Gems & Gemology

GIA

WINTER 1969-70

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Gems & Gemology

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IN THIS ISSUE

NEW NONFLUORESCENT HIGH-PROPERTY SYNTHETIC EMERALDS

by

Charles W. Fryer

For some time we have known that Pierre Gilson has been making synthetic emeralds that have higher properties than the Chatham synthetics and the old Gilsons. Furthermore, these new Gilson synthetics do not fluoresce to long-wave ultraviolet light, as do all other known synthetic emeralds, including the old-type Gilson. Needless to say, this could cause problems to the uninitiated jeweler trying to determine if an emerald were natural or synthetic. It is the purpose of this article to initiate the uninitiated.

We recently had the opportunity to study 18 loose Gilson synthetic emeralds. The only stones we had seen previously were unmounted, which precluded any specific-gravity determination and made it all but impossible to test for transparency to short-wave ultraviolet. Seven of the 18 were the new nonfluorescent stones, five were the usual Gilsons (which fluoresced orange-red), and the remaining six fluoresced red, similar to the Chatham. Some rather interesting conclusions can be drawn from our tests on these stones.

In the past, it has usually not been too difficult to prove whether an emerald was synthetic or natural. The low refractive indices, birefringence, specific gravity, wispy inclusions and the fluorescence easily proved synthetic origin. These methods are still satisfactory for all synthetics, except the nonfluorescent Gilsons, and possibly the Linde hydrothermal, although it, too, fluoresces red. However, before we discuss the nonfluorescent stones, a brief review of the properties of the other Gilsons tested would be in order.

Five of the stones were decidedly more yellowish green than the others. Under long-wave ultraviolet, these stones fluoresced the orangy-red color usually attributed to the Gilson product. A weaker orange-red fluorescence was observed under short-wave ultraviolet and X-ray. The transparency to short-wave ultraviolet and X-ray will be discussed in a later paragraph. All the stones had refractive indices of 1.564-1.569, ± .001, with a birefringence of .005. The optic-axis direction was parallel to the width of three

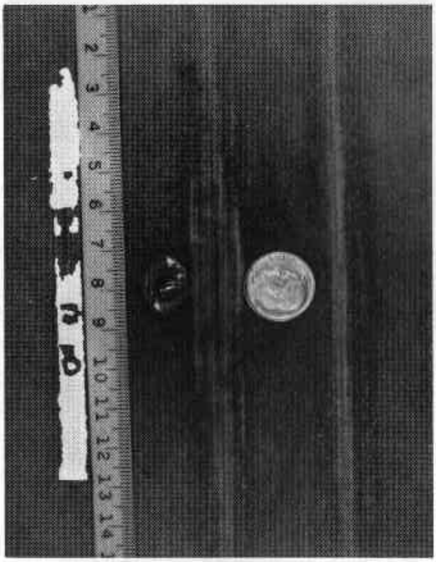

Figure 1
Strings of bubblelike inclusions (63x)

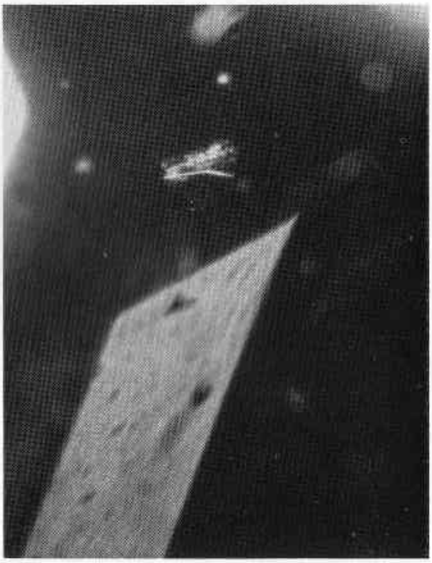

Figure 2
Odd grouping of bubblelike inclusions (63x)

of the stones and parallel to the length of the other two. The specific gravity was approximately 2.65, ± .01. The inclusions were the typical wisps associated with flux-fusion synthetics, phenakite crystals, strings of bubble-like inclusions and growth lines. *Figures 1, 2, 5* and *6* show these different kinds of inclusions.

The 13 stones remaining were bluish green, similar to the Chatham product. Six fluoresced about the same as the Chatham: a dull red under short-wave ultraviolet and a somewhat stronger red under long wave. Under X-ray, these six stones fluoresced a weak orange-red. Transparency to short-wave ultraviolet and X-ray will be discussed later.

The refractive indices of the six fluorescent stones mentioned above were in the 1.562-1.567 to 1.568 area, with a birefringence of .005 to .006. The optic axis was parallel to the width of two of the stones and parallel to the length of the other four. The specific gravity of all six stones was approximately 2.65, ± .01. The inclusions were typical of flux-fusion synthetics. (Refer to *Figures 3* and *8*, as well as the previous ones.)

We come now to the seven bluish-green stones, which did not fluoresce at all to long-wave ultraviolet. These are the stones that can cause the most difficulty in proving origin. However, the combination of the inclusions, the peculiar absorption spectrum, and a newly discovered reaction to X-ray will simplify the identification.

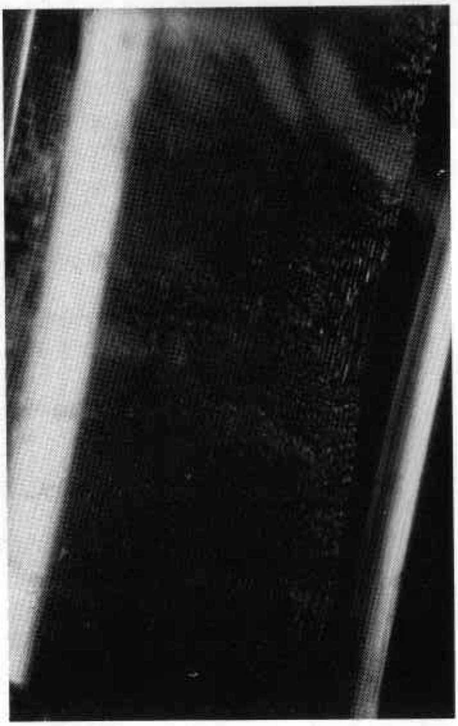

Figure 3
Wispy inclusions, with the optic-axis direction parallel to length of inclusions (63x)

The refractive indices of the non-fluorescent stones were 1.571-1.579, with a birefringence of .008. The optic-axis direction was parallel to the length of all stones except one, which was parallel to the width. The specific gravity was approximately 2.68 to 2.69, sinking slowly in a 2.67 liquid, as do most natural stones and the Linde hydrothermal. All other Gilsons tested floated in a 2.67 liquid, as do most Chathams.

Apparently, it is the addition of iron to the new Gilson product that is responsible for the lack of fluorescence. The increase in the R.I. and S.G., as well as a line at 4270 in the absorption spectrum, also can be attributed to the presence of iron.

Since the properties of the non-fluorescent Gilsons overlap those of most natural stones, it becomes increasingly important to identify them on the basis of the inclusions and the absorption spectrum. In addition to the usual flux-fusion inclusions, there were some short needlelike inclusions present in some of these non-fluorescent stones. The needles were

Figure 4
Wisps and flux-type inclusions, with the optic-axis direction parallel to length of inclusions (63x)

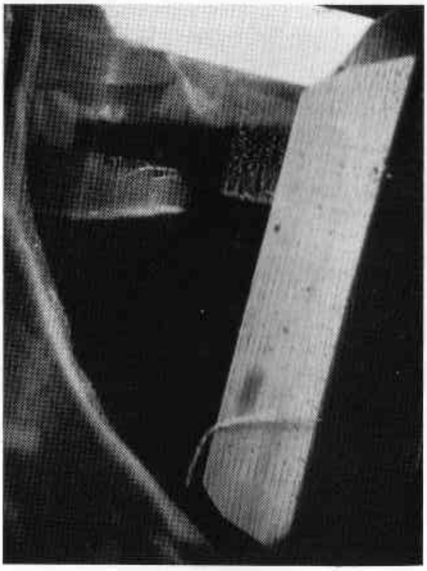

Figure 5
Wisps and growth lines (31.5x)

oriented parallel to the optic-axis direction in the stone. *Figures 4* and *7* show the appearance of these inclusions.

If a stone should be free of inclusions, the absorption spectrum shown in *Figure 9* would become very important in its identification. The line at 4270 Å is best seen in a direction other than parallel to the optic axis. This line is easy to overlook, so especially careful observation is required. So far, this line has not been encountered in any other emerald, either natural or synthetic.

It used to be thought that the transparency to short-wave ultraviolet was a reliable test for separating synthetic from natural stones: naturals were opaque to short-wave ultraviolet and synthetics were transparent. Now, however, Gilson has changed

Figure 6
Snowflake-like clusters of phenakite crystals (63x)

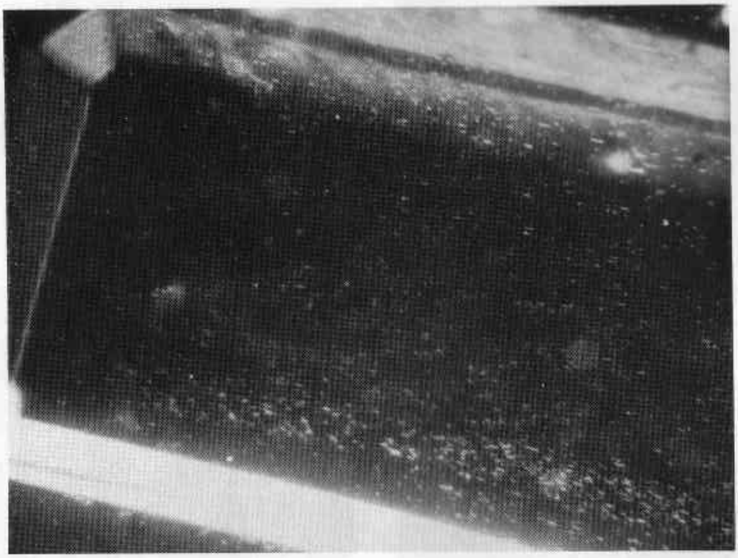

Figure 7
Plane of short needlelike inclusions, with optic-axis direction parallel to length of inclusions (63x)

that, with some of his stones being transparent and others opaque to short-wave ultraviolet. Furthermore, some naturals have been encountered lately that are transparent to short-wave ultraviolet. This test has no reliability for separating natural from synthetic emeralds.

One other interesting and useful fact is that the iron has also caused the stones to become opaque to X-rays. Unfortunately, this will not be of much use to the average jeweler, but it will be of considerable importance to a gem-testing laboratory having the necessary X-ray equipment. All 18 of the Gilsons, plus representative samples of natural emeralds, Chatham synthetics and Linde hydrothermals, were tested for X-ray transparency under the following conditions: the stones were placed in a transparent tray over a piece of industrial X-ray film. They were immersed in a safety-film cleaner to absorb secondary radiation, prevent reflection and refraction, and to compensate for the different thicknesses of the stones. This is the same fluid used in place of carbon tetrachloride for pearl X-radiographs, so carbon tetrachloride would probably work as an immersion fluid. The distance from the film to the X-ray source was 17 centimeters. The exposure time was based on one-half the time we would use to shoot pearls of a comparable thickness. Power requirements for the X-rays are 40 kilovolts and 7 milliamperes. Standard developing procedures were used

Figure 8
Phenakite crystals and wisps (63x)

for processing the film. Interpretation of the film showed that all of the natural and synthetic emeralds, *except* the seven nonfluorescent Gilsons, were transparent to the X-rays. The important thing was that all of the nonfluorescent Gilsons were *opaque* to the X-rays.

We might sum up by saying that most Gilson synthetic emeralds can still be separated from natural stones by their lower R.I., birefringence, S.G. and the fluorescence to long-wave ultraviolet. Of course, the inclusions are also typical of flux-fusion products. In the case of a nonfluorescent stone with a high R.I. and S.G., we must rely on the inclusions and the 4270 line in the absorption spectrum.

As mentioned previously, we can no longer rely on the short-wave transparency test. If a jeweler cannot see any distinctive inclusions and has no spectroscope available, rather than take a chance on misidentifying a stone, he should submit it to a qualified laboratory for an X-ray transparency test.

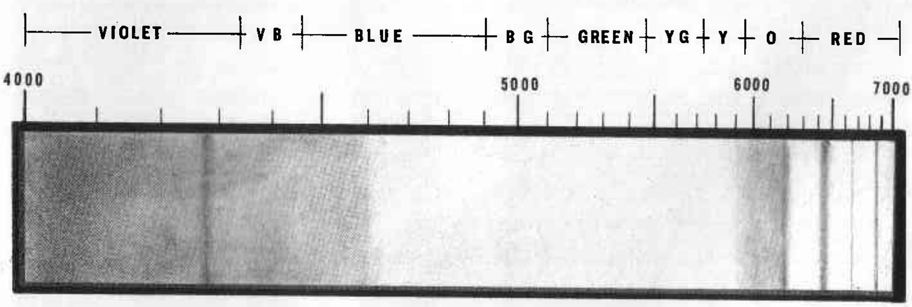

Figure 9
Absorption spectrum of Gilson nonfluorescent synthetic emerald

Developments and Highlights at GIA's Lab in New York

by

ROBERT CROWNINGSHIELD

Flux-Grown Synthetic Rubies

Although Carroll Chatham first exhibited samples of his flux-grown synthetic rubies more than 10 years ago and a few single crystals were sold in recent years and jewelry made with crystal groups has appeared in the market for several years, it is only this year that plans by Created Gemstones, Inc., to market faceted stones in most popular shapes have materialized.

The initial examination of several lots has shown them to be remarkably varying in internal characteristics, as well as in nuances of color. Attempts to characterize the inclusions have been complicated by their variations. It would seem by microscopic examination that several different techniques may be involved, and it is much too early to state which technique will be the one used to produce future crystals. Stones examined recently have ranged in weight from melee size to a handsome pear shape of more than 13 carats. However, judging from crystals examined, even larger sizes may be anticipated. So that serious gemologists may be made aware of this new product, we requested permission to introduce them in this issue.

If we assume that Chatham's process is one of flux fusion, we are immediately aware of the differences seen in his stone compared with those for the only other flux-fusion synthetic stones so far described. These are the ones shown in the Spring, 1969, issue of *Gems & Gemology* under the heading "Kashan Flux-Grown Rubies" on page 30. In these stones the coarse flux fingerprint inclusions, short dashed lines of flux inclusions and fine veils of flux seem characteristic. In the Chatham stones we do find veillike inclusions (*Figure 1*) and occasionally fairly coarse "flux fingerprints" (*Figure 2*).

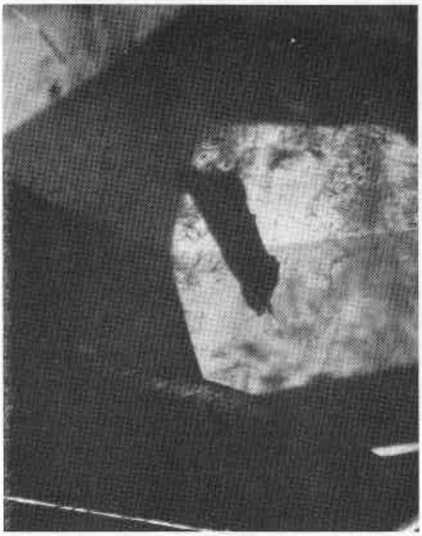

Figure 1

Figure 2

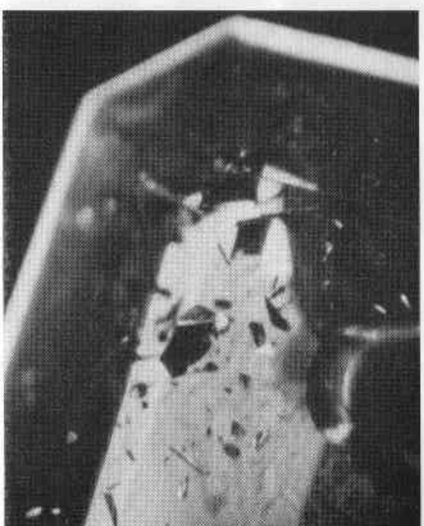

Figure 3

Figure 4

However, there are many other characteristics.

Included hexagonal metallic platelets, probably platinum, are shown in *Figures 3* and *4*. Rutile needles in three directions in a natural corundum are seen clearly in *Figure 5*. The natural seed is outlined in a blue color that resembles an ink stain. In *Figure 6* this same inky line is curved, but typical flux inclusions are seen on either side of it. These blue demarcation zones are perhaps the most distinctive inclusions we have seen and we can offer no explanation for them. They occur in some of the darkest as well as the lightest colored stones.

Sometimes the areas on either side of a blue demarcation zone are strikingly different. In *Figure 7* the area on the right side is lighter in color, with tiny spherical gas bubbles next to the zone with wisps farther out. On the left, the color is much richer and a single large flux inclusion is present (not seen in the photo).

In *Figure 8* the outline of the seed crystal may be seen (arrow). The angular chevron-shaped color banding is in the growth material, but seems to have taken its cue from the natural seed. The chevron is very dark red, whereas the general growth is lighter red.

The most surprising characteristic we have observed is curved growth lines that resemble those of flame-fusion synthetics but that fan out from a point, rather than having a strictly subparallel growth as in Verneuil synthetics. At first we suspected we were seeing a Verneuil seed, but soon realized that it was not so. Note the fingerprint inclusion along

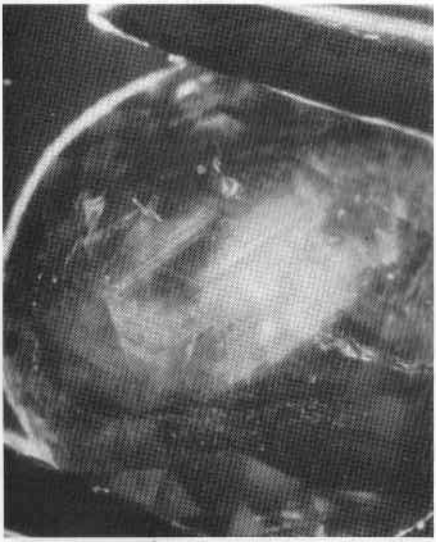

Figure 5

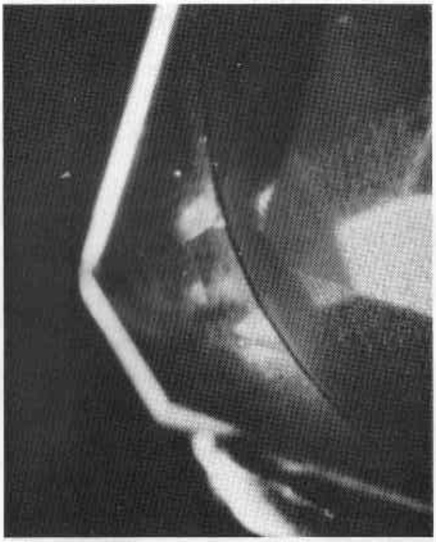

Figure 6

Figure 7

with the curved growth lines in *Figure 9*. In one stone (*Figure 10*), the growth resembled those of Verneuil very closely, so we were prompted to perform a Plato optic-axis observation. The stone showed no strain pattern and the curved banding almost disappeared. A Verneuil stone showed the expected strain pattern along the axis and the curved striae became more distinct, rather than less. Some of the very best colored stones have a slight mistiness reminiscent of those seen in Kashmir sapphires. These stones may show a slight trace of whitish fluorescence when viewed under a long-wave ultraviolet lamp.

One stone had an amazing assortment of inclusions (*Figure 11*). One is a tapering hollow tube, and a few are hexagonal greenish platelets appearing very much like mica. Others appear to be platinum platelets mentioned above. Deep within the stone are straight color bands and wispy flux inclusions. Further observation of the micalike platelets revealed that what was taken for transparency was reflection of neighboring platelets in the mirrorlike surfaces of the platinum.

Ultraviolet fluorescence, except in areas of natural seed material in rare stones, appears to be approximately the same as reported in the article in the Spring, 1969, issue of *Gems & Gemology*. *Figure 12* illustrates a group of six Chatham stones compared with eight Verneuil synthetics for short-wave transparency. They are approximately the same.

With each stone as individual as those of nature, the accompanying illustrations hardly begin to depict the wide variations we have thus far seen.

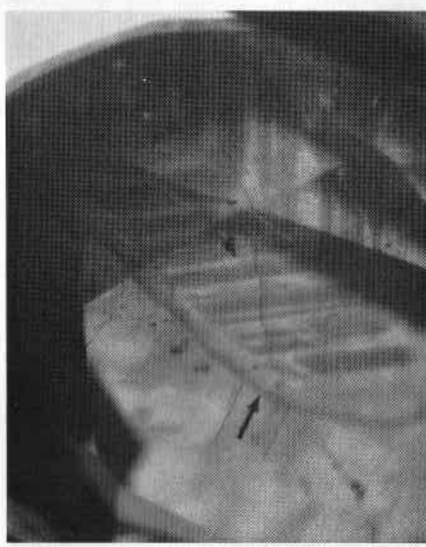

Figure 8

Figure 9

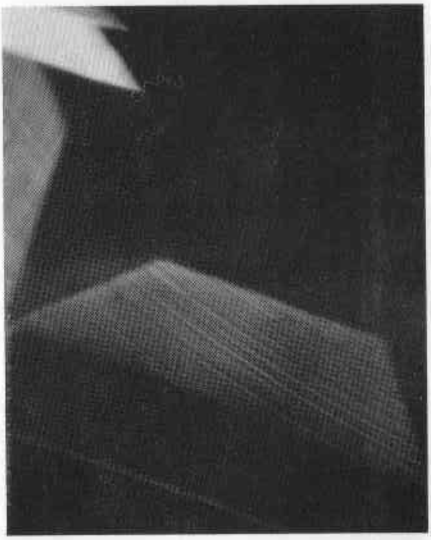

Figure 10

Figure 11

Figure 12

However, with experience and an occasional short-wave ultraviolet test, the skilled gemologist should be able to distinguish this new product from both natural rubies and common Verneuil synthetics.

Artificially Colored Opal?

Figure 13 illustrates a very handsome opal of the kind discussed in the last issue of *Gems & Gemology* in the Los Angeles column. It had a refractive index of 1.37 (water is 1.33) and a specific gravity of approximately 1.42. Weighed dry it was 6.62 carats. After being in water for only the length of time to weigh it, it was again weighed out of water and the resulting figure was 6.95 carats, thus making a reliable specific gravity difficult to obtain. Opal with this very low refractive index and specific gravity has been examined from the Nevada mines, but with these properties it is usually light in color. Magnification revealed some suspicious dark coloring in cracks and other areas. With the extreme porosity of the stone, it is reasonable to suspect artificial coloration. However, we are still studying this kind of opal and must reserve judgment as to treatment until we have better information.

Figure 13

Plastic-Treated Turquois

A very pleasing dark-blue turquois with matrix yielded no evidence of artificial coloration. It had a respectable specific gravity near 2.70, the proper refractive index and absorption spectrum, and no reaction to a hot needle. The only suspicious characteristic was a too great translucency in thin areas and some slight white areas near the matrix zones. We were informed that it was plastic treated but with a lengthy process that eliminated cracking. Surface curing of the plastic seems to have altered it to the extent that a hot needle did not cause charing nor an odor. We hope that we will be able to report further on this material, since it is a definite improvement over other processes.

Polished Groove on Diamond

Figure 14 illustrates an unusual polished groove (arrow) on the surface of an otherwise flawless diamond. We have never seen anything like it on diamond before and cannot figure how it might have been done.

Figure 14

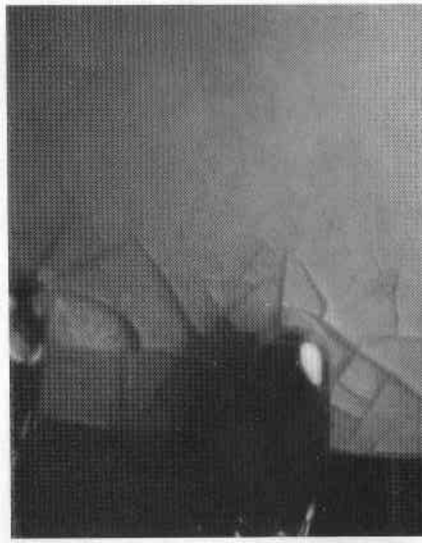

Figure 15

Dyed, Plastic-Treated Turquois

An unusual treatment for another turquois is shown in *Figure 15*. It is a surface-dyed, clear-plastic-coated, nearly white stone. The clear plastic or lacquer had begun to craze near the girdle of the stone and a few chips were loose, so it was possible to determine that the outermost coating was colorless (*Figure 16*).

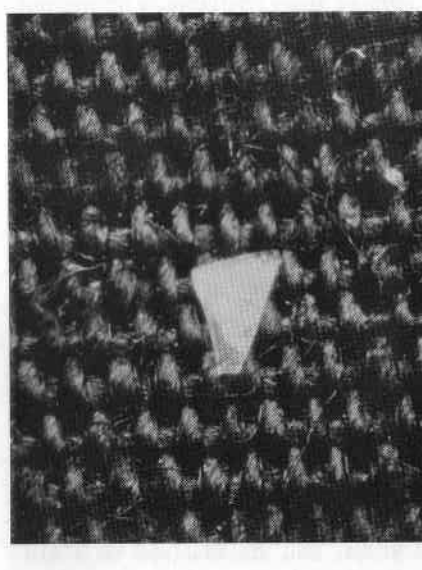

Figure 16

Repaired Emerald

A very good repair job is shown in *Figure 17*. It is an emerald from which an emerald-crystal section had fallen out. Careful use of an epoxy or other fluorescent cement was used for the work. From the top the repair could not be seen.

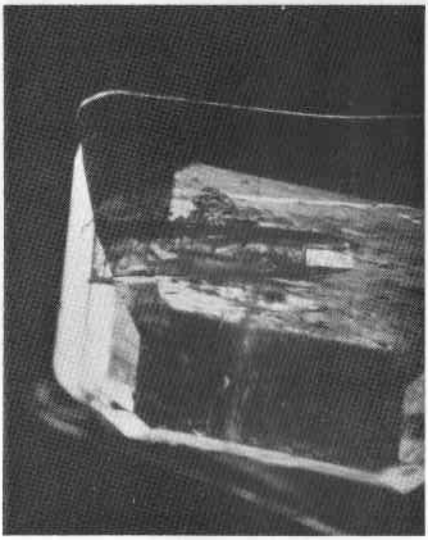

Figure 17

"Growth" in Opal

Within a short time after receiving a handsome, large Mexican-opal cabochon, a New York dealer noticed a small white spot "growing" within the stone. He called to ask if we had ever heard of such a thing. We said we had and he promised to show us the stone, which he did some time later. But by that time the spot had grown to considerable size and definitely had affected the appearance and, probably, the value of the stone (*Figure 18*).

Jadelike Idocrase

Although we have reported the occurrence of jadelike idocrase from Pakistan on several occasions, we had never encountered round beads nor material that looked so much like jade. *Figure 19* shows the mottling of the stones. Except for the higher luster, one might never suspect that the stones were not jadeite.

Another Damaged Zoisite

We continue to hear occasional difficulties with blue zoisite during manufacture. In almost every case we are convinced that the misuse of heat is the culprit. The lovely stone shown in *Figure 20* was damaged at the very last moment before delivery to the client by the foolish use of steam! We can quite confidently say that these stones will not take rapid temperature changes, and in this respect may be even more tempermental than peridot, garnet or the clear quartz stones.

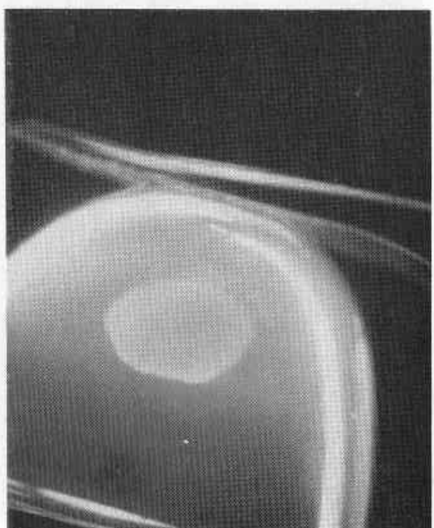

Figure 18

Unpolished Girdle

We have occasionally been surprised to see an unpolished girdle on a large marquise or pear-shaped diamond. Usually, because the girdle does reflect into the body of the stone, it is faceted and thus increases the scintillation of the stone. However, we are aware that the unpolished girdle, being white, may improve the color appearance in light-brown and light-yellow stones. *Figure 21* shows an unpolished girdle on a 12-carat marquise.

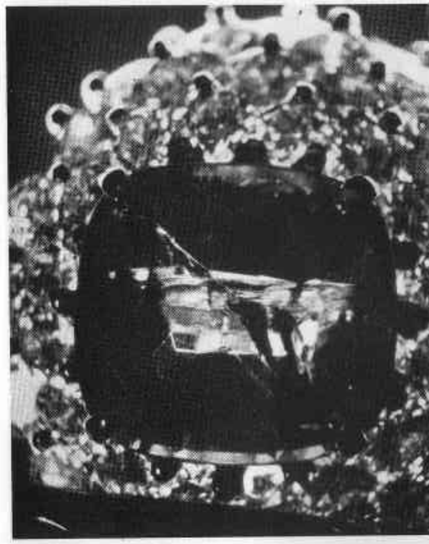

Figure 20

Needles in Diamond

A black diamond that came through the Lab recently owed its color to a host of black needles oriented in three directions. Under the microscope one was reminded of labradorite. Rarely, we see a small patch of such needles in an otherwise nearly colorless diamond (*Figure 22*).

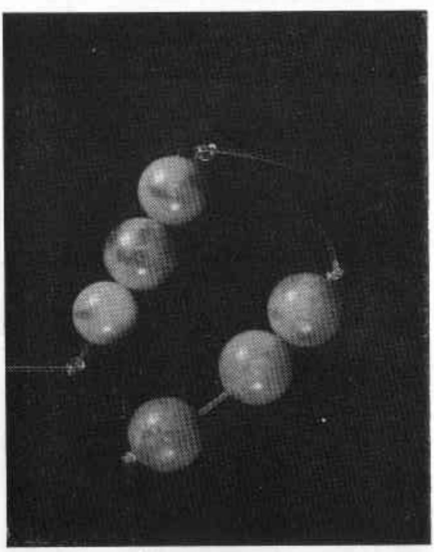

Figure 19

Banding in Synthetic Emerald

Whether such regular banding as seen in *Figure 23* is typical of non-fluorescent synthetic emeralds is yet to be seen. The stone observed had refractive indices within the range of natural stones and a specific gravity of 2.70. Typical flux fingerprints and veils gave it away, however.

Unusual Fluorescence

A very fine natural blue sapphire of 18 carats surprised us when it was

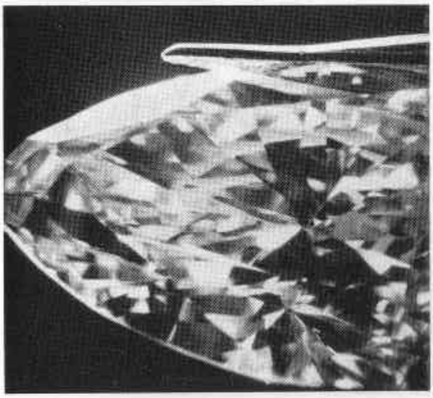

Figure 21

tested under short-wave ultraviolet: it appeared greenish white, just as if it were a synthetic. However, the fluorescence was zonal. *Figure 24* shows the stone under dark-field illumination. *Figure 25* is the same view under short-wave ultraviolet after a 15-minute exposure using the *Photoscope.*

Horsetail Inclusion

A fine 6-carat demantoid garnet had the classical horsetail inclusion shown to perfection in *Figure 26*.

Unusual Combination

A most unusual specimen shown to us by precious-stone dealer Walter Arnstein, New York City, was a polished slab consisting of alexandrite and emerald. The alexandrite did not join the emerald in an even plane but with "tongues" that could be seen on the polished side by virtue of the higher refractive index. Although not clear enough for faceting, cabochons or flat plates of the stone would make desirable and intriguing collector's items.

"Chrome Chrysoprase"

In one week recently we tested

Figure 22

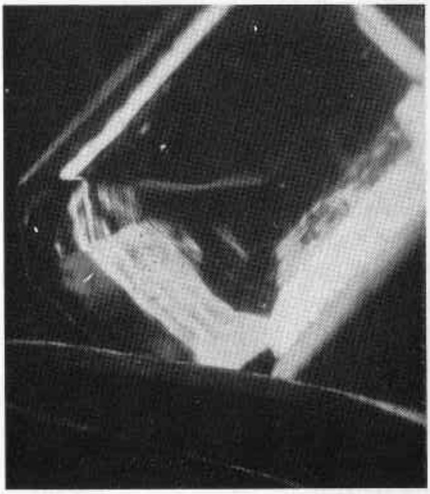

Figure 23

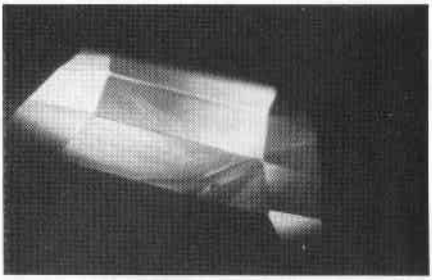

Figure 24

examples of what we could only call "chrome chrysoprase." Both stones resembled very fine, so-called apple-green jadeite. Both showed good chrome lines in the spectroscope, and we could find no evidence of dye. One stone was being offered at more than $3000 wholesale – a fair price had it been jadeite.

Acknowledgements

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

To **Dorothy Reidel**, GG of New Jersey (recently removed from New York), for a jet necklace for use in display and classwork.

To **Cartier, Inc.**, for a rough specimen of purpurine glass. It is most useful because it illustrates the various color tones possessed by this attractive material.

To Graduate Gemologist **Lewis Kuhn** for a beautiful curio: a hollow, natural vug of Mexican opal. It could not be polished, since it was too thin. In the display case it is much admired.

To **Harry Neiman**, Nu-Age Products, Hyde Park, Massachusetts, for six different colors of diamonds atomically treated by his firm.

To **Lucien Grunzweig**, student, Created Gemstones, Inc., New York City, for a selection of rough pinkish corundum from Brazil and a Chatham synthetic-emerald crystal. The color of the rough corundum is very similar to the first stone we have seen cut from synthetic hydrothermal corundum. The many wisps and intense ultraviolet fluorescence in the synthetic stone are the same as we see in our specimens of this pinkish material.

To **Frank Jaegar**, Precious Minerals Corp., New York City, for two unusual, bright-green crystals that were identified in the Los Angeles Lab as actinolite, probably chrome-bearing.

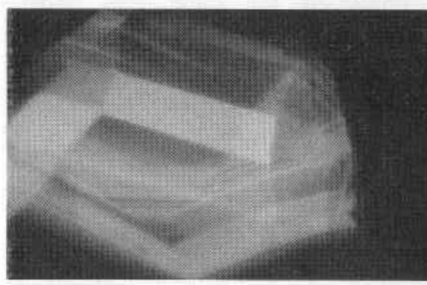

Figure 25

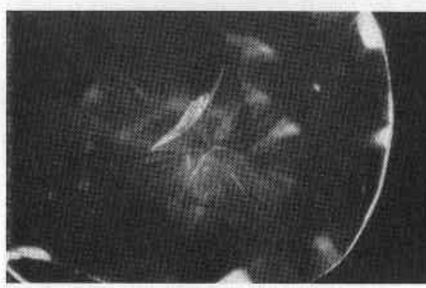

Figure 26

Developments and Highlights at GIA's Lab in Los Angeles

by

RICHARD T. LIDDICOAT

Hydrothermal Synthetic Emerald

In the Fall, 1969, issue of *Gems & Gemology* we reported a hydrothermal synthetic emerald of unknown origin. Since that time we have received the latest Linde product, and find its properties are the same or close to those of the specimen reported in the last issue. *Figure 1* shows the spicules, or commalike inclusions, that are characteristic of hydrothermal synthetics seen to date. In addition, there were two-phase inclusions that resembled somewhat the wispy inclusions seen in flux-fusion synthetic emeralds. *Figure 2* shows a large bubble in a cavity in the same stone. These two photos were taken at 63x. In *Figure 3* you see the effects of repeated twinning, which was very prominent. This one had indices of about 1.571-1.577. The specific gravity was increased to the point where it sank slowly in our emerald liquid, which is set at about 2.68. An accurate hydrothermal determination gave 2.685.

More on Synthetic Flux-Melt Emeralds

For the past two or three months we have been examining many flux-melt synthetic emeralds, some of which have properties in a range that we reported for years to be those expected only in natural emeralds.

Recently, more and more synthetic flux-fusion emeralds have been encountered that are apparently in the new line being produced by Pierre Gilson of France. They seem to range in R.I. from a low for the extraordinary ray of 1.567 to a high for the ordinary ray of 1.58; several have been 1.570 to 1.577, and some as high as 1.574 to 1.580. These synthetics are characterized by almost total lack of red fluorescence under a two-tube

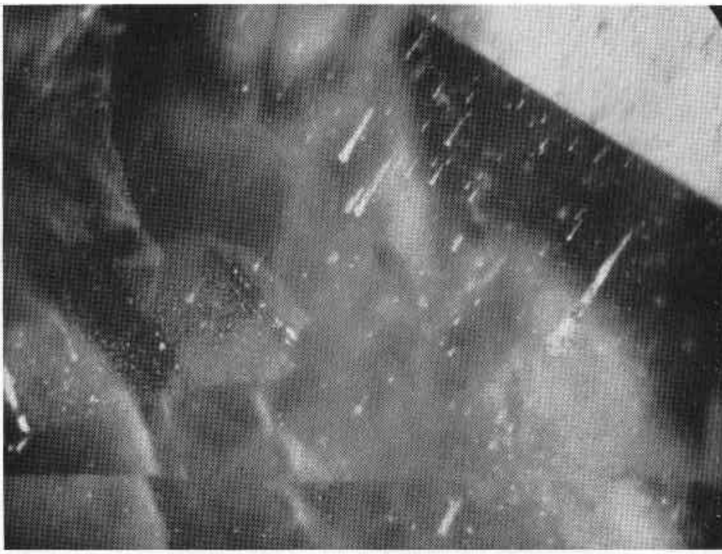

Figure 1

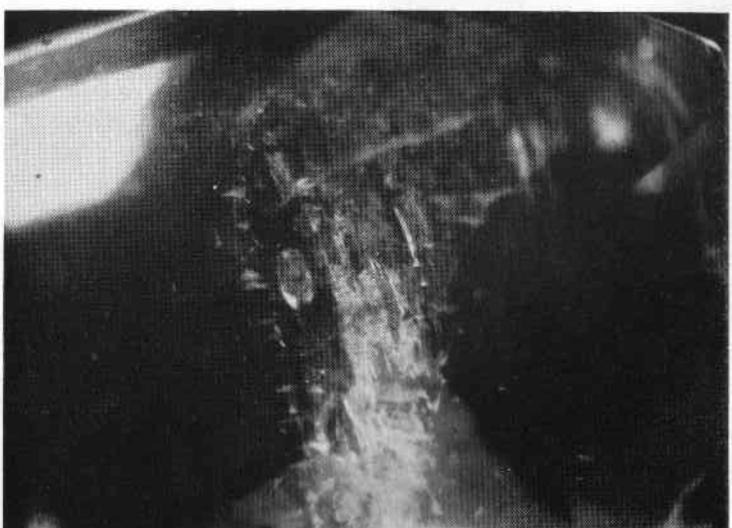

Figure 2

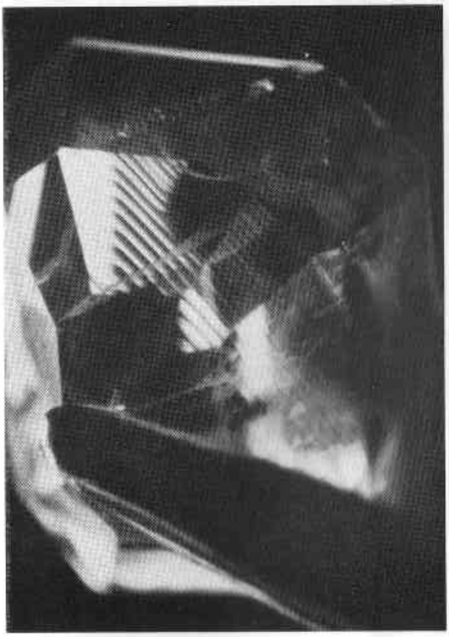

Figure 3

Mineralight (a long-wave ultraviolet source), and fairly weak fluorescence under short-wave ultraviolet.

Many of these sink slowly in a liquid set near 2.68, but most show the wisplike inclusions that are characteristic of flux-melt synthetics. It is the inclusions that make them obviously synthetic, because they are never encountered in natural emeralds.

For a gemologist familiar with typical flux-melt inclusions that resemble veils or fingerprints of two-phase inclusions, these synthetics are reasonably easy to recognize. However, the properties of these recent ones are those that have been heretofore expected only in natural emeralds. The wisplike or veillike inclusions are actually solid flux. The infrared spectrum of flux-melt synthetic emeralds fails to show the lines caused by water vapor in natural emeralds.

These latest examples are very similar in properties to the latest Linde product in their lack of fluorescence, their refractive indices and specific gravities. However, the Linde stones are characterized by the spicule, or commalike, inclusions and the thick accumulation of tiny two-phase inclusions near the edge of the seed plate. It is becoming increasingly difficult to distinguishing between natural and synthetic emeralds, whether flux melt or hydrothermal.

Needles in Synthetic Emerald

In the past month or two we have encountered some rather unusual inclusions in synthetic emerald. The little radiating needles shown in *Figure 4* intrigued us because they were unlike anything we had seen in the past.

Treated Diamond

In this era it is becoming increasingly unusual to encounter cyclotron-treated fancy-colored diamonds. Recently, we found a top-surface-treated brown diamond in which the coloring was quite evident under the microscope. The spectroscope was of little assistance in identifying this stone. The treatment was evident near the top surface of the stone when photographed from the pavilion side (*Figure 5*). This picture was taken at 39x, and it shows the table surface from near the crown looking through

Figure 4

the pavilion at the table and star facets.

Another Unusual Diamond

Within the last few days, we examined a yellow-brown, emerald-cut diamond whose characteristics were quite similar under the spectroscope to those described in an earlier report by our New York Laboratory. The stone had yellowish fluorescence, a strong absorption line at 4155 Å, a fairly strong line at 4780, a very weak line at about 5050 (probably the familiar 5040), another fairly strong line at approximately 5480, plus a very thin, sharp, stronger line just below 5700 (*Figure 6*). There was no line at 5920.

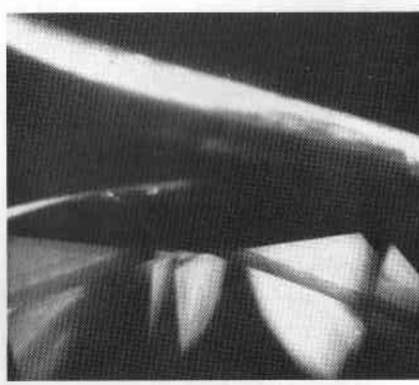

Figure 5

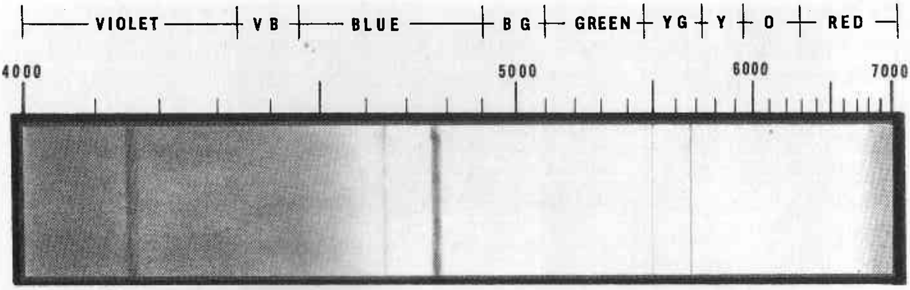

Figure 6

It seems clear to us that the diamond was of natural origin, but the two lines in the 5500 area were so rare as to have been reported only a few times in the past and were thus worthy of mention.

An Unusual Treated Opal

We received for testing a rather unusual opal that had been treated by the common sugar-and-acid treatment. Apparently, the opal was more porous than usual, so large areas of the surface were penetrated deeply by the acid. Apparently, the denser areas were at the original polishing level, showing little effect of attack, whereas there were many areas that had been dissolved to a depth of about 1/2 mm.

The top of the stone is shown under 17x in *Figure* 7, showing the areas of etching. The back of the cabochon is shown under 40x in *Figure 8*. The black areas are recessed, and the white areas stand up above the portions in which the black is evident.

Striae in Light-Green Synthetic Sapphire

We encountered a light-tourmaline-green synthetic sapphire that showed unusual, strong, prominent curved striae. We expect to see curved striae in red, blue and alexandritelike synthetic sapphire, but to find it in a light-tourmaline-green synthetic is unusual in our experience.

Odd Obsidian Inclusion

We encountered some fibrous inclusions in an obsidian that were quite

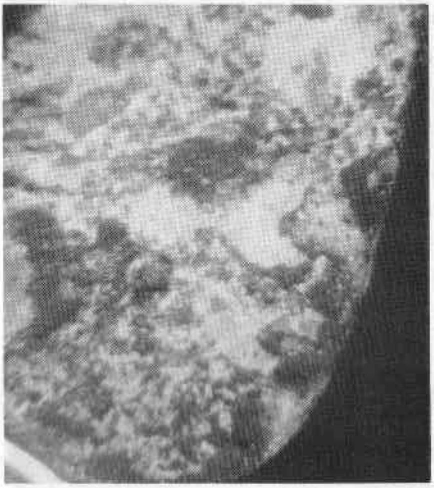

Figure 7

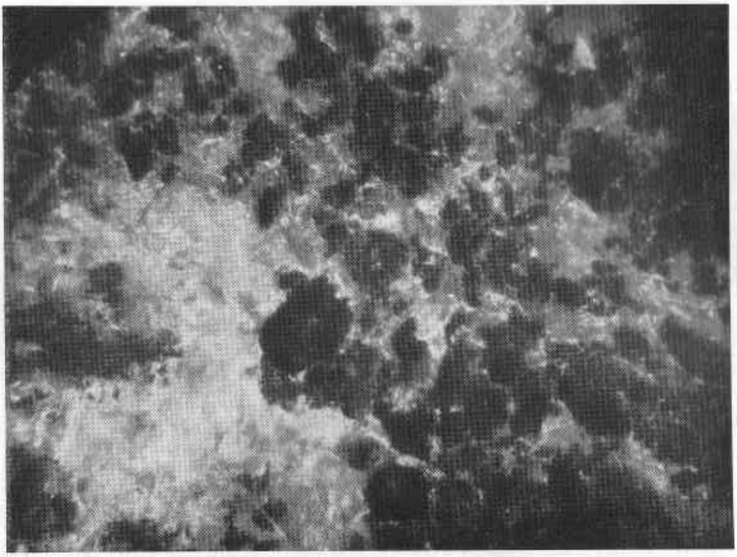

Figure 8

interesting (*Figure 9*). At the center of the photograph is an inclusion that looks somewhat like the spicules seen in Linde hydrothermal synthetic emeralds, but at the end is a radiating group of obviously crystalline fibers.

Figure 9

Silk in a Synthetic Yellow Sapphire

A synthetic yellow sapphire was identified in the Laboratory on the basis of a number of spherical bubbles and a typical chromium spectrum, plus dark-red fluorescence. It showed one odd inclusion: a very thin needle that was certainly not to be considered typical for a synthetic yellow sapphire (*Figure 10*).

White-and-Green Carvings

In the last six months we have tested quite a number of very attractive carvings in a very pure white with rather bright-green markings. Some were quite massive and very attractive.

Figure 10

When a spot reading gave us a refractive index of about 1.70, we thought the material might be Pakistani idocrase, but X-ray diffraction showed it to be diopside.

Cat's-Eye Peridot

For the first time we encountered peridot that had a fairly good eye. We did not photograph the inclusions in the cat's-eye material, but did take some of the same kind of inclusions in a faceted specimen that came in at about the same time (*Figure 11*). We could not effectively photograph the inclusions in the material that showed the eye.

Odd Pyrite Inclusions in Emerald

At 20x in *Figure 12* are some pyrite inclusions in an emerald, which, around the edges, are beginning to alter to limonite. At the top of the photograph we see an inclusion that has almost completely altered, whereas the one in the middle shows very little change; the one at the bottom has altered only slightly to limonite. We have never seen a more graphic illustration of the process of the alteration of pyrite to limonite.

Synthetic Quartz from Russia

Synthetic quartz in a number of colors was donated to the Lab recently by GeoAids, International. One of the colors was somewhat akin to smoky quartz and had areas from which stones could be cut showing no characteristic that would distinguish them from natural material by currently available tests. The blue material had

Figure 11

three very weak absorption lines in the spectroscope, very roughly akin to the trio of lines seen in synthetic blue spinel, but much weaker. The main broad band was centered near 6500 Å, with others at 6400 and 5500. The very diffuse band between 4900 and 5000 Å was visible only in a long section of the material. See *Figure 13*.

There was also a sort of greenish color. None of these colors could be considered attractive nor saleable, but we feel its availability in the United States should be reported, because it probably will appear before long in cut stones. We feel that it is being imported largely for the amateur lapidary trade, rather than for jewelers, but it will undoubtedly turn up in identification problems in the future.

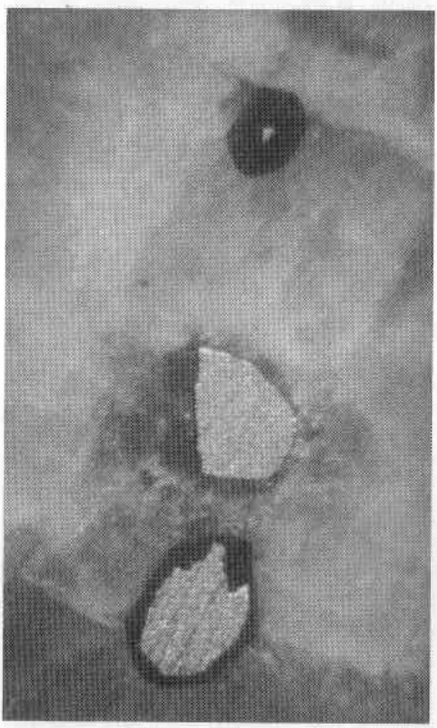

Figure 12

Rare Minerals Tested

We have tested some very unusual minerals since the last report, one of which, augelite, a basic aluminum phosphate, we have encountered in the past. This one had many two-phase inclusions, as shown in *Figure 14*.

Two of the other four minerals we had never seen were creedite and whewellite. The former is a hydrated calcium-aluminum sulphate containing fluorine. The refractive indices were approximately 1.46-1.485. This rare mineral has a hardness of only 3 1/2, so it is strictly a collector's item, rather than a gem material.

Whewellite is a calcium oxalate. Since this is a salt of oxalic acid, an organic acid, it is a real rarity in the gem-collector's field. It is monoclinic, optically positive, hardness only 2 1/2, specific gravity 2.23, and refractive indices 1.49, 1.555 and 1.65.

Simpsonite is an exceedingly rare hexagonal aluminum tantalate, with a hardness of 7, a specific gravity near 6.00, refractive indices of about 2.06, and a birefringence of about .100. This mineral, which is bright orange-yellow in color, has all the attributes of a very attractive and durable gemstone, but it is very rare in faceting quality and occurs only at Alto do Gis, Rio Grande do Norte, Brazil.

More on Synthetic Emerald

Another synthetic emerald with some very strange inclusions, but with

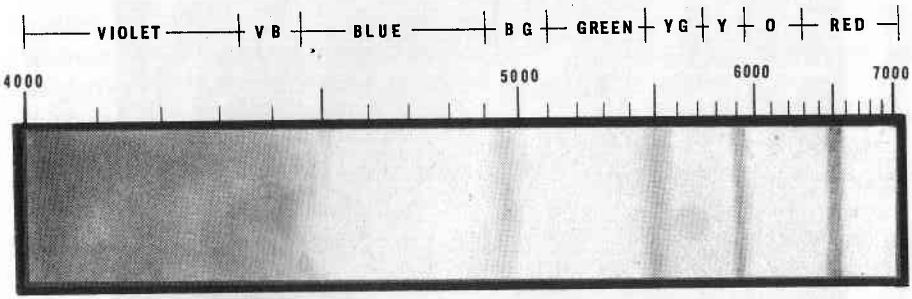

Figure 13

Figure 14

the low properties of the older flux-melt type, is shown in *Figure 15*. These flowerlike spots were unlike the inclusions we had seen in synthetic emerald heretofore.

Very Unusual Condition in a Diamond

In a mounted diamond, in which there was no sign of any kind to suggest twinning, we noted on one bezel facet strong running lines (wheel

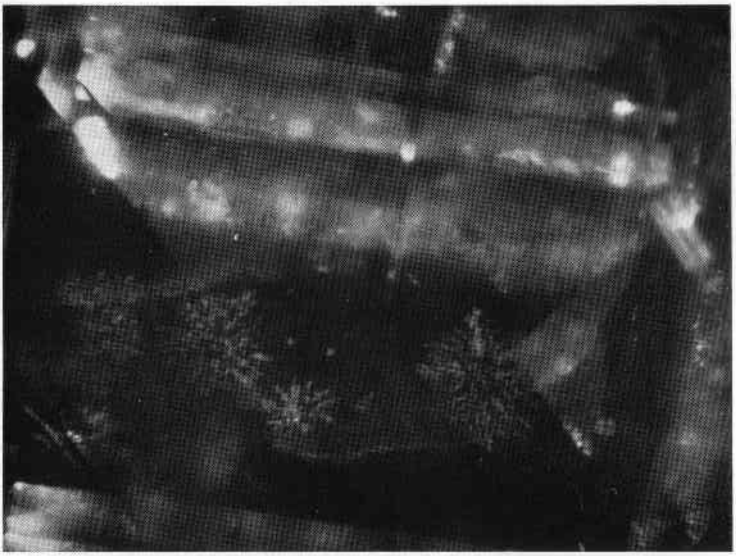

Figure 15

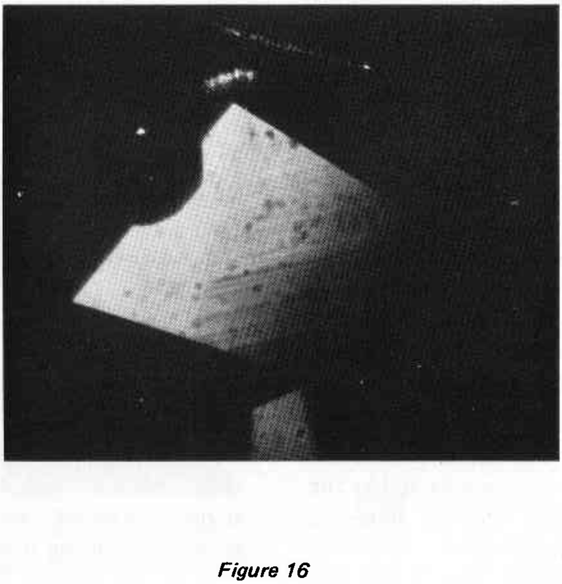

Figure 16

marks) on a portion of the facet, whereas the other portion appeared to be perfectly smooth (*Figure 16*). The brighter side to the left is without running lines, but the wheel marks are very prominent on the right side.

This would suggest a distinct difference in hardness on the two sides of that line. So, in all probability, this must be a twinned crystal, even though there is no evidence of it in the form of a twin line.

Acknowledgements

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

To **Edward Brocherdt** of La Jolla, California, for three unusual diamond crystals (one a rare modified cube), presented to GIA through La Jolla Jewelers. They will make useful study stones for the Diamond Appraisal class.

To Graduate Gemologist **Charles Barr** of Lubbock, Texas, for a sapphire and an attractive pink grossularite cabochon.

To student **Art House**, jeweler, of Beachwood, Ohio, for an interesting selection of rough stones, including chrome chalcedony, tourmaline, garnet, ruby and emerald.

To student **Toni Garrett** of Tulsa, Oklahoma, for six synthetic rubies.

To student **Constance Heineche** for a helpful assortment of cut stones.

To Graduate Gemologist **Ben Gordon** of Gordon Jewelry Co., Houston, Texas, for a large selection of natural and synthetic stones, all of which will be welcome additions to our student test sets.

To Graduate Gemologist **John C. Westphal** of H. E. Volkmann's Sons Jewelers, Kankakee, Illinois, for a cut smoky quartz.

To **C. D. Parsons**, lapidary of Burbank, California, for an excellent assortment of corundum rough and zoisite (Tanzania) rough, which will be most helpful for student study sets. Also, for a selection of 34 fragments of rare minerals to be used in research with X-ray diffraction equipment.

To **Leon M. Agee**, Graduate Gemologist and manufacturing jeweler of Spokane, Washington, for a selection of cut stones for student test sets.

Gemological Digests

LARGE DIAMOND FOUND IN LOUISIANA

We learned recently from C. E. Mounce, a former student in Shreveport, Louisiana, that a large diamond crystal had been found not far from Shreveport and brought to him for sale. In a new housing development in the village of Princeton, about 18 miles east of Shreveport, a boy playing in the yard of his new home found the 18.20-carat crystal, a modified octahedron. His father took it to several jewelers in the Shreveport area and was directed by one of them to Mr. Mounce. Mounce bought the stone, shown in *Figure 1*, and then sent it to the firm of Lazare Kaplan & Sons, New York City, for cutting. It was cut into a 3.47-carat oval, a 2.27-carat marquis, and a 2.75-carat heart shape. The oval and the pear were approximately VS_2 in clarity grade and about J in color. The heart shape was approximately a VVS_2 and I in color.

The remarkable thing about this discovery, if it was actually found as reported, is that we believe it to be the southernmost point at which a diamond has been found in this country. It is far enough away from a primary source in Arkansas that it would suggest that perhaps another pipe exists somewhere in the vicinity, if the geology in the area were different. However, since Shreveport is in the area of gravels and other sediments dropped fairly recently by the Mississippi River system, geologically speaking, it is almost certainly an alluvial stone, in that the last-known volcanic activity within hundreds of miles, to our knowledge, would have been sometime before the deposition of the surface sediments in the Shreveport vicinity. This is a large stone to have been carried hundreds of miles in a river, other than a swift mountain stream. The *Mounce Diamond* if found at Princeton, Louisiana, as reported, would have to take its place among the top five to ten rough diamonds found in the United States.

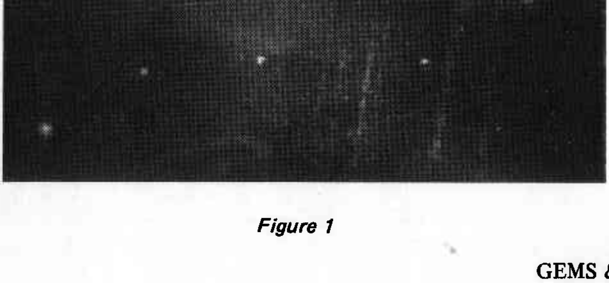

Figure 1

Book Reviews

RUBIES & ROSES, by Peggy Feasey. Published by Charles E. Tuttle Co., Rutland, Vermont, and Tokyo, Japan, 1969. 128 pages. Clothbound. Illustrated in black-and-white and 45 color plates. Price: $12.50.

In this unique book, one of the most beautifully illustrated we have ever seen, the author develops the unusual concept of interpreting with flowers the romance of gems.

After a brief discussion of some of the basic properties of gems, such as brilliance and luster, Mrs. Feasey presents a fascinating, brief history of the influence of flowers and plant forms as a decorative motif in jewelry design.

She then reverses the influence and opens up for the reader the beautiful, breathtaking world of floral arrangements and compositions inspired by gems. She considers first the so-called precious stones –diamond, emerald, ruby and sapphire–and relates delightful stories of the roles played in history by gems, and explains how to derive exquisite floral creations from them –creations that seem to scintillate with the same brilliance and luminosity as the gems. Twenty-two other stones are treated in the same manner, and each is accompanied by a superb color plate showing a flower-and-gem design and a concise description of the materials used.

Throughout the book Mrs. Feasey urges the reader to use his own imagination and duplicate in his own way the form, color and texture that these stones may inspire– to see the interrelation of these marvels of nature. She urges us to see in amethysts, for example, the lavender delphinium and the purple larkspur; to see in waxy jade the strong leaves of sanseveria combined with satinlike roses. She taps the sources of inspiration and stimulates her audience to do the same.

Rubies & Roses will undoubtedly open the door to a new realm of creative experience for many persons.

WORLD MAP OF GEMSTONE DEPOSITS, by H. J. Schubnel. Published by the Bureau de Recherches Géologiques et Minières, Paris, France, 1969. Printed in color. Available from the Gemological Institute of America.

Monsieur H. J. Schubnel, of the above-mentioned Bureau, has succeeded in the very difficult task of producing a world map of the major gemstone occurrences.

About 150 deposits, both mining districts and individual mines, are located on the map. The author, not being satisfied with merely showing locations, has designed a colored symbol for each of the major gemstones. This symbol, in turn, has been modified in shape to show whether the deposit is igneous, metamorphic, alluvial, vein, lode, etc. Moreover, the size of the symbol indicates the comparative importance of the deposit. Since this is a gemstone map, the largest deposits are not necessarily the most important from a gemological standpoint. The Bakwanga deposit in the Congo, for example, is the largest diamond deposit, but it produces mostly industrial stones; therefore, its symbol is small.

The map includes other colored symbols that indicate the geological age of the formations in which the gemstones are found. It measures 34½ x 22½ inches and is on a scale of 1:40,000,000. It is admirably suited for framing for wall decoration in a gem room.

JEWELRY THROUGH THE AGES, by Guido Gregorietti. Published by American Heritage Publishing Co., Inc., New York City, 1969. 328 pages. Clothbound. Illus-

trated with black-and-white and color photographs. Price: $14.95.

This book is unique for two reasons: it is the first major treatise on the history of jewelry since H. Clifford Smith's *Jewellery* in 1908, and it contains many more color reproductions than any previous book on the subject. The color plates, numbering more than 200, are exceptional in every respect. Another 200 are in black and white.

The author tells the story of jewelry in eight chapters, entitled Gold, Colored Stones in Jewelry, the Middle Ages, the Renaissance, the Baroque Period, the 18th Century, the 19th Century, and 1870 to the Present Day.

The well-written text covers the subject quite well, and includes some material not considered in other works on the subject.

Guido Gregorietti is director of the Museo Poldo-Pezzoli and professor at the Academia di Brera in Milan, Italy.

Jewelry Through the Ages is a beautiful and informative book, and one that will be required reading for all serious students of the history of jewelry.

JADE, by Louis Zara. Published by Walker & Co., New York City, 1969. 84 pages. Clothbound. Illustrated with black-and-white photographs. Price: $4.50.

This modest-size handbook for collectors is an abbreviated version of other, more comprehensive, works. The subjects discussed parallel in part those found elsewhere: the similarities and differences of jadeite and nephrite, facts and superstitions, and brief chapters on the use of jade by the Chinese, middle Americans, the Maori, Eskimo, American Indian and the Moguls. A final chapter gives advice to the collector. Included in each section is a discussion and comparison of the use of jade by each cultural group.

Mr. Zara is a noted author who has had a life-long interest in gems and minerals, especially jade. His book is part of a series known as Collectors' Blue Books, published by Walker & Co.

THE FABULOUS KEOKUK GEODES, by Stephen R. Sinotte. Published by the author, Portage, Michigan, 1969. 306 pages. Clothbound. Illustrated with black-and-white and color photographs. Price: $19.95.

A geode can be defined as follows: "A cavity in clay or other formation that has been lined with a layer of quartz or other mineral. Weathering and erosion have subsequently carried away the host rock, leaving a hollow ball, the interior walls of which are usually studded with crystals."

This book, which deals with the geodes of the Keokuk, Iowa, region (the world's most notable source), was developed primarily around three concepts: the origin, formation and development of geodes.

The first concept embraces the premise that geodes had their origin as diagenetic concretions in the marine sediments of the Mississippian sea.

The second concept deals with the process by which silica replaced calcite at the margins of the diagenetic concretions, thus transforming them into geodes.

Thirdly, the concept of development of geodes is concerned with cavity formation and mineral paragenesis resulting from the action of acidic solutions.

The author develops these concepts in a most comprehensive manner, leaving little or nothing to be desired by the reader. 36 color plates and analyses of selected geodes augment the text. The appendix includes a discussion of principal collecting sites, a glossary and a bibliography.

For those who have a particular interest in these unique geologic formations, *The Fabulous Keokuk Geodes* will offer a wealth of informative data, much of which is unavailable elsewhere.