Gems & Gemology

GIA

WINTER 1971-72

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Gems & Gemology

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WINTER, 1971-72

IN THIS ISSUE

The Barion Cut–
A New Standard Mixed Cut
For Diamonds

by
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In the recently published International Diamond Annual, Volume I (1971), another new cut for diamonds was advertised. Already more than fifty cutting styles have been used on diamonds at one time or another, but with the Barion cut, it would seem that a definite breakthrough into the field of brilliant diamond cutting has been achieved.

For many years, Mr. Basil Watermeyer who is associated with Jooste's Diamond Cutting Works, Johannesburg, has been trying to improve the brilliancy of step-cut diamonds. After various unsuccessful attempts, he once more concentrated his efforts on the regular square shape and per chance conceived the present style of cutting. He patented and named this cut the Barion, after his wife, Marion, replacing the first letter by that of his name, Basil – hence Barion.

Generally, the Barion cut may be regarded as a mixed cut resulting from a full emerald-cut crown superimposed on a modified brilliant-cut pavilion. The girdle outline is square, but modifications are possible.

Details are as follows:

Crown

(a) The fully-cut emerald crown has three steps running parallel to the girdle and are cut at 40, 34½ and 32° to the plane of the girdle respectively.

(b) The table diameter measured squarely, is in the vicinity of 62% of the girdle diameter. An ideally-cut table of 53% appears out-of-proportion, while spreading the table very much in excess of 62% will decrease the amount of dispersion *(refer to Figures 1 and 2).*

(c) The crown height is about 1%

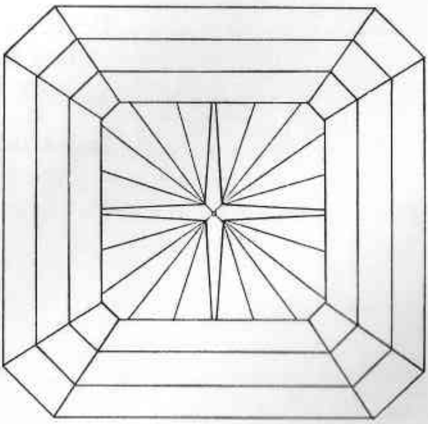

Figure 1

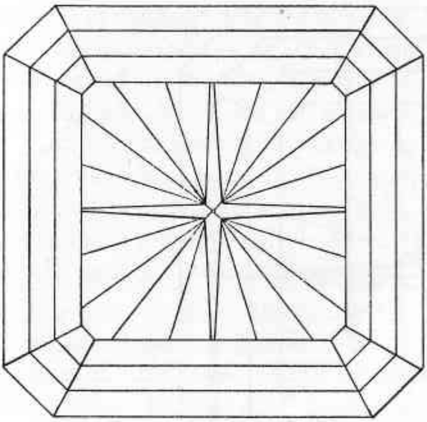

Figure 2

thinner than the usually accepted ratio between table width and crown thickness, e.g., a 62% table has a crown thickness of about 12 to 12.5% of the girdle diameter and not the usual 13%.

(d) The eight girdle facets are polished and have a thickness of between 0.7 and 1.7% of the girdle diameter; good color diamonds being cut with a thinner girdle to avoid a heavy appearance.

Pavilion

(a) The fully-cut brilliant pavilion has an additional four half-moon facets parallel to the girdle and making an angle of about 60° to the plane of the girdle.

(b) The four point corner facets are the only facets other than the four half-moons to meet the girdle. (The four half-moon facets should be regarded as an extension of the girdle as they separate the remaining four pavilion and sixteen lower girdle halves from the girdle facets proper.)

(c) The eight pavilion main facets, i.e., the four point corner and four pavilion facets are set at an angle of 41° to the girdle.

(d) Only the four pavilion facets which extend from the center of the half-moons meet in the culet to form a cross when viewed through the table.

(e) The remaining twenty facets (4 point corners, 8 inner halves and 8 outer halves) meet in a common plane above the culet. They are closer to the culet than in the round brilliant cut.

(f) The pavilion has a depth of 43% of the girdle diameter.

(g) A small culet is added to prevent chipping.

Nomenclature and Facet Distribution
(Illustrated in Figures 3 and 4)

Crown		
Table	(1)	
Table Break	(4)	
Center Break	(4)	
Girdle Break	(4)	
Top Point Breaks	(12)	25
Girdle		8
Pavilion		
Half Moon	(4)	
Inner Half	(8)	
Outer Half	(8)	
Point Corner	(4)	
Pavilion	(4)	
Culet	(1)	29
	Total:	62 facets

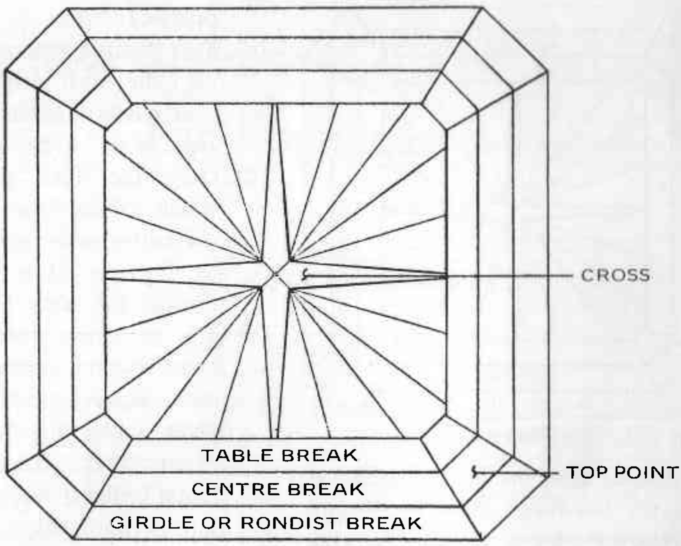

Figure 3

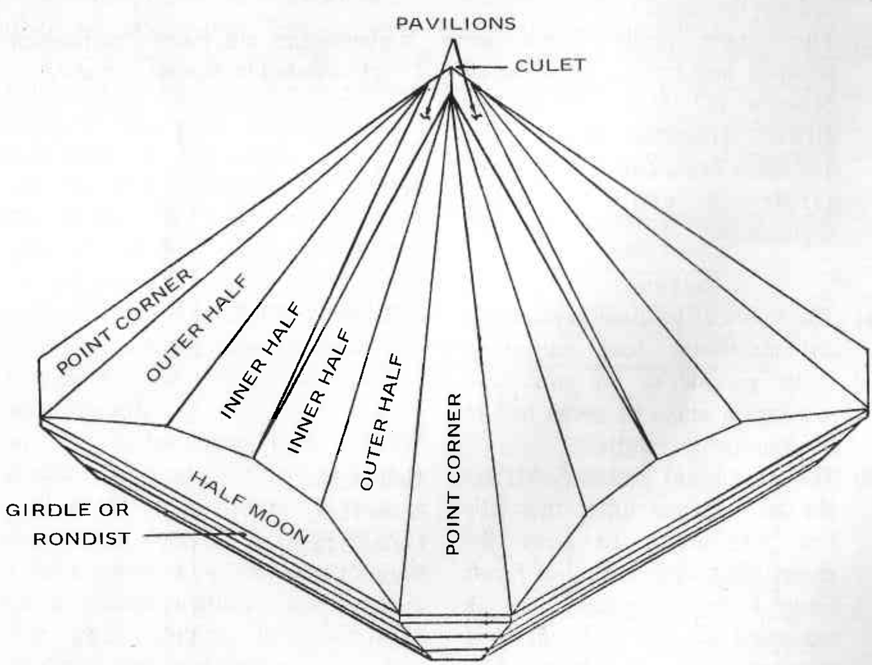

Figure 4

The optical appearance of a Barion cut diamond is very interesting. The whole effect of the cut stone when tilted from side to side is a pulsating one. The three parallel steps of the crown capture and break up the reflections from the pavilion causing them to curve outwards in rhythmic flashes like a fountain *(Figure 5).*

According to Basil Watermeyer, leading gem houses in Europe, at this stage, have rated the Barion in fourth place after the round, marquise and pear-shaped brilliant-cut diamonds. However, its popularity will depend on whether it can compete in price with that of the round cut. First indications are that with skilled craftsmen and suitable rough about 10% lower per carat prices are not unthinkable.

The weight retention from the rough is considerably higher than that of the round brilliant cut. Rough stones having rounded octahedrons modified by hexoctahedrons and trisoctahedrons are well suited for the Barion cut. The step-cut crown, the general squarish girdle outline and the introduction of the four half-moon facets placed parallel to the edge of the girdle, all permit extra weight retention without giving the finished product a "lumpy" appearance, or sacrificing brilliancy, scintillation or dispersion.

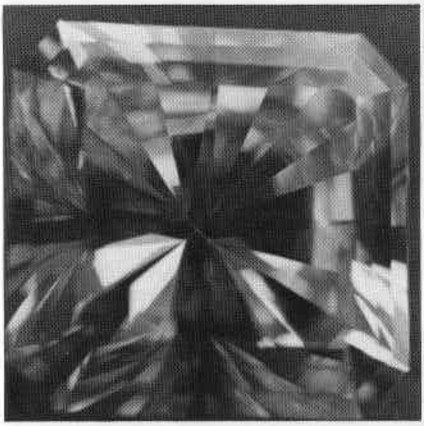

Figure 5

The brilliancy of the Barion is equal to that of the round brilliant cut, and its scintillation is superior to that of any other step-cut diamond. Moreover, the polished girdle facets prevent any chance of greyish internal reflections on oblique observation. Since no rounding up is involved in the polishing process, bearded, strained or burnt girdle areas are unknown.

The main boon, however, is that for the first time a diamond with comparable brilliancy and standardized shape other than round may be offered to the public. Too often in the past, jewelry designers have been forced to exclude square-cut diamonds from their creations. With the advent of the Barion cut, this difficulty has been overcome and exciting new fields of design are now awaiting exploitation.

Acknowledgements

To **Basil Watermeyer** for technical details and relevant information.

To **Jooste's Diamond Cutting Works (Pty) Ltd.**, Doornfontein, Johannesburg for permission to publish this paper.

To **Nigel Chapman** for photographs.

Developments and Highlights at GIA's Lab in New York

by

ROBERT CROWNINGSHIELD

Drilled Diamonds

One of the most repeated questions we have had from jewelers has been concerning the use of lasers in improving the appearance of highly-flawed diamonds. Since the first mention of this procedure in this column *(Fall, 1970 issue of Gems & Gemology)* we have learned a few bits of information and have been allowed to examine several diamonds both before and after the use of a drilling technique. One informant tells us that he uses an extremely fine drill to reach a dark inclusion in order to allow acid to effect the necessary bleaching. He tells us that if the cone-shaped hole curves it is not due to a laser but to his drilling technique. His reason for abandoning the use of the laser is that it cannot be curved to reach a desired point and there is some danger in releasing strain too rapidly, with consequent cleavage cracks along the hole. Unfortunately, we have not been able to observe either technique and can therefore only report second-hand information. However, we can report that the process, whether laser or mechanical drilling, does in most cases decidedly improve the appearance of diamonds that would otherwise have objectionable dark inclusions. We are indebted to Louis Glick, Gem Trade Laboratory member, for making available the stones for us to photograph before and after drilling.

Figure 1 shows an included crystal in a diamond around which a series of fractures or cleavages appear black. *Figure 2* shows the same inclusion through the pavilion. *Figure 3* shows the same inclusion after a laser beam, or a drill hole, has pierced one section of the radiating cleavages and eliminated the blackness. Several theories have been advanced as to what occurs. One is that the black is graphitic carbon which turns to carbon dioxide when the inclusion is opened at atmospheric pressure. The other is that a liquid is injected that changes the optical relationship within the fractures and allows light through, thus, diminishing the blackness. A final suggestion is that the acid used actually leaches out impurities of

Figure 1

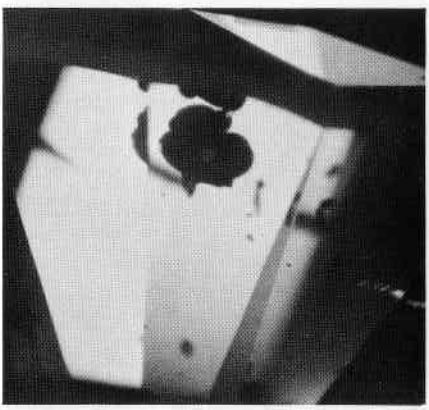

Figure 2

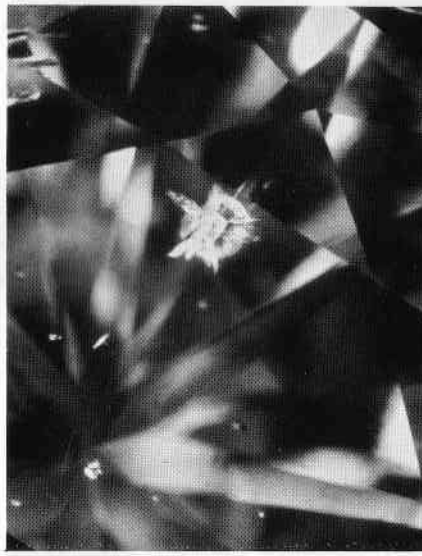

Figure 3

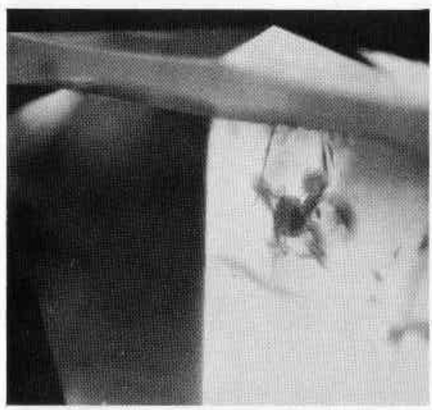

Figure 4

foreign material within the faults. *Figure 4* shows how the drill hole has not pierced near the included crystal but at a distance from it.

We have encountered drill holes that have become filled with black dirt, making them more obvious than those with white inside walls. We are informed that some operators are now filling the drill holes with an epoxy, probably using a vacuum to help it into the hole.

Questions have been asked about whether or not such treatment of a diamond must be mentioned to a customer. At the moment, the matter is being considered by regulatory agencies and we will report any decisions when they have been announced.

Rare Diamond Inclusions

As usual, diamond occupies most of our observations and this issue will be no exception. We noted the following to be of particular interest. *Figure 5* shows a square bull's-eye inclusion under the table of a round brilliant. *Figure 6* captures a magnificent octahedral diamond crystal inclusion in a somewhat irregular diamond crystal.

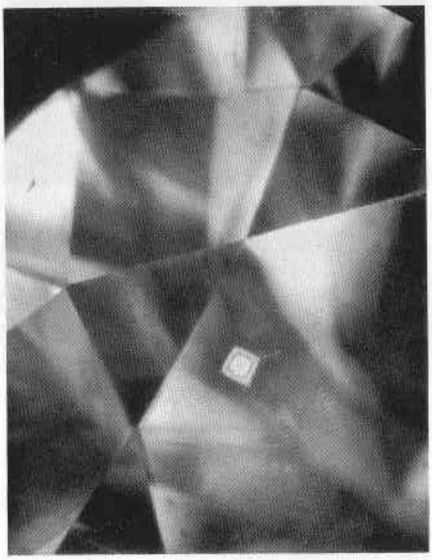

Figure 5

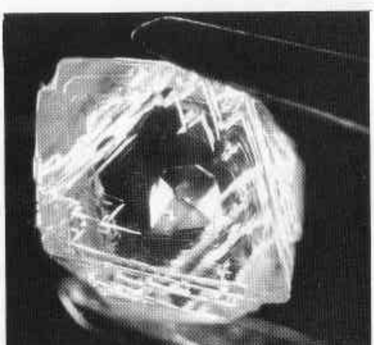

Figure 6

Figure 7 illustrates a brilliant red pyrope garnet inclusion adhering to a cleaved section of a diamond. We are indeed grateful to Lazare Kaplan and Sons for this specimen as a gift. The stone is currently under study by Dr. Vincent Manson of the American Museum of Natural History in New York City. Dr. Manson is making a special study of inclusions that reach the surface of diamonds and would, incidentally, be grateful for any our readers could send him.

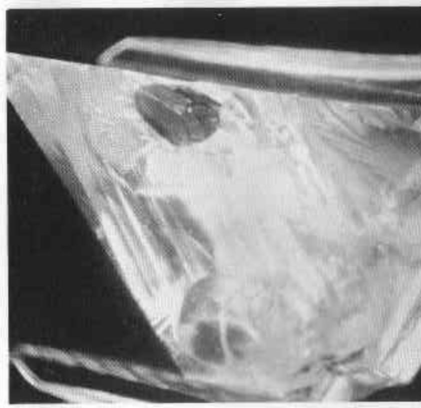

Figure 7

Figure 8 clearly illustrates the surface of a burned diamond. It has been suggested that microscopically-thin layers of grease or oil ignited causing areas where these layers were to oxidize more readily than clean areas.

Diamonds – Are They or Aren't They?

The unusual treatment of the girdle in the diamond shown in *Figure 9* caused one dealer to suspect that the stone was an imitation. The natural, seen in *Figure 10,* would have told an

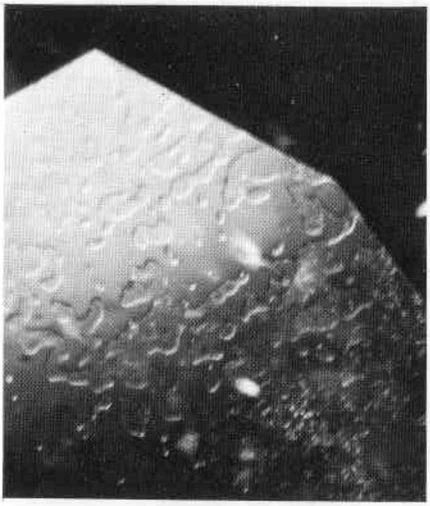

Figure 8

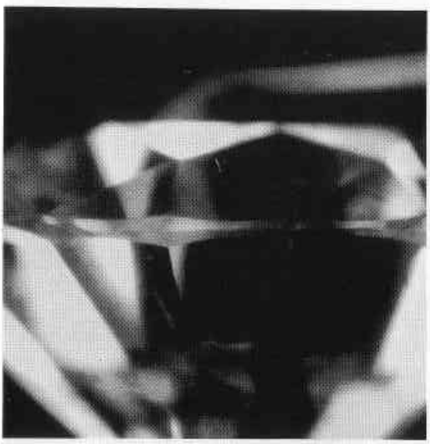

Figure 9

experienced grader the truth – it is a diamond. It has been our experience that this type of girdling is occasionally done to eradicate the bearding along the girdle which prevents a stone from being called flawless.

Unusual internal graining in a square pattern is seen in *Figure 11.* The diamond in *Figure 12* weighed 3.50 carats and exhibited perhaps the

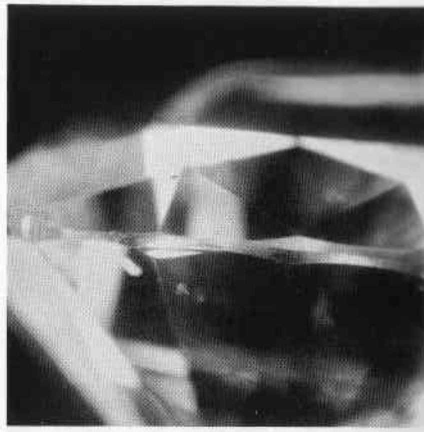

Figure 10

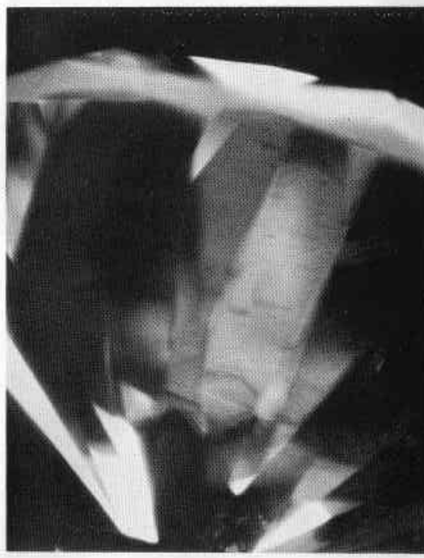

Figure 11

most drastic wear we have ever seen. It is little wonder that the average jeweler would suspect that it is not a diamond.

Finally, under the discussion of diamond and a new imitation to us is the clever carving shown in *Figures 13 and 14.* Ornamenting the side of a ring were lines of diamonds carved from the metal with each corner bead raised and polished. To the unaided eye the effect was quite deceiving.

Foiled Again!!

The largest rose-cut diamond we have ever seen with foil crimped to imitate the back facets of a diamond is shown in actual size in *Figure 15.* We were at a loss to estimate the weight of the thin rose cut but judging from others we have seen it must be all of 10 carats. A normal pear-shape diamond of this shape and dimensions would be approximately 50 carats in weight.

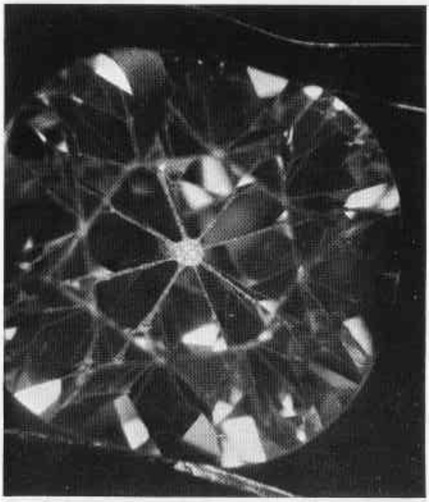

Figure 12

Figure 13

Doublets of Natural and Synthetic Corundum

In the past few months we have been shown several parcels of both rubies and sapphires which proved to be well-made doublets of greenish to yellowish crowns of natural sapphire and synthetic ruby or sapphire bases. We have been waiting to see one in jewelry and were recently rewarded. It appeared to be about a four-carat, fine-blue sapphire, and loupe inspection showed angular banding through the table. Spectroscopic examination showed a strong natural sapphire band. However, a joining plane at the girdle was detected, and

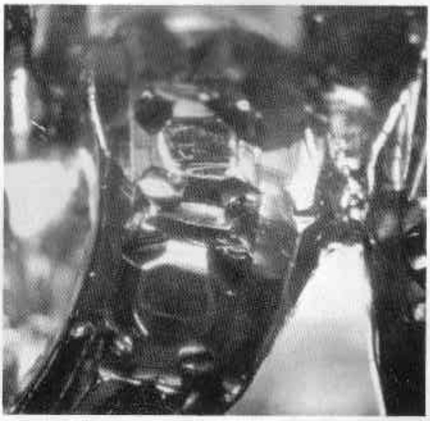

Figure 14

short ultraviolet fluorescence quickly told us the truth *(Figure 16)*.

Figure 17 shows another doublet immersed in methylene iodide. Curved striae may be seen in the pavilion. Jewelers must redouble their caution when identifying both rubies and sapphires, as these stones produced in Thailand and selling for about $10 per carat, we are told, can easily be mistaken for natural stones.

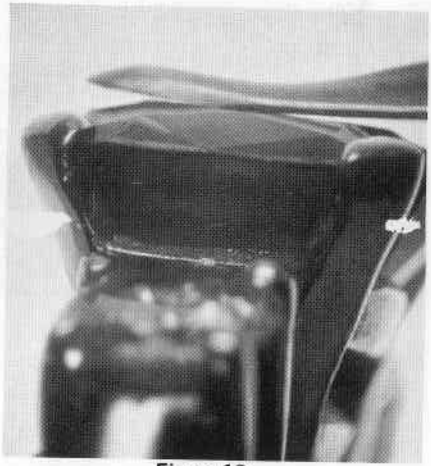

Figure 16

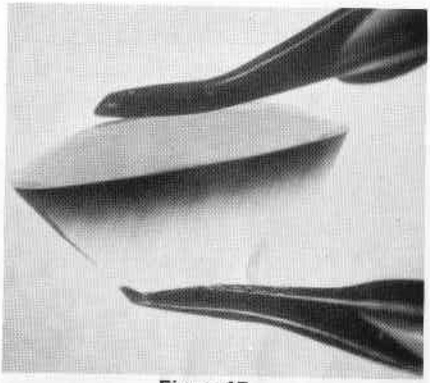

Figure 17

Figure 15

More on Doublets

Doublets consisting of a diamond crown and synthetic white sapphire or zircon pavilions have occasionally been encountered in the past. The Institute has one such doublet in its collection. These stones were fashioned by cementing the crowns and pavilions at the girdle plane. In most cases, the cementing agents were a source of trouble. Arborescent patterns would develop as they dried out, making their presence readily apparent. In some cases, the cements were so ineffective that the parts separated. Modern cements, particularly the epoxies, have made some of the newer doublets – crowns of colorless synthetic sapphire or spinel and pavilions of strontium titanate – better in appearance and longer lasting than their earlier prototypes.

Another development in this field is a doublet advertised as Pavilion Diamond by Wellington Jewels in the September 20th Washington Post. We had the opportunity to examine an example of the product and despite the name, found that the crown – not the pavilion – was diamond and the pavilion was strontium titanate. *Figure 18* illustrates the highly imperfect nature of the diamond top. Although not seen in the black-and-white photograph, the dispersion of the strontium titanate back was still apparent. *Figure 19* shows the girdle area where the two sections are joined. Each part of the doublet was cut with a heavy girdle, so that when joined, an exceedingly thick girdle easily visible to the unaided eye resulted. It is not known whether this one specimen is representative of the product, however, it would seem to offer no problem in detection on the basis of flaws that terminated in a flat plane, excessive dispersion, and the obvious joining plane at the girdle.

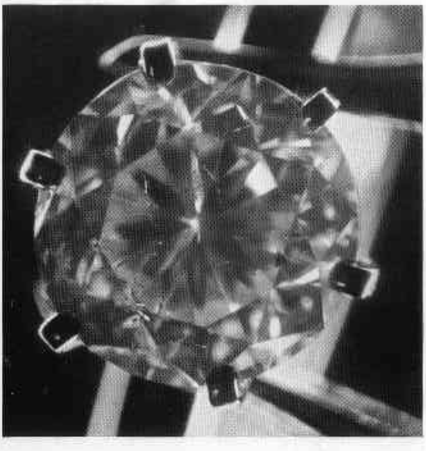

Figure 18

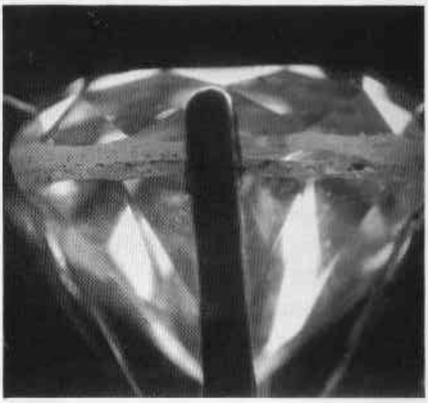

Figure 19

Unusual Natural Sapphire

In *Figure 20* we see a natural blue sapphire with striations that looked for all the world like those seen in glass. In fact, it was submitted by a student in the Colored Stone course who could not reconcile dichroism with swirls.

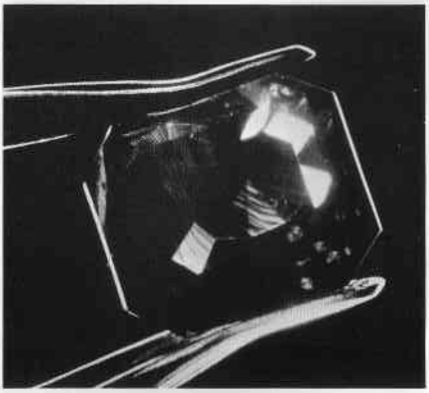

Figure 20

Unusual Synthetic Inclusions

The stone shown in *Figure 21* is a synthetic sapphire with threadlike or wispy inclusions that were a puzzle with magnification alone.

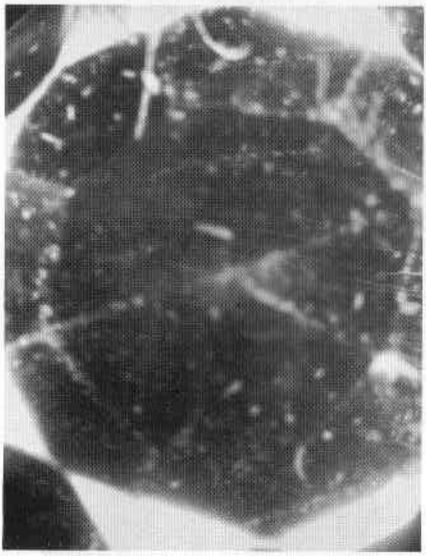

Figure 21

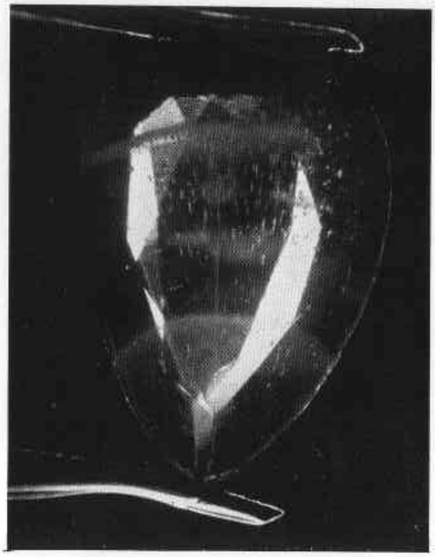

Figure 22

The synthetic ruby shown in *Figure 22* had a sleepy appearance due to the myriad of bubbles both large and small. This appearance was assumed to be that of a natural stone until the laboratory was called in to referee the dispute. Another pear-shaped synthetic ruby *(Figure 23)* shows the effects of deliberate crackling by quenching a hot stone in a cool liquid.

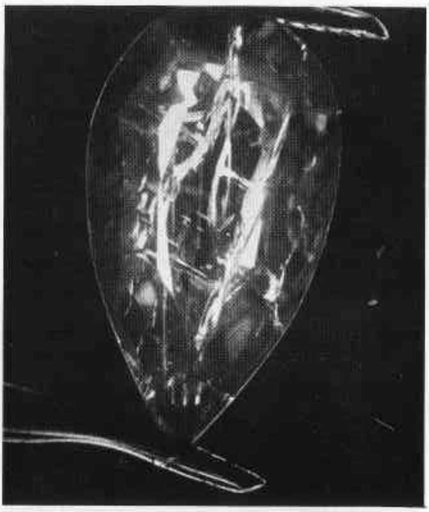

Figure 23

New Final Examination?

While identifying the necklace shown in *Figure 24,* we thought how good it would be for an examination project. The piece contained natural stones (Ceylon and Brazil), synthetics, glass and garnet and glass doublets.

Remarkable Green-Grossularite Garnet

The clasp of the jadeite necklace, seen in *Figure 25,* is a green garnet that beautifully matched the necklace that was being offered for a considerable sum. The odd appearance of the beads in the photograph is due to the crinkled aluminum foil we use in our Photostand for diamond

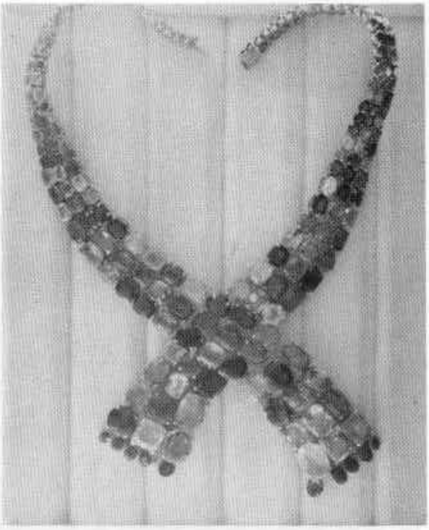

Figure 24

Figure 25

photos. Unfortunately, as with most of the items we photograph, they are in our possession all too short a time to make adequate individual preparations.

Imitation Glass?

Cut stones of glass containing both gas bubbles and angular inclusions are not often seen. *Figure 26* illustrates this in a tourmaline green round brilliant that would give a beginner a bit of trouble.

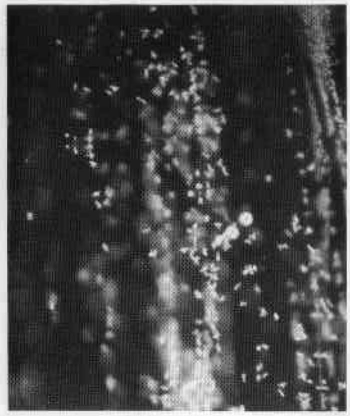

Figure 26

Glass Again

The diamonds and platinum work in the bracelet shown in *Figure 27* are both top quality. However, the emeralds turned out to be very good glass. They are probably the type known years ago as Ferrer Emeralds from the name of a man working in Barcelona in the 1920's on imitations of emerald that included not only a fine emerald color but inclusions of gas bubbles to look like natural emerald "jardin." In the case of this bracelet, it appeared that the green stones were not the ones originally in the bracelet, and may represent the choice of an owner to sell valuable stones and replace them with stones she would not have to worry about.

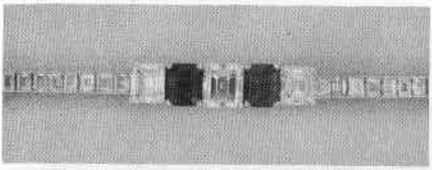

Figure 27

Natural Emerald – Yes or No!

We are indebted to Edward Tiffany of Birks Ltd., Toronto, for alerting us to a type of emerald with properties we had never before encountered. He also flew to New York with five cut stones for us to examine. The refractive indices were 1.582-1.588, specific gravity 2.70, with no reaction under the color filter and no ultraviolet fluorescence. The spectroscope revealed no evidence of chromium in several of them and only weak lines in others. What was especially odd were the inclusions – and lack of inclusions in some. *Figure 28* illustrates some odd hexagonal ghosts seen in several of the stones, while *Figure 29* shows a fan-shaped fracture (?) seen in most of them. We appreciate the two photographs taken by Mr. Tiffany.

We cut short our examination of the stones so that Mr. Tiffany could visit Dr. Kurt Nassau at Bell Laboratory in Murray Hill, New Jersey. We felt it would be wise to have a water vapor test in order to establish the possibility of their being a new source of synthetic or, in the event water vapor was present, attempt to distinguish between hydrothermal synthetic and natural. Dr. Nassau's infra-red spectroscopic examination showed the stones to be

Figure 28

Figure 29

very iron rich and to have both Type I and Type II water vapor – strongly indicating natural origin. Of course anyone attempting to make a truly baffling hydrothermal synthetic might produce stones with strong alkaline content plus chromium and iron. So, by this test alone we could not be sure the stones were natural.

Next, we corresponded with both Dr. Gubelin of Lucerne and Basil Anderson of London, where we were able to secure confirmation of the stones' natural origin by virtue of the fact that Mr. Anderson, after first experiencing the same doubt as to origin, was later brought uncut crystals with undoubtedly natural matrix minerals. Since seeing these stones, which were bright, quite clean and weighing from two to seven carats and of an attractive yellowish-green color, we have not encountered any others.

Emerald Imitations

We have been presented with numerous requests to examine beryl triplets that were supposedly made from natural emeralds. In fact, one manufacturer showed us a large pale-green crystal from Russia from which he says he makes his stones. The crystal showed evidence of chromium and a weak-pink color filter reaction. However, when cut into crowns and pavilions for triplets, the sections were not only so pale as to be outside the emerald terminology, but were also free of any color filter reaction or chromium spectrum. Unfortunately, in Europe a report had been issued, undoubtedly on somewhat darker-triplet sections, to the effect that they are emerald – a most unfortunate thing, since it can only be misleading to a consumer. Some of the triplets which we have seen appear to be made with two layers between the beryl sections – one green and the other colorless as shown somewhat indistinctly in *Figure 30.* The arrow points to the somewhat opalescent layer above the darker green cement layer.

Figure 30

Pink Treated Diamonds

We wish to thank Mr. Harry Neiman, Nu-Age Products, Hyde Park, Massachusetts, for allowing us to study 4 pink-treated diamonds weighing a total of .41 carats. Although the method of treatment has not been disclosed, the stones reacted to ultraviolet and spectroscope the same as those we had reported more than ten years ago.

Acknowledgements

We are grateful for the gifts received in recent months and wish to express our sincere appreciation to the following:

To **Bill Warren**, Graduate Gemologist, for a gift of carved tiger cowrie shell and a cameo of the same material. We have never seen the material before and were informed that it is being cut commercially for jewelry. The carved areas are a lovely tone of dusky purple to brown accented by the white of the outer skin *(Figure 31).*

To **Bernard Mecke** of Sea Cliff, New York, for a fine cuttable uvarovite-garnet crystal weighing more than one carat. We do not, however, plan to have it cut.

To student **Wilford Rose** for good

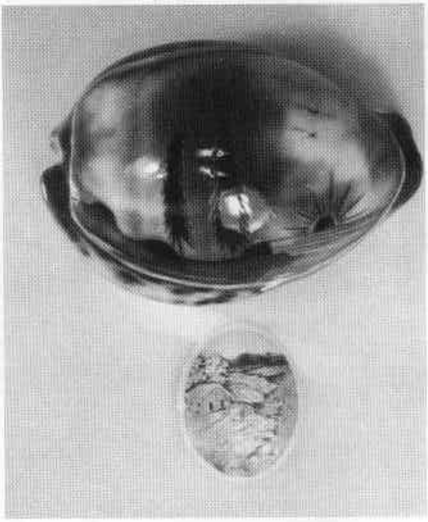

Figure 31

examples of rough opal from Andamooka and Queensland. In addition, your columnist would like to thank Mr. Rose for the assistance he gave in the preparation for a visit to Australia in November. Through his contacts, he was able to visit both Coober Pedy and Lightning Ridge – currently the most active opal fields.

To **Dr. Kurt Nassau** of Bell Laboratories, Murray Hill, New Jersey, for a gift of synthetic material with possible commercial appeal. It consists of colorless pulled boule sections and flux grown crystals in red, blue and green of gadolinium gallium oxide with garnet structure ($Gd_3Ga_5O_{12}$). We found it to have a specific gravity of approximately 7.05 and a refractive index by comparative immersion with known materials somewhat in between the refractive index of zircon and diamond. It is reported to have a dispersion also between that of zircon and diamond. Dr. Nassau told us that we should not be surprised to see many other synthetic garnets with unusual rare earth elements because research is continuing in the field of computer components.

To **Jerry Call**, ex-NY staff member, for several black star beryl cabochons, rough andalusites and a beautifully terminated purple topaz crystal.

To **Ed Cambere** of Trifari who arranged for a gift of twenty 1.50 carat round YAG brilliants courtesy of Trifari and Raytheon Company.

To **Tom Feurneisen**, Airtron Division of Litton Industries, for a fine selection of 2 and 3 mm. round modified brilliant-cut YAGs. Considering their size they are quite well cut as seen in *Figure 32.*

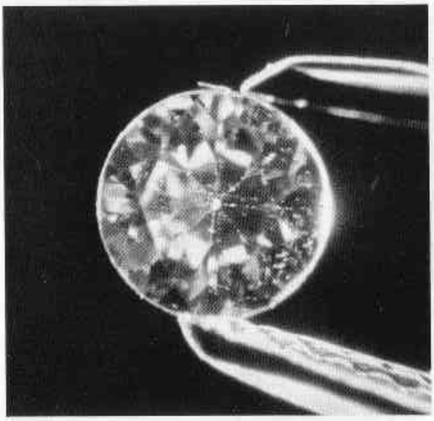

Figure 32

To **Roland Naftule** of Nafco Gems Ltd., New York, for several examples of their synthetic sapphire and strontium titanate doublets that were shown in this column in the *Fall, 1971 issue of Gems & Gemology.*

Developments and Highlights at GIA's Lab in Los Angeles

by

RICHARD T. LIDDICOAT, JR.

In the period since our last report, we have seen some very interesting material. As usual, we were confronted with some fascinating problems.

An Oölitic Conclusion

While we were examining some dark opal in which a treated or natural black color determination had been requested, Chuck Fryer, our Laboratory Supervisor, concluded that the material was what we term oölitic opal and that it was not treated. The reasoning for his conclusion came about when he recalled that the treated opals he had previously examined had areas in which the black specks were visibly more porous and softer than the areas in the play-of-color.

In this specimen *(Figure 1)* undercutting in the polishing showed that the black areas were actually harder than the rest of the stone. Since dyed areas are more porous and therefore give a softer reaction to polishing than the other areas of the stone, he concluded that the color was induced naturally. We felt this to be an interesting and well substantiated conclusion.

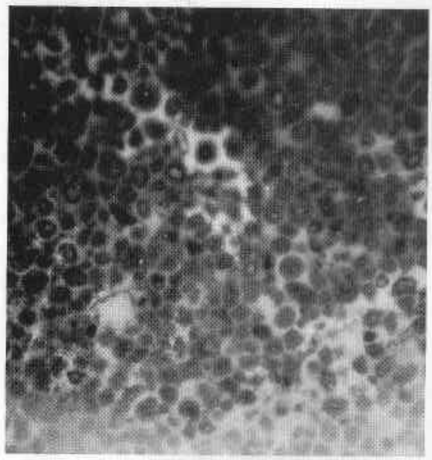

Figure 1

Parallel Banding

On numerous occasions, we have been aware that testers have been led astray by very strong parallel banding in flux-grown synthetic emeralds. *Figure 2* shows very strong parallel

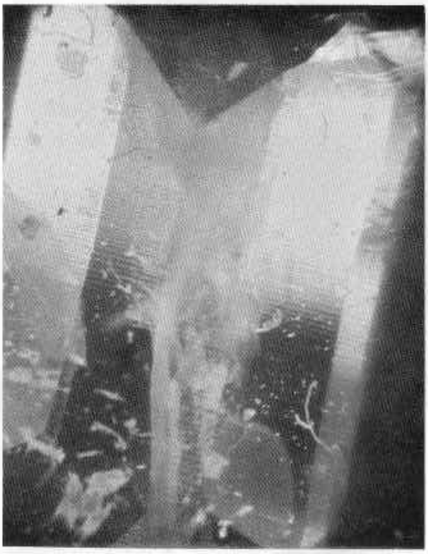

Figure 2

banding across the width of an emerald-cut synthetic emerald. Also evident are the wisplike inclusions that characterize this synthetic. These parallel growth lines are very typical of some flux-grown synthetic emeralds, so they should not be considered evidence of natural origin.

Unusual and Challenging Gem Materials

C.D. "Dee" Parsons, of Burbank, California, who probably cuts more rarely encountered gem materials than anyone, dropped in to see us and brought a deeply appreciated group of stones that will be very useful for test sets of the rare and unusual. For example, he gave us transparent rhodonite, brazilianite, phosphophyllite, apophyllite, siderite, cassiterite, datolite, scheelite, zincite and apatite. The apatite is a deeper and more attractive blue than we have ever encountered.

This time his *piéce de résistance* was a material that we not only had never seen, but had never heard of – grandidierite. It is an iron-aluminum-magnesium silicate, with a hardness of 7½, specific gravity of 3 and indices from 1.602 to 1.639. Like kornerupine, it is found in Madagasgar.

Mr. Parsons had also cut some fluorites with very interesting inclusions. *Figure 3* shows some flat metallic inclusions which probably are hematite. Some larger inclusions are shown in *Figure 4* and appear to be possibly galena. The phosphophyllites were transparent in the beautiful light blue that is characteristic and two of the stones were among the largest known, one approximately 4.5 and the other about 5.5 carats.

An Exceptional Cab

While on the subject of unusual gem materials, I might mention a cabochon we identified recently. It was light blue in a quite pleasing color and had a structure similar to that of agate *(shown in Figure 5)*. We found refractive indices of about 1.61 to 1.63 and a birefringence of approximately .02. Although it was slightly affected by hydrochloric acid, it did not effervesce as we would expect a carbonate to do. Our first thought had been that perhaps it was smithsonite, but the lower specific gravity of 3.43 together with the low birefringence showed that this was not a possibility. It turned out to be

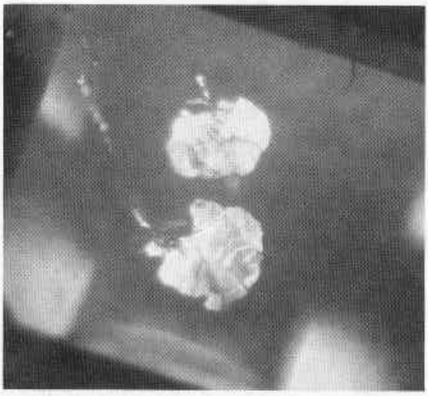

Figure 3

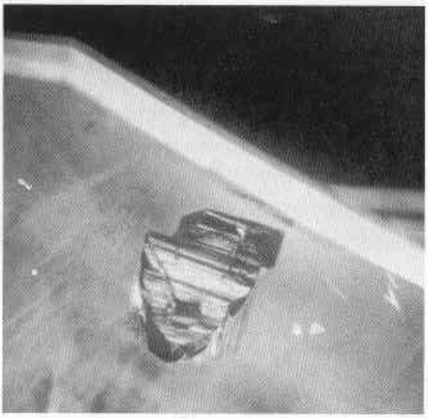

Figure 4

hemimorphite. This is the first time we have encountered that material used as a gemstone.

Tricky Curves

We seem to be seeing more green YAG than earlier. It usually seems to have been sold as synthetic emerald or else as demantoid garnet. One such specimen *(Figure 6)* showed such obvious curved striae that Chuck Fryer took a picture of it.

Undetectable Quartz

A very large crystalline mass, approximately 2 x 2½ x 5 inches came in for identification *(shown in Figure 7)*. It proved to be quartz. We felt that it probably was synthetic, since we have never seen anything like it in nature, but we have no means of detecting a synthetic rock crystal quartz.

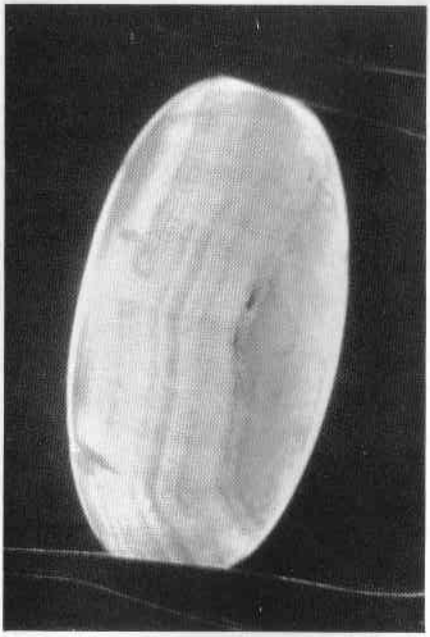

Figure 5

Colorless Pavilion

One item that we can depend on getting every so often is a Ceylon cut blue sapphire in which the coloring is concentrated in a narrow band, and which the sender has decided is probably a doublet. The reason is that one half of the stone may contain no color at all, so the color is

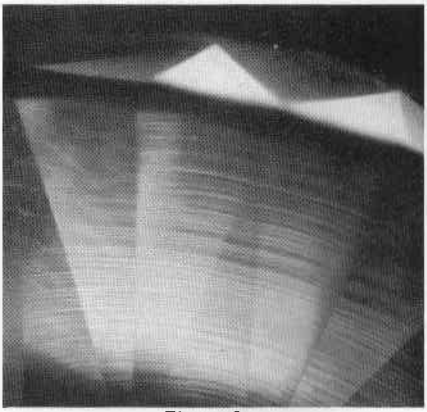

Figure 6

concentrated in the crown or in the pavilion near the culet.

We recently received such a stone. Typically, it had almost no crown. It is shown in *Figure 8*, with the color division line marked by arrows in the illustration. The whole crown, which was exceedingly flat, had a bright blue color, but the deep pavilion was colorless. From above, it appeared to be an exceptionally fine sapphire. The people who sent the stone in for identification were sure that the stone was a doublet. Actually, it was a natural sapphire with very strong color zoning.

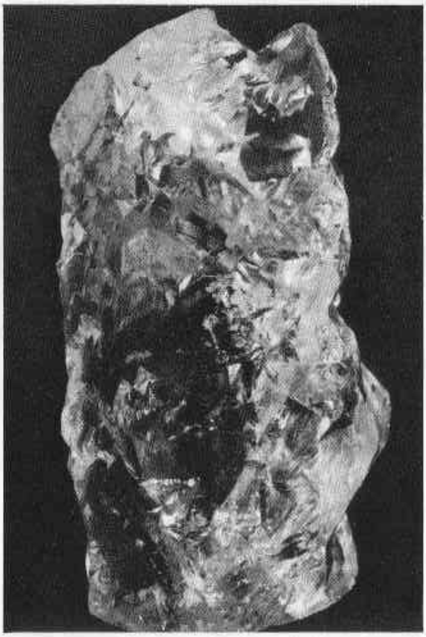

Figure 7

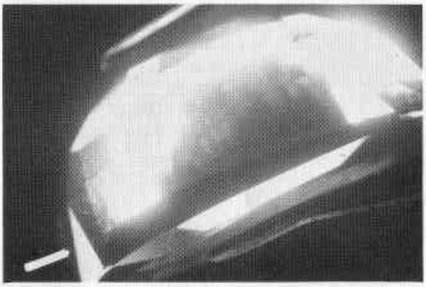

Figure 8

Problematic Grain Lines

Grain lines in diamonds have been presenting an increasing problem in that many of the very fine stones which show no inclusions of any description under 10X do show a number of crystal growth lines that vary in importance from those that are difficult to find to those so strong that they affect the brilliancy of the diamond.

Recently, we were called upon to grade a large emerald-cut green diamond in which the darkness of the color seemed to emphasize very strong grain lines. It is obvious from this picture *(Figure 9)* that they had to be considered in the clarity grade of the diamond. The three grain lines appear as streaks near the culet toward one end of the stone. They almost appear to be cleavages, but in fact, are not. There was no surface manifestation of this condition in the stone, but even so, they had to be considered in the clarity grade.

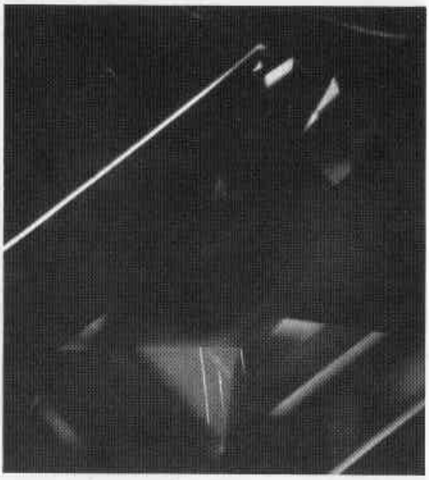

Figure 9

Crystals in Opal

One of our recent testing problems was to determine whether an opal had a treated or natural color. In it, we were surprised to notice some very angular blocks that were obviously crystals. These are shown in *Figures 10 and 11.* In the direct overhead light *(Figure 10)* seemingly rhombohedral crystals are evident. In *Figure 11,* blockier crystals are evident with less of an angle between the sides.

In any case, this was a treated opal. The crystals contained within the opal were not identified. They did not react to hydrochloric acid, so they were not calcite as the overhead light picture had suggested. It is possible that they were feldspar crystals.

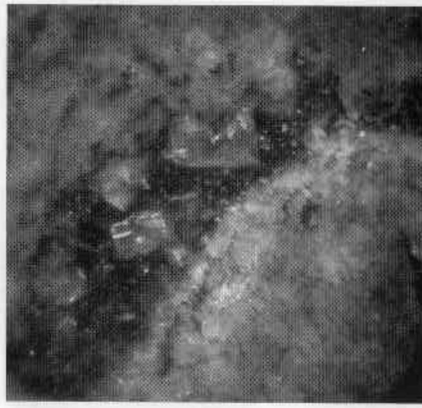

Figure 10

Figure 11

Bubbles vs. Crystals

For identification, we received a number of pieces of corundum, most of which were blue sapphires, but one was deep red in color. This stone had a number of small, nearly round objects that appeared at first glance to be bubbles. It was very interesting that the two largest bubbles or crystals were fairly near the surface.

When we are examining a ruby of this type to determine whether it is natural or synthetic, ordinarily we use dark-field illumination only, but in this instance, Chuck Fryer directed an overhead pinpoint light source toward the stone and was able to detect tiny circular planes extending away from each of the objects we were examining. This proved to our satisfaction that the objects were indeed crystals rather than spherical gas bubbles. This finding was confirmed by the fact that the medium-to-slightly-dark red stone which should have shown very strong fluorescence to long-wave ultraviolet, was actually inert to both long-wave and short-wave ultraviolet light. In addition, twinning was evident in the stone. This would have been possible in a synthetic ruby, but is more common in natural stones.

In thirty years of gem testing, I don't recall any ruby that looked as synthetic at first glance that was satisfactorily proved to be a natural stone. It was easy to understand why it had been sent in for confirmation.

Repaired or Not?

We had in for identification a ruby that probably came from Tanzania. In it was a plane that had the appearance shown in *Figure 12.* Our first impression was that the plane on the pavilion of the stone might have been cemented back in place after breaking away from the stone. The round flat discs, we thought, could be a cement, but it appeared in quite a few places that the needles of the type shown in *Figure 13* passed through the plane uninterrupted. We finally concluded that it was not a cemented piece but that some foreign material had gotten into the fracture.

Figure 12

Figure 13

X-Ray Diffraction Does It Again!

We received for identification a snuff bottle that was basically black but in which two mottled green and white insets had been placed. The insets were in the form of the two sides of a coin and were recessed into the black material. The inset coin carvings were found to be jadeite and the black material had properties approximating those of nephrite. A number of metallic inclusions in the black section left us in doubt, so we resorted to x-ray diffraction for confirmation. It proved to be nephrite.

Acknowledgements

We wish to express our sincere appreciation for the following gifts:

To **Guy Theodore**, student, Krementz & Co., for an assortment of opal and synthetic stones.

To **Rudy W. Giessenbier**, Jewelry Arts Inc., Shawnee Mission, Kansas, for a selection of tumbled and rough quartz, feldspar and corundum.

To **George Flint**, student, Lewistown, Montana, for five Yogo Gulch sapphires.

To **Harold L. Blattenberge**, student, Martinsburg, Pennsylvania, for a 9 carat round brilliant-cut citrine quartz which has been placed in our display case.

To **Robert Refowich**, student, Bethlehem, Pennsylvania, for a fine 4.90 carat brilliant-cut sphalerite for our display case.

To **Edward R. Swoboda**, Los Angeles, California, for a large parcel of green and colorless rough fluorite to be used in our resident classes.

To **Lee Sparrow**, San Francisco, California, for a smoke-treated opal cabochon for class use.

To **Julio Sauer**, Lapidisao Amsterdam S/A, Rio de Janeiro, Brazil, for crystal groups and single specimens of brazilianite, euclase, rose quartz, herderite, emerald, eosphorite and andalusite.

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INDEX TO GEMS & GEMOLOGY
VOLUME XIII
Spring, 1969—Winter, 1971