute alike.

* * *

From B. W. Anderson, director of the Gemmological Laboratory of the London Chamber of Commerce, the G.I.A. has received for use in its laboratories a very much appreciated gift of a Beck Spectroscope.

From Virginia V. Hinton, C.G., F.G.A., a copy of *"The Grand Old Days of the Diamond Fields"*, by George Beet, and a copy of *"The Tears of the Heliades (Amber as a Gem)"* by Buffum, have been received for the Institute's library.

* * *

From Th. Badin, of Rio de Janeiro, has come a copy of *Brasilianishcer Edelsteine und Ihrer Vorkommen*, by W. Frederick von Calmbach, edited by N. Medawar, Rio De Janeiro, January, 1939.

* * *

From Lazare Kaplan & Sons two rough diamonds have been received, one of which is most unusual in that it fluoresces three colors—blue, orangy-pink and pronounced orange—at once.

Use of the Diamondscope

by

JEROME B. WISS, C.G.

In theory the Diamondscope is a simple instrument composed of two main parts, the magnifier and the illuminator. Neither of these parts employs any heretofore unknown principle of optics, light transmission or reflection, but the manner in which the known principles have been employed, and their adaptation to the needs of the jeweler, is unique.

Certain refinements, adjustments and attachments are found on this instrument, which when taken as a whole, permit the user to become proficient in gaining much valuable knowledge which can be turned to his profit. No other instrument embodying all of its features is to be found in the field today. Those who have used it properly over a period of time, rate it as the No. 1 instrument in a completely equipped gemological laboratory.

The magnifier consists of a binocular type compound microscope with three stages of magnification. The combination in the model known as the G.I.A. Standard Diamondscope is a pair of adjustable, wide-vision 15-power eyepieces which are used in conjunction with .7-power, 1.5-power (or 2-power), and 4-power paired objectives. These latter, set in a revolving head (known as a drum nosepiece), may be thrown alternately into line with the eyepieces by the pressure of the thumb and index finger. The magnifications thus obtained are 10½, 22½ and 60. The approximate diameter of the field of vision of these three magnifications is 21½ mm., 10.2 mm., and 3.81 mm.

For the most efficient use in detection of some synthetics, a 7.5-power objective affording a magnification of 112½x can be used by temporarily inserting it in the place of one of the other objectives. Indeed, the principal use of the 22½, 60 and 112½ magnifications is in the examination of colored stones and synthetics. In diamond grading the 10½ magnification is used in determining the degree of perfection or imperfection of the stone, because 10x is the standard magnification specified by the Federal Trade Commission. However, the detection of very small imperfections under 10½ magnification can often be accelerated by first examining the diamond under the 22½ magnification. The location and nature of such imperfections having been noted under 22½x, the revolving nosepiece is moved to bring the 10½x into line. If the imperfection cannot then be seen it is safe to assume that it cannot be seen by any other known method of visual observation under 10 magnifications or less.

The illuminator is a round metal container approximately 5″ in diameter, flat on the top, with a circular opening in the top 2⅜″ in diameter, through which light is emitted. At the right side is a slit-like opening through which to insert a background slide, or baffle, which falls naturally into place just below the opening in the top of the illuminator case. One end of this slide contains a translucent light blue frosted glass. On the other end is an opaque metal disk, black on one side and aluminum colored on the other. A conical shaped, highly polished reflector forms the base of the illuminator. Set in the base of the reflector is a miniature 6- to 8-volt 15-candlepower electric light bulb. The illuminator is covered by U. S. Patent No. 2157437.

The magnifier is supported by a rack and pinion adjustment controlled by a pair of geared focusing wheels fastened on the lower portion. The right hand, or the left, or both at once, may be used in focusing.

The illuminator is hinged on a heavy two-legged base. The illuminator and magnifier as a unit may be tilted away from the vertical towards a seated observer as much as 90°. A heavy screw stud with a wheel on the right side allows of sufficient tightening to hold the entire unit at any desired angle.

Since practically all large municipalities use alternating current of 110 or 220 volts, an auxiliary part known as a step-down transformer is an integral part of the lighting system.

An ingenious and unusual type of stone holder, furnished with the Diamondscope, is so constructed that it allows of universal motion, and may be set on either the right or left side on top of the illuminator. There is just enough friction in the joints and sleeves to hold fixed in any desired position the largest and heaviest stone which can be held in the springed jaws of the pointed tweezer end of the stone holder.

Examination of Stones

Any stone before being examined *must be clean* if accurate results are to be obtained. This applies more particularly to diamonds than to some colored stones. Some jewelers have found a piece of clean colored silk a useful cleansing aid. Bright-colored silk is preferable, so that any minute piece of lint left on the diamond will be noticed immediately by its vivid color. To thoroughly clean a greasy or finger-marked stone, immerse it in pure grain alcohol or carbon tetrachloride, wrap it, while still wet, in good quality lens paper of double thickness, and rub it dry.

To place the specimen in position for examination, push the opaque end of the background slide into position under the opening of the illuminator. Remove the stone holder from its post, pick up the specimen which has been placed table down on a clean substance, grasping it so that its girdle is firmly pressed by the two flat points of the stone holder. If this is not done properly the specimen may slip down into the grooves of the tweezer end of the stone holder and confusing reflections of the rough edges of the tweezer will be thrown into the edges of the specimen. Return the stone holder to its post and adjust the specimen, table up, approximately in the center of the opening of the illuminator. Care should be taken to set the stone holder in a line parallel to the top of the illuminator. Any deviation from this parallel position will cause less light to be thrown into the back facets of the specimen, as the relation of the reflector to the baffle plate in the illuminator is such that a focal point of light is found at a point about ½″ above the top of the opening in the illuminator.

If the Diamondscope is used on AC with the earlier-type variable transformer, turn the rheostat switch as far as possible toward the *off* position so that the minimum of current will pass into the bulb, then turn on the switch. Repeated snapping-off of current with the rheostat in full open position causes rapid deterioration of the filament of the low voltage bulb. The resultant blackening of the bulb's glass dims the light source. The newer-type transformer is fixed at the correct voltage and employs only the on-off switch.

If the Diamondscope is operated on DC with a cage-type resistance coil, simply connect the cord plug to a convenient outlet. If the Ohmite resistance coil is employed with the Diamondscope, the control switch should first be turned to zero, then gradually turned to obtain the strength of light required.

For the jeweler who has never used a Diamondscope, the next step, getting the specimen into perfect view with both eyes, is probably the most difficult—a natural result of the long-accustomed use of a single eye loupe by most jewelers. Care should be taken that the detachable objectives are in line with the eyepieces. With the .7-power objective the field is greatly reduced, therefore only a slight movement of the objectives will in many cases prevent observation of the object, since it will be out of the field.

Steps in Focusing

Tilt the entire instrument backward so that the binocular eyepieces are at the proper level for the eyes. Peer into the eyepieces; close one eye and slowly move the eyepiece opposite the open eye in or out, until the outline of the specimen is in clear view. Without moving the head, open both eyes, then close the eye through which the outline of the specimen has just been seen. When the specimen is centered in the second eyepiece, it should be visible equally well through both pieces. If such is not the case, a repetition of closing first one eye and then the other, while making slight adjustments of both eyepieces, will eventually give desired results. At this juncture the specimen will probably appear blurred, as no attempt at focusing has been made. By slowly moving the objective towards or away from the specimen by means of the focusing wheels a perfect focus on the top, or table, of the specimen may easily be obtained.

Although most procedure is the same, whether a colored gemstone or a diamond is being examined, there are still differences. Examination of a brilliant-cut, one-carat diamond will first be described.

A few small bits of dust and lint may still adhere to the diamond. These may be eliminated by gently brushing the top of the stone with a clean, fine camel's hair artist's brush. Only a few hairs of the brush need touch the diamond. Swabbing with the entire brush, as in use as a paint brush, may only deposit additional dust upon the stone.

When the top of the diamond has been freed of all dust particles, the stone should be turned over and the back facets brushed in like manner. Several brushings may be required.

An ear syringe is also very useful for removing particles of dust and lint from the specimen. A small bulbous affair, made entirely of soft rubber, is recommended. By holding the syringe so that the narrow open end protrudes between the index and middle fingers, with the thumb on the top of the bulb, fairly strong puffs of air may be directed at the stone by pumping the bulb with the thumb. I have found that the syringe is not so effective as a brush while the stone is being examined. The air currents set up by the "puffing" gather dust from the illuminator and the atmosphere, and deposit them upon the stone. The syringe is recommended for a final "blow off" of the stone after it has been cleansed and picked up by the stone holder, prior to putting the stone holder in place.

Observations

The observer now has before his eyes a perfectly clean diamond, "standing out" in its full three dimensions with practically no surface glare. This is, indeed, an ideal picture. The entire outline of the diamond is in focus and may be viewed at one time.

The first observation should be of the shape and make of the diamond. Is it perfectly round? Does it have any flat sides? Do all of the facets meet symmetrically? Are there any surface scratches, chips on the girdle, or polishing marks visible? All may be readily answered without having to change focus.

By looking down through the table at the culet, all of the facets on the pavilion, or back, of the diamond may be seen if the stone is a properly proportioned modern cut. The slightest indication of the culet's not being in the exact center of the table will reveal that certain back facets are wider than others, due to lack of symmetry in cutting. A lumpy stone with a small table will not allow a view of the back break facets when viewed from the top.

Every stone should be viewed from the back and the same observations made as from the top. In observing the back, particular attention should be given the girdle and the back break facets. Many times extra facets and naturals break the symmetry to such an extent that the diamond cannot be classified as flawless although otherwise free from imperfections. A slight adjustment of focus may be required when the stone is turned culet up.

While making observations of the make, etc., of the diamond from either the top or back, the interior of the stone is bound to come under observation. The imperfections in all stones which are classified by the writer as imperfect and slightly imperfect are bound to be noticed, and the majority of even the very slightly imperfect stones may be so classified as well.

(To Be Concluded)

DIAMOND GLOSSARY

(Continued from page 262 of last issue)

(Continued Definition of Perfect from Fall, 1945 Issue)

diamond eye loupe or other magnifier of not less than ten power." However, the A.G.S. had in 1937 recommended that "because the term *'perfect'* had acquired so varied a usage among different members of the trade as to be impossible to define and standardize" A.G.S. members should discontinue it in favor of the term *flawless,* and carefully defined that term, the use of which was permanently adopted by a majority of A.G.S. members. The term *"perfect"* is used occasionally to describe ruby, emerald and all other so-called colored stones in which absence of flaws is not as important a factor of value. Its use to describe any gem is challenged by some scientists who question whether any natural object is perfect. See **commercially perfect; flawless; "perfect cut"; perfection, degrees of; polish; proportions.**

"perfect, commercially." See **"commercially perfect."**

"perfect cut." (1) A term occasionally used in an exaggerated sense to mean a diamond or other gemstone the **fashioning** of which more or less approaches perfection. Fashioning which is perfect in every detail is probably impossible. (2) The term is often used deceivingly in describing or advertising diamonds to imply that a diamond is **"perfect"** or **flawless.** Such usage is prohibited by the American Gem Society and is ruled an unfair trade practice by the **Federal Trade Commission.** See "perfect."

"perfect girdle." A term which has been used in the trade to mean a girdle which, while retaining its circular outline, has been polished to the sharpest edge possible.

perfection. The state, quality or condition of being perfect (Standard).

perfection, comparative. The comparative proximity to the state of being perfect. See **perfection, degrees of comparative.**

perfection, degrees of comparative. Systems of nomenclature that have been used to describe degrees of comparative perfection include: (A) 1. Perfect; 2. Piqué; 3. Second piqué; 4. Third piqué; 5. Slightly imperfect; 6. Imperfect. (B) 1. Perfect; 2. V.V.S.I. (very, very slightly imperfect); 3. V.S.I.; 4. S.I.; 5. Imperfect. (C) In 1937 the ***American Gem Society*** recommended for use by its members: 1. Flawless; 2. V.V.S.; 3. V.S.; 4. Imperfect.

"perfectly cut." Same as **"perfect cut."**

peridotite. A very basic igneous rock consisting chiefly of olivine and pyroxene; usually dark in color. **Kimberlite** is a peridotite.

Peruzzi, Vincenzio (or Vincent). A Venetian diamond cutter who developed the **Peruzzi cut** at the end of the 17th Century.

Peruzzi cut. The first style of brilliant to be cut with 58 facets, 32 above, and 24 below the girdle, plus a table and culet. As the first brilliant cut to have three rows of facets above the girdle it was therefore also known as the **triple cut brilliant.** This style produced much more fire than the **double cut brilliant,** but its total depth was about equal to its girdle width, hence it lacked the brilliancy of later brilliant styles. According to Schlossmacher its **corner facets** were smaller and of different shape than its **bezel** and **pavilion facets,** necessitating two different sizes and shapes for the adjoining **break facets.**

"Pesas diamond." Quartz.

petrography. The description and systematic classification of rocks (Webster). The branch of **petrology** which studies the structural (macroscopic and microscopic) mineralogical and chemical character of rocks (Standard).

petrology. The science of rocks. The word is often used synonymously with petrography and lithology. Some writers have made petrography include both petrology and lithology.

phenomena (in diamonds), optical. A few diamonds change from colorless in filtered or unfiltered daylight to a faint pinkish color under artificial light. Even more rare are diamonds which are less yellowish by transmitted light than by reflected light. The cause of these changes of color is not yet known. **Fluorescence, phosphorescence,** and other types of **luminescence** are not gemologically classed as phenomena in the strict meaning of that term.

Philip II Diamond. According to DeBoot a 47½-carat diamond purchased by Philip II of Spain (1527-1598). It would have been an unusually large and important diamond at that time.

"philosopher's stone." An imaginary stone, the use of which medieval alchemists believed would make flint into gold, or into diamonds or other precious stones.

phosphor-bronze. A kind of bronze of great hardness, elasticity and toughness. Its superiority is due to the introduction of a small amount of phosphorus, usually as a compound of copper (phosphor-copper) or with tin (phosphor-tin) (Webster). Diamond saws are made of phosphor-bronze.

phosphorescence. In gemstones: a variety of **luminescence** exhibited by some diamonds and other gemstones, notably kunzite. It is caused by the emission of visible light rays after exposure of an object to X rays, cathode rays or to the ultra rays (including those in sunlight) and differs from fluorescence which is an emission during exposure. Thus it is a continuance of luminescence after the removal of the excitation of fluorescence, and a phosphorescent stone or other object is said to phosphoresce or glow. Phosphorescent diamonds are unusual. In general: the emission of light, or the property of emitting light, without sensible heat; also, the light so emitted (Standard). See **luminescence; photoluminescent gemstones.**

phosphorescent diamond. See **phosphorescence.**

photoluminescent gemstones. Gemstones which become luminescent by exposure to the action of light rays only; said to be fluorescent if luminescent during exposure to light, and phosphorescent, if luminescent after exposure. See **fluorescence; phosphorescence; luminescence.**

photometer. An instrument for measuring the intensity of light or for comparing intensities from two sources. In such comparisons the greatest accuracy is obtainable from light transmitted through standard thicknesses or from light reflected from opaque objects, hence the difficulty in registering upon a photometer the comparative brilliancy of two diamonds.

photomicrograph. A photograph of a greatly magnified image of an object, usually produced by the use of a camera and a microscope. A photomicrograph of the inclusions in a gemstone is often useful in identifying it, as for instance in case of loss. The diamondscope is especially useful in obtaining such microphotographs of diamonds.

physical properties of diamonds. See **properties of diamonds.**

picking table. A flat or slightly inclined platform on which ore is distributed to remove unwanted minerals. Used in the South African diamond mines until grease was accidentally spilled on a table and **grease tables** were installed.

picotite. A dark brown, translucent to almost opaque variety of spinel (Dana). A primary mineral in the kimberlite occurrences of South Africa (Wagner). Suggested as a possible inclusion in diamonds when most so-called "carbon" was thought to be dark colored inclusions. See **carbon inclusions.**

piedra del Cabo (Span.). South African diamond.

pierres de fantaisie. A term used for diamonds with any noticeable depth of hue such as rose, red lilac, etc. See **fancies.**

Pigot Diamond. One of the world's most famous diamonds, of Indian origin. Said by Mawe to have been 49 carats in weight, of the first water and to have ranked among the finest in Europe, although not then considered to be of sufficient depth. However, its fifty-eight facets were insufficient in number to produce maximum fire. Its name is usually misspelled *Pigott* and because of an error of some long-dead author, its last owner is stated in most books to have been the Pasha of Egypt. It was probably a gift or bribe from the Nabob of Arcot to George Pigot, governor of Madras until his death in 1776. In 1775, Pigot probably brought the stone to England, at which time he became Baron Pigot. In 1801 it was sold in a lottery, then resold at Christie's for 9,500 guineas. An unconfirmed rumor attributed its possession to Madame Bonaparte, Napoleon's mother, but Streeter states that in 1818 it was sold by Rundell and Bridge to Ali Pasha, a statement verified in news items of that period. From 1788 to 1822, Ali Pasha was Pasha of Janina, Albania (not the Pasha of Egypt), and a collector of diamonds. Nominally subservient to the Sultan of Turkey, he was reported to have resisted arrest by that ruler in 1822. Mortally wounded, he ordered the destruction of his two most cherished possessions, the Pigot, and his favorite wife, Vasilikee. Another report was that he had been in custody and was beheaded. His wife survived, but if the diamond was not destroyed, its later history has remained a complete secret.

(To Be Continued)