Gems and Gemology

SPRING, 1963

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Gems & Gemology

VOLUME XI — SPRING, 1963 — NUMBER 1

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On the Cover

One yellow-diamond-marquise bud with pear-shaped white-diamond petals forms the blossom motif for this diamond-and-platinum brooch created by E. Meister of Zurich, Switzerland. The stem of the blossom and the bent stalks are set with baguettes. It was one of the fifteen that received awards at the Waldorf-Astoria, New York City, October, 1962.

Care of Gem Materials and Their Substitutes

in

Manufacturing, Repairing, Displaying and Wearing of Jewelry

by

Robert Crowningshield

It is not the purpose of this paper to dwell on the more familiar factors of durability; (e.g., hardness, cleavage and brittleness), but rather to summarize some of the lesser-known factors that can contribute to unexpected difficulties when handling jewelry.

Some of the factors to be discussed are inherent properties, whereas others are the result of modern treatment of gem materials and their substitutes that perhaps result in more salable items but in certain cases lessen their durability.

One of the important inherent properties of gem materials, but not always considered seriously, is the matter of reaction to heat and light. Students of gemology are aware that there are several gem materials that are made marketable by the application of heat; these include zircon, citrine, some tourmaline, "pinked" topaz, aquamarine, greened amethyst and others. Except for some zircons, most heat-treated stones that reach the market retain their new color under most conditions of display and handling. However, certain stones, particularly some unheated amethysts and some brown zircons, may alter in color during manufacturing or repair processes.

Occasionally, amethysts may fade gradually on exposure to light or to a combination of light and heat. We have encountered a few of these stones that have faded to colorless over a period of ten to twenty years. In one instance, the wearer of an amethyst ring, while preparing a meal, had frequently removed her jewelry and placed it on the warming shelf above the kitchen stove. In another case reported, the heat generated in sizing a ring had been responsible for fading an amethyst. Freshly mined kunzite crystals fade from a striking blue-violet to the familiar pink color. Rarely, the color continues to fade in daylight, although the recent large find of kunzite in Brazil has produced cut stones that have been reported as susceptible to fading in artificial light.

We have encountered two instances where natural brown zircons changed to orange, in one case during manufacturing of a ring, and the other while in position for examination over the spectroscope light in the New York Laboratory. In both stones, the original brown color returned after a period of several hours at room temperature.

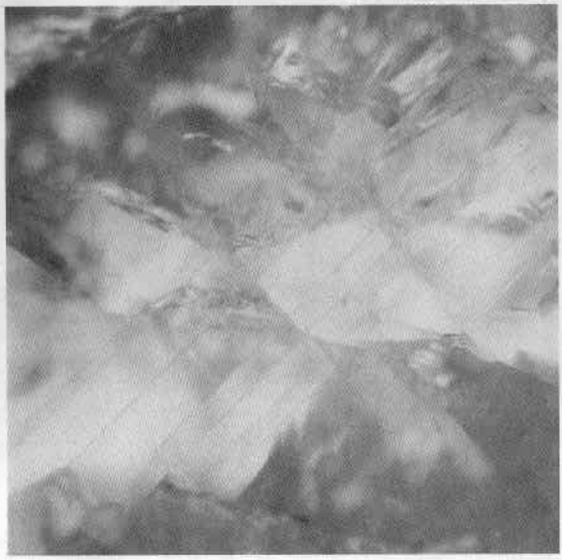
In the past year, two separate reports concerning the fading of natural yellow sapphire during manufacturing processes have come to our attention. Communication with Basil Anderson, of the London Laboratory, brought us the information that his experiments have shown that yellow sapphire may fade appreciably at the relatively low temperature of 250°C. (482°F., a moderately hot oven). In one of the cases mentioned above, our informant told us that he placed a faded, 16-carat stone on the window ledge of his shop in a Canadian city and forgot about it until spring. In April, he was surprised and delighted to see that the stone had regained its color; therefore, the firm completed the jewelry and sold it. That was more than ten years ago and there has been no complaint by the buyer. Of course, if the yellow sapphire in question had been artificially treated by X-rays to deepen the color, it would have taken very little heat, or only exposure to strong light, to return it to its original pale color, a test that anyone who is suspicious of the color of a yellow sapphire can perform by placing it in a sunny place for a day or two. Unlike a diamond, no permanent means of deepening the color of a yellow sapphire has yet been reported.

Although it does not require extremely high temperatures to change brown topaz to pink (if the material is the type that will "pink"), we have heard of only one brown stone that was accidentally pinked. It was mounted in a diamond-and-platinum pendant and was inadvertently thrown into a fireplace and later recovered after complete cooling. It had changed (without cracking) to a desirable, and more valuable, pink color.

More important than occasional change of color is relative resistance to temperature change of the various gem minerals. Diamond has a very low coefficient of expansion; i.e., on heating it expands very, very slightly and a relatively rapid cooling usually causes no difficulty, unless the stone has a void or an included crystal with a high coefficient of expansion or if it is badly strained and internal cleaving or fracturing around the inclusion takes place. One included crystal that can cause such internal cracking is garnet. Contrary to what one would imagine, it is not always possible to see a red-garnet inclusion, because of total reflection on its contact surface. Any diamond, especially one with a crystal inclusion, should be handled carefully.

Perhaps the gem minerals most likely to be broken by a sudden temperature change are garnets of all types, peridot,

Figure 1



the single-crystal quartz stones and opal. These are the stones most often brought to our attention after breaking during the course of manufacturing or repair. Sapphires and rubies are subject to splitting along repeated-twinning planes with a temperature change; in fact, twinning planes are subject to splitting with a blow *(Figure 1)*. We have come to the conclusion that repairmen would do well to figure the cost of unmounting and resetting twinned corundum when making their quotations for repairing jobs, rather than take the risk of sizing or soldering prongs with the stones in the settings (this would apply to the four other gem minerals mentioned, as well). One example was a very large star sapphire in a man's ring that had broken along a rhombohedral plane when the repairman attempted to change the ring a quarter size by hammering it on a mandril. Recently, we saw a star sapphire that had cracked, although not along a parting plane, when the same method of sizing was attempted. Repairmen sometimes overheat a diamond and produce a frosted surface, which is due to oxidation; this can usually be removed, unless deep pitting (where grease was present) has occurred. Loss of weight to completely repolish the stone usually is less than 3%. Sizing a ring set with melee has often resulted in the dirt on the backs of the small stones being fused to the diamond. This usually produces a blackish-looking stone, and the dirt is difficult to remove without boiling in acid.

More and more, it is becoming necessary for jewelers and repairmen not only to know the identity of the stones they are working with but also the type of treatment they might have undergone. The reasons are rather obvious

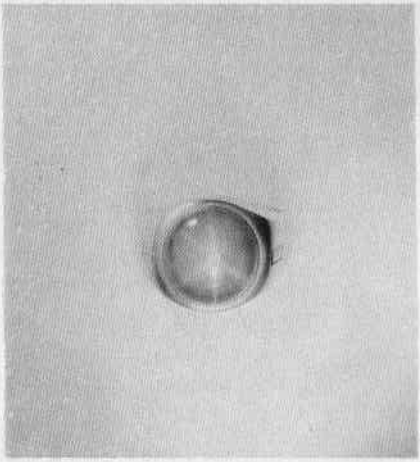


Figure 2

when we consider the number of artificial treatments that have come into prominence in the past ten or fifteen years.

For instance, one means of removing an artificial coating on a diamond is by the use of dry heat. The heat necessary to size a ring or repair a prong may be all that is needed to change the color; therefore, a customer who brings in a ring to be sized that she bought in Atlantic City, Miami Beach or Hot Springs may be in for a surprise (and you will be, too), if you hand her an off-color stone.

Sizing a star-sapphire ring without first establishing whether or not it is a doublet (at least four types have been reported in *Gems & Gemology)* could result in a vastly changed stone *(Figure 2).* The same can be said for quartz, beryl or synthetic-spinel triplets imitating emeralds.

Several types of treated stones that have come into the market in recent years must be handled with care for fear of fading. First, are the lighter green, atomically treated diamonds. Whereas other colors retain their color under all conditions that anyone would reasonably subject a diamond to, green stones can fade under the heat of a jeweler's torch. We might mention a related hazard; that of repolishing an early cyclotron-treated stone that has been damaged. Since both treatments are skin deep, the color can be removed by repolishing.

More than one combination of dyes seem to be used in dyed jadeite, dyed serpentine and the assembling of triplets. Some dyes are much more resistant to fading than others, whereas some fade in a store window or even in a lighted case. Some seem to be quite color-fast, yet others fade or change color in the dark.

We have heard, and will evidently continue to hear, about an ever-growing number of ways in which turquois is "improved." Simple wax or oil treating is seldom long lasting; therefore, stones soon become freckled in appearance, begin to turn greenish or fade in spots *(Figure 3).* During manufacturing, acids, polishing or any heating can cause discoloration before the jewelry even gets into the consumer's hands. Heat flowing along settings often affects the stone at prongs or the bezel. More sophisticated methods of treating turquois may result in stones that do not give any more difficulty than untreated turquois, which is subject to change, depending on its compactness and how it is handled. Good-quality, plastic-impregnated turquois, handled sensibly by the manufacturer and repairman, gives little trouble and seems to be

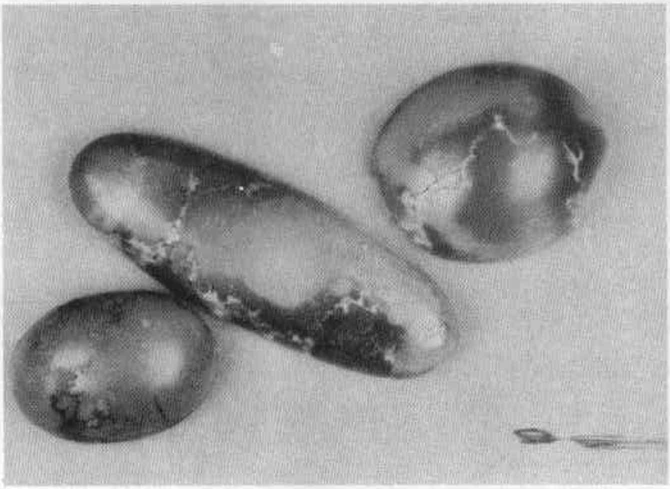


Figure 3

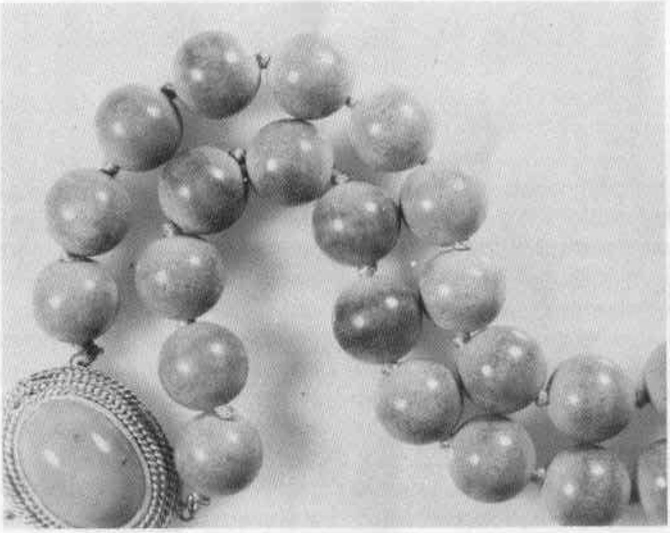


Figure 4

equally successful in the hands of the consumer. The very poor type of chalky turquois that is surface stained and then clear-plastic coated is highly susceptible to peeling and consequent discoloration. The various imitations other than glass may discolor too *(Figure 4).*

The abundance of artificially "blacked" opal that we have seen indicates that much of it may have inno-

Figure 5

cently, or not so innocently, gotten into the jewelry trade *(Figure 5)*. Not enough time has elapsed for us to have data on the durability of the black color. Since it is occasionally necessary to repolish opals, a word of caution is in order. Some of these treated black opals cannot be repolished without a change so marked that the owner would be unhappy.

In recent years, black-dyed cultured pearls have been accepted and many dealers in the U.S., Europe and Japan are busily using various means to produce the black color. In general, if the so-called center dyeing, or French method, is used, the results are quite satisfactory. However, several instances of pearls fading upon exposure to sunlight have been reported to us. Some of these reports involved fairly well-matched pairs of pearls in earrings, but one changed from a bronzy overtone to one of purplish. The late Lester B. Benson experimented with some of these center-dyed cultured pearls and found that exposure to ultraviolet light was the cause of the change; therefore, it would be wise not to display dyed cultured pearls in a sunny window. Some surface-dyed cultured pearls fade considerably upon exposure to sunlight, so that any overtones that had been obtained are lost and the body color begins to assume a chocolate to dark-greenish-brown tint. A clue as to whether one is dealing with a center- or a surface-dyed cultured pearl was given by Benson, who noted that the surface-dyed pearls showed no fluorescence under long-wave ultraviolet light and the center-dyed showed a faint greenish glow.

We have yet to see in the New York Laboratory a drilled clam "pearl" that was not cracked. If you should ever be asked to mount a clam pearl, it would be advisable to set it in claws and not to drill it, although one authority mentioned that he had accomplished drilling by immersing the pearl in water while drilling.

A word of caution about placing a known triplet, especially the kind resembling emerald, into any of the heavy liquids. Although bromoform is excellent for demonstrating a triplet, the liquid will attack the green cement and eventually the color will be lost and the parts may separate.

The GIA's Diamond Course has much to say about the undesirable proportions of stones that result from the saving of weight from rough diamond crystals, but usually poorly proportioned stones are not any more susceptible to breakage than the better-made ones. This does not apply to emerald. One means of saving weight from emerald rough is to omit the corner facet from a step-cut stone. Since emerald is somewhat fragile, because of its structure and possible flaws, this type of cutting can result in breakage during setting or wear. We have seen several sizeable stones that have broken, not at the time of setting (which we probably would never see) but later, during wear, because of the unequal strain on the stone caused by the type of setting required. One recent example concerned a very fine, two-carat stone that broke across the corner after the owner had worn it for several months. The area of strain in a square-cornered setting is limited to the corner, whereas in an octagon the area of strain is distributed across the longest dimension of the stone.

We have been somewhat surprised at the number of otherwise well-made flexible diamond bracelets and necklaces that allow the diamonds to strike one another when the piece is bent slightly the wrong way. In all cases where the diamonds could touch, damage had occurred.

Setting a marquise or pear-shape diamond so that the sharp ends are exposed may produce a graceful ring; however, the chances of the wearer breaking the stone are excellent. A wise jeweler will not handle merchandise of this type. We have seen several examples of broken stones caused by this short-sighted style of setting. Repairing a damaged diamond by making an extra facet at the girdle and thereby thinning it, especially on a fancy-cut stone, is inviting exactly the same thing to happen again — only to a more severe degree.

We have noted diamond, ruby and sapphire guard rings in which the stones, including the diamonds, were so badly abraded that no facet junctions remained on the crowns of the calibre-cut stones. It was found in one instance that the owner customarily wore all of the rings together with her very large emerald-cut diamond engagement ring. The culet of the diamond could touch the stones of the guard ring next to it and, since the guard rings were not always worn in the same arrangement, all took a turn at the "beating" *(Figure 6)*. This type of combination, as well as any dangling diamond jewelry that

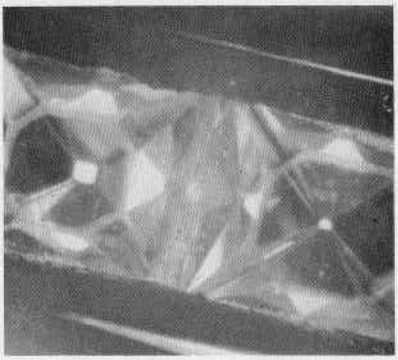


Figure 6

could strike other stones or pearls, should be avoided *(Figure 7)*.

We have seen several examples of damage to stones incurred by setters who were unaware of the stone's identity. Since Fabulite does resemble diamond, a diamond setter may unconsciously set the stone as he would a diamond. He should use great care and prepolish all settings and prongs, since post-polishing may round facet junctions and give the stone a glassy appearance. Another case of misidentification damage came to our attention when a paper of badly broken green stones were shown to us. The setter, assuming that he was working with jade, was puzzled when stone after stone cleaved under what he considered gentle pressure. The stones were amazonite.

The most effective shop method of cleaning diamonds is to bring them to a boil in sulphuric acid; this is done occasionally to remove an artificial coating. Although platinum settings will not be affected by the acid, a slight discoloration around solder joints may occur. A word of warning will not be amiss in the event one is tempted to boil jewelry that contains sapphires or rubies in addition to diamonds — the acid will remove the polish from the corundum.

Although we have heard of many poorly set melee that have come out of their mountings in an ultrasonic cleaner, or later been blown out by steam pressure, we have heard of only one instance of actual damage to a small stone as the result of the ultrasonic cavitation. We would welcome any experiences from readers that might add to our information.

In the Winter, 1959-60, issue of *Gems & Gemology,* the results of leaving white-gold rings in a common concentrated sodium-hypochlorite bleach were described. The electrolytic action on the active metal of the alloy (zinc or copper) by the sodium-hypochlorite causes a break at the weakest solder joint *(Figure 8)*.

The wearer of necklaces of pearls or other stones should be cautioned that their hair sprays and atomized perfumes may do harm, especially to pearls and turquois. For example, we examined some cultured pearls that had a thick flaky coating of hair spray on them. The jeweler was at a loss to explain what was "happening" to his customer's pearls. The customer admitted that she frequently sprayed her hair after she was completely dressed to go out. A thorough cleaning and restringing of the pearls returned them to their original condition, since they had not been attacked.

Finally, a word to jewelers about merchandise that they have borrowed from manufacturers. Train your shipping department (or yourself, if you do the shipping yourself) to study the

Figure 7

Figure 8

pieces before wrapping them for return and make certain that ample packing is used. Wrap diamond clasps so that they cannot contact pearls or beads. Never put more than one loose stone in a paper without cotton, or, if they are larger ones, without wrapping individually in paper. Never allow any two pieces of jewelry to touch, for instance, if you have three rings to return, wrap them separately and carefully.

Dealers have shown us some fantastic examples of retail jewelers' negligence in returning borrowed items. One dealer handling rough and cut stones went to great trouble to make a loan collection of rough minerals available to retail stores. He had separate boxes made to fit each specimen and all were properly labeled. The collection went out once and was a tremendous success. It was returned with all of the minerals *jumbled* into one box with inadequate packing and not in the original boxes. It was easy to see how the retail jeweler's actions caused more than $3,000 in damage. The dealer never loaned this collection again.

Channel-set bracelets are frequently bent the wrong way, straining or breaking the hinges. Always fasten the clasps and then fill the center with paper before wrapping the bracelet in sufficient paper to make a safe parcel.

The trained gemologist is in an excellent position to abide by the golden rule of the jewelry trade: "Do unto other's merchandise as you would have them do unto yours."

Diamond Mining in Brazil

by
Thomas Draper

Beginning with the Winter, 1949, edition, a series of articles contributed to *Gems & Gemology* dealt with the history and development of the diamond-mining industry in Brazil, which will now be continued to cover the lapse of time since the last contribution published in 1951.

Generally speaking, diamond mining has not shown much progress. The ubiquitous *garimpeiro* is still responsible for the greater part of the production from old fields, from new sources in Mato Grosso, and from renewed activity in the Grão Mogol field, which, by an oversight, was not described in the first series. The name is not, as might be supposed, derived from the Great Mogul Diamond, but from a run-away slave, Gramagão by name, who was the first to discover gold in the region.

The term *garimpeiro* was originally applied to fugitive slaves who engaged in clandestine gold and diamond mining and were subject to severe penalties if caught, including being branded for the first offense and having an ear cut off if caught a second time.

Grão Mogol is, to all intents and purposes, merely an extension of the Diamantina field, since it lies less than 100 miles north and presents the same diamondiferous conglomerates that have become a bone of contention among geologists because of the total absence in Diamantina itself, and elsewhere in Brazil, of any definite affinity in origin with the kimberlites of South Africa. Grão Mogol has, in fact, presented evidence diametrically opposed to the basic origin of diamonds by the occurrence, in the famous Pedra Rica (rich stone), of diamonds embedded in the indurated quartzites of the region. This unique occurrence was first brought to the attention of the scientific world by Peter Claussens, who visited the locality in 1841 and described it in the Review of the Royal Academy of Brussels in the same year. Claussens was followed by Virgil von Helmreichen, an Austrian geologist whose observations were published in the Vienna Academy of Science in 1846. At later dates the locality was visited by other geologists, including Gonzaga de Campos and

Francisco Paulo de Oliveira. Boutan, Branner and Orville Derby have also referred to it in their contributions to various scientific journals.

The discovery of diamonds in the Grão Mogol field was made by a fugitive slave, João Costa, who gathered a following of fellow fugitives and engaged in clandestine mining. News of the discovery, confirmed by spies sent for the purpose, was followed by active measures on the part of the *Intendente* (administrator) in Diamantina, who dispatched a squad of 150 slaves under armed escort to take possession; they followed it immediately afterwards by another squad, also under armed protection, to incentivate operations because of the promising results of the first tests.

Outnumbered, João Costa and his followers abandoned the field for the time being, but returned shortly afterwards with additional companions and commenced operations within sight of the legal camp. Its commander, now relatively weaker in strength, sent for reinforcements, which, when forthcoming, suffered a shameful defeat. Unable to spare any more soldiers, the *Intendente* appealed to the Governor of the Province in Ouro Preto, who saw an opportunity of gaining renown as a military genius and placed himself at the head of 200 well-equipped soldiers, morally supported by two cannon of *grosso calibre*. In Diamantina he acquired a few more soldiers and, after a festive *despedida* (farewell) and a religious blessing set forth to teach the *garimpeiros* a lesson, but found no

Lonesome garimpeiro engaged in earning his daily bread.

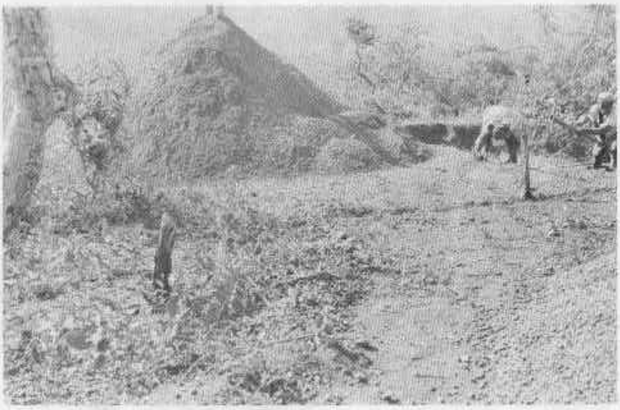
Diamantina is noted for the curious figures that have weathered out of the indurated quartzites of the region.

enemy in sight. Day after day, week after week, he sought in vain to bring Costa to battle until, thoroughly discouraged, he had to face the prospect of an ignominious return; however, purely by chance, he caught his enemy at a disadvantage and inflicted upon him a decisive defeat. Costa was one of the few that escaped unwounded, but the martial governor returned minus his two cannon, interred in the quicksands of the Itacambirussú River. This defeat of Costa was only a prelude to a series of engagements that eventually compelled the *Extraction* to abandon the field because of the difficulty of maintaining adequate military strength and supplies. During eight years of occupation the *Extraction* recovered 53,000 carats of diamonds, which, through lack of adequate control, represents only a part of the actual production. Historians suggest that the larger stones never reached Diamantina. The area exploited was practically devoid of gold, unless the gold also disappeared during the course of operations. The slaves of the period were known to be accomplished actors in compensating themselves for the harsh treatment that was their daily lot.

Although the Grão Mogol field was discovered not long after that of Diamantina, it still offers possibilities from an economic point of view. Unlike the Diamantina area, which suffered intensive exploitation, Grão Mogol is still, comparatively speaking, intact. Its accessible parts, stripped by the discoverers and their successors, legal as well as illegal, contain extensive areas that have not been touched, either because they could not be ground-sluiced or because of the heavy overburden that renders manual labor unprofitable. Sections of the Itacambirussu and its tributary, the Congonhas, are known to be virgin, and the Macaubas also contains sections that offer possibilities. There is no record of any large-scale mechanized operations, either by hydraulic pressure or by earth movers, although there are sections in which either method could be employed to advantage. The Grão Mogol field was the first in which carbonados were found after their discovery in Bahia and is also noted for its amber-colored diamonds, which rarely appear in the Diamantina field.

With the exception of the Diamantina, Bagagem and Grão Mogol fields, all the diamonds found in Brazil are alluvial in character, no *massa* mines having been found elsewhere. For the benefit of those who have not read the previous contributions, these *massa* mines, so called because of the plastic condition of the diamondiferous medium, consist exclusively of quartzite boulders, presumably of local origin, separated from each other by a sericitic binder. The problem of the origin of the diamonds found in this medium is too complex to be dealt with in a contribution of this nature, nor will it ever be satisfactorily settled unless and until more information is obtained by a systematic study of the geology of the region. There are anomalies that can only be ironed out with time and patience.

These peculiar conglomerates, discovered by a woman in 1833, occur in masses that promised to guarantee a longer life than alluvial occurrences, but this expectation has proved to be disappointing. In the Dattas, Serrinha and Cavalo Morto Mines they are patchy in



Alluvial patch on a hilltop. The garimpeiros prepare the gorgulho by screening out the oversize, before trucking it down to the riverside for washing.

Tractor used to haul out gravel for treatment.

values and in degrees of induration. More than half of the Serrinha Mine was found to be too hard for hydraulicking. Dattas also became too hard on the eastern side and dipped below the hydraulic grade on the western side. Cavalo Morto, even with 200 pounds pressure per square inch, also failed to pay expenses.

The Boa Vista Mine, taken over by an American company in which Mr. Arnold Schiffman, of Greensboro, N.C., is interested, acquired the Serrinha plant and power quota and commenced operations a short time ago, with the original plant consisting of three South African rotary pans, pending the erection of the Serrinha unit, which has a much greater

Ground sluicing off the overburden.

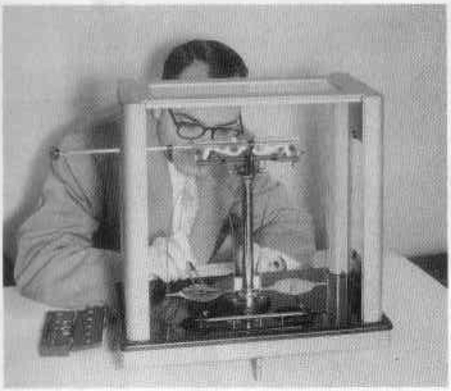
Tractor used to strip off overburden.

capacity. A thorough geophysical examination, confirmed by core drilling, showed that the *massa* is approximately 80 meters in thickness; this confirms the original estimate of approximately 33,000,000 cubic meters of ore in sight. The values, established by the Draper administration and successors, ensure a profit, provided a sufficient quantity of material can be treated per day.

An addition to the *massa* group was provided by the old Campo Sampaio Mine, which was found to extend over the watershed into the Rio Pardo basin. The extension, discovered by *garimpei-*

Continued on page 31

Developments and Highlights



at the GEM TRADE LAB in Los Angeles

by

Richard T. Liddicoat, Jr.

Diamond?

In the last several months, we have seen many interesting gemstones and substitutes. One that was causing concern to some jewelers was a large, near-colorless stone that had been sold as diamond; when submitted for an appraisal, however, it did not look like a diamond to the appraiser. The reason for his reaction to the appearance of the stone was its lack of transparency, which was caused by a cloud of minute cottony inclusions that occupied almost all of the stone, and its resultant low brilliancy. The nature of the girdle surface, naturals and other inclusions revealed it to be a diamond. Within two or three days, the same stone was brought in by another person for an identification.

Emerald Brooch with Earrings of Glass to "Match"

Recently, we received an elaborate pendant-type, drop shape, diamond-and-green-stone earring with a request to identify the green stone; it proved to be glass. To the unaided eye, its "garden," which was made up of a mass of bubbles, imparted a natural appearance and gave the viewer the impression that the stone was made in a deliberate attempt to defraud, a belief that was heightened by the platinum mounting paved with diamonds. A short time later, the other earring and a huge matching brooch were sent in. The large green stone in the brooch was an emerald, but the other earring contained glass. The whole set had been through an air crash in which many lives were lost. Apparently, ownership of the set has not been established.

Brown Topaz Find

We have seen some interesting topaz, both faceted and in good crystals, from a newly reported deposit in San Luis de Potosi, Mexico. Since the color was not the rich, slightly reddish brown, sometimes called sherry topaz, we heat treated one stone to see whether a pink color might result; however, it turned colorless, rather than pink.

"Lava" Cameos

We have seen many cameos cut from an opaque gray rock labeled "lava;" usually, these have been in collections so we have had no opportunity to test them. Recently, on two separate occasions, we tested such materials and found them to be largely calcium carbonate. Those tested were so fine grained that limestone is more aptly descriptive than marble. Another one that tested similarly was a low intensity of brownish yellow. A gray one resembling that usually labeled "lava" was glass.

"Emerald" Find Proves to be Fluorite

A man traveled several hundred miles to visit the Laboratory in person with an example from a new "emerald" find, on which he had made a claim. We assured him on the telephone that it was unnecessary to make the trip — that the stone could be sent by registered mail, but he insisted on bringing it in. Although the color was an intense green, it proved to be fluorite, not emerald. A victim of a recent fire that burned out his uninsured store building and inventory, the man was understandably disappointed with the findings.

Fabulite Sold as Diamond

We received several white transparent brilliants from a jeweler, who was cooperating with his local Better Business Bureau in an effort to put an end to the fraudulent activities of another jeweler. Incredibly, the man in question had been selling strontium titanate (Fabulite) as diamond to a number of local people. Apparently, several had taken the stones to other jewelers for appraisal, some of whom were gemologists. It is not surprising to find itinerant swindlers attempting to pass off an attractive stone as diamond; what is incredible, however, is that a jeweler, knowing the propensity of customers to have large diamonds appraised, would think that he could go undetected for even a week. Perhaps the jeweler bought the Fabulite from the typical hit-and-run confidence man, not realizing that they were not diamonds.

Scorodite

We usually report identifications of unusual gem materials that come into the Laboratory, either for those who might be asked to identify them by an avid collector or for collectors who wish to catalog the new items that have been cut. However, by no stretch of the imagination could the mineral scorodite be considered a potential gem material, as far as durability or availability are concerned. In its usual forms, scorodite would have no interest to anyone as a gemstone, but from the prolific rare-mineral locality at Tsumeb, Africa, very attractive blue scorodite has been found. Its refractive indices have been recorded at 1.74 up to 1.92, although the birefringence is usually on the order of .03. It is a hydrated iron arsenate, usu-

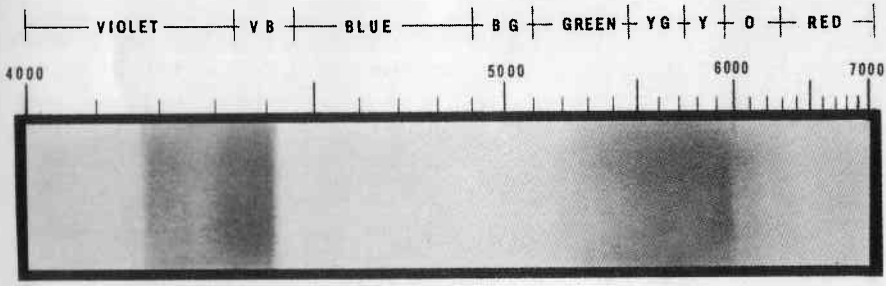


Figure 1

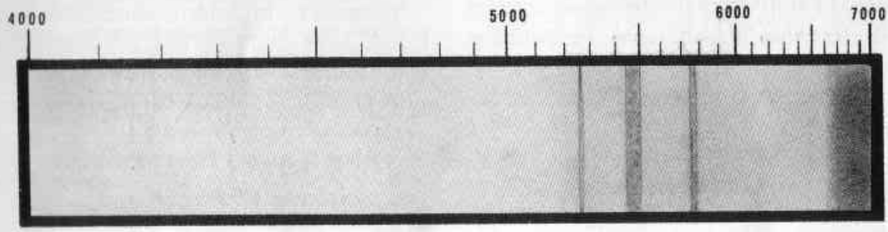


Figure 2

ally occurring in what mineralogists describe as leek green to liver brown, but that from Tsumeb is blue with reddish overtones. It has a hardness only of approximately 4 and it is soluble in hydrochloric acid, so it is not very durable. Its particularly interesting property is its very strong pleochroism, showing violetish blue (X), greenish blue (Y) and bright red (Z). The one we tested had indices of approximately 1.78, extending to over the scale, with a specific gravity of 3.218. A spectrum for this scorodite is illustrated in *Figure 1.*

Transparent Staurolite

Although staurolite in an opaque form is well known for its cross- and X-shaped twins, a transparent stone is rare. Recently, we had occasion to examine a transparent reddish-brown cut specimen. Material from the St. Gotthard Pass area, and from a few other places in the world, is sometimes sufficiently transparent to be cuttable. This specimen had indices of approximately 1.734-1.748 and a specific gravity of 3. A spectrum for the stone is shown in *Figure 2.*

Opalescent Quartz

A faceted stone resembling Mexican opal was reported to have been through a fire and been quenched in the process, thus crackling it badly. Although it had been a relatively normal-appearing milky rock crystal, the fire had given it an opalescence; in other words, it did not have the play of color of opal or the iridescence of iris quartz, but a milky opalescence.

Brass Statue

The largest item we have been called upon to identify in a long time was a

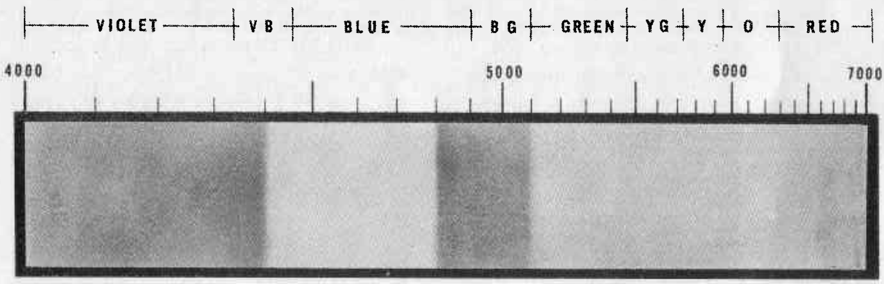


Figure 3

metal statue so heavy that the owner could barely carry it. He was an antique dealer who had obtained the statue as an example of early Korean artistry. After its acquisition, he began to wonder whether it might be gold or whether in one spot it concealed a cache of gems, a rarely seen, but known, condition in heavy metal statues of the period. The metal proved to be brass. A careful examination and a number of measurements led to the conclusion that a gem cache was unlikely, because of the configuration of the interior.

Golden Pearls

We had occasion to test a huge pair of golden pearls that had a long story associated with them. They were a gift to a business man from a prominent Oriental family. Although they had been in the hands of the present owners for only five or six years, they were supposed to date back to the turn of the century. X-rays penetrated not only the pearls, but the pedigree, and the result was a shocked and incredulous owner who wanted to see the radiographs. To the layman, X-radiographs are usually meaningless, and to show them is usually unsatisfactory. However, in this case, the owner took one look at the radiographs and was satisfied.

Translucent Lapis

We were surprised to encounter translucent lapis more or less accidentally. We were able to obtain a rather clear absorption spectrum from the piece we were examining *(Figure 3)*.

Other Unusual Gem Materials Recently Encountered

An intense, slightly greenish-blue emerald-cut phenakite was submitted for testing that was notable also for its spectacular dichroism, ranging from an intense greenish blue, described by one viewer as a peacock blue, to an intense violetish red. Since gem phenakite is usually colorless or very faintly tinted, we were delighted with such an intensely and deeply colored and so lovely a specimen. Because of its rarity, we recorded its absorption spectrum *(Figure 4)*. Other properties recorded were: refractive index, 1.654 - 1.67; specific gravity, 3.00; and light-blue fluorescence under ultraviolet light.

Other relatively rare materials tested recently included enstatite, scheelite, clinozoisite, proustite and zincite.

Nomenclature

George Marcher, an early GIA Graduate, still active, although long past normal retirement age, has written to us relative to the use of the word "triplet."

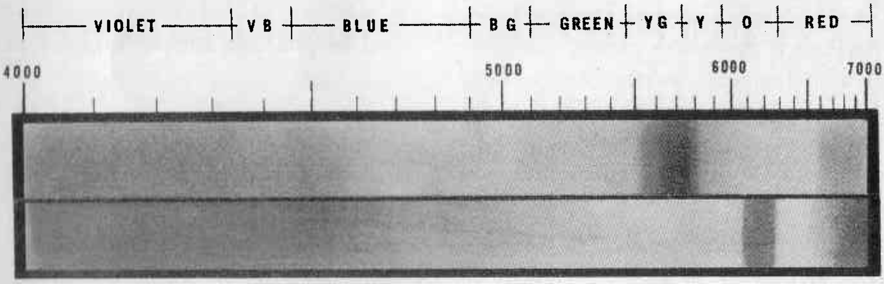


Figure 4 (o- top) (e - bottom)

"Dear Mr. Liddicoat:

"If you were a dealer and I an innocent bystander, I would say you had cheated me, if you sold me a gemstone representing it to be a triplet although it was built up of only two pieces of stone cemented together. Cement is not a stone, and it never was a stone. But you represented it to me as consisting of three stones, by naming it 'triplet.' I wanted it to show my friends as a curiosity because I was informed when I bought it that it was constituted of three pieces of stone and it looked pretty. (Epictitus once said 'The beautiful is that which pleases on being seen.')

"Now, getting back on the track, the term 'doublet' basically means to me, a double stone made up of a piece of colored glass melted permanently to the back of a thin scale of red garnet, then cut with facets into a red, green or blue gemstone. (The color of the glass dominates this marriage of materials and the redness of the garnet is completely subdued.)

"Now, let us get on the track again. These wonderful old doublets often showed their structure interestingly by the curved surface of the joint between the glass and the garnet. In such an instance the natural surface of the garnet, which had been tumbled around in soft gravels for enough centuries to become sufficiently polished for this use 'as is.' Remarkable substitute gemstones they were, indeed. But about the turn of the century a new interloper entered the scene — the 'reconstructed ruby' — big lie, usually. It was the cause of great confusion even among the 'smart ones.' Soon the brittle glass edges of the old doublets crumbled away to be replaced by the tougher and more interesting red substitutes. Then the happy marriage of the glass and the garnet became broken up — divorced!

"At first it was very difficult to produce large sized boules of uncut synthetic stones, as dealers were later compelled to call them. This condition, or difficulty, led to the development of the 'mascot emerald.' It consisted of two pieces of slightly flawed quartz cemented together with Canada balsam into which a green coloring agent had been mixed. These could be made as large as the fashion leaders would accept. But the fault of these old mascots was that alcohol frequently used in cleaning jewelry attacked these cemented stones and dissolved out much of this cementing material and its beauty was ruined beyond repair. Then a new cementing was found. These are now made in Europe where they are known as soldered stones — principally of emerald color.

"Now, I do not like the name 'doublet,' nor the term 'soldered emerald.' It smacks too much of the nomenclature of the tin smith for a beautiful lady to wear on her beautiful hand. I greatly prefer 'bonded emeralds,' the coloring material being in the cement which holds the two pieces together permanently. These gemstones will break in other directions, but not along the plane whereby the two parts are joined.

"When I sell such a gemstone I make certain that the jeweler knows precisely what he is buying and I want him to pass on the information accurately to his customer. The lady who wears it is not obliged to pass the details of its identity on to her friends who are only admiring the article. We may assume that she is not selling it to a friend. But frankness is always admirable."

Gemologically yours,
George H. Marcher

Mr. Marcher has been a colored-stone dealer for the better part of his more than eighty years, so when he speaks of the early days of synthetic corundum, his comments are not hearsay. Although, we do not defend the term triplet, since it is somewhat misleading, we do argue with some of his suggested alternate terms. For example, a "bonded emerald" suggests that whatever is used to form a stone is emerald, and that, in fact, the product is emerald. Commonly today, of course, the two portions are synthetic spinel, so the product is purely an imitation emerald. Other terms that have been suggested, such as "composite" stones and "assembled" stones, actually are somewhat less descriptive than triplet, even though there is a misleading connotation in the term triplet, as Mr. Marcher has pointed out.

The trouble with "bonded," "composite" and "assembled" is that although they suggest parts making up a whole, they fail to indicate whether the whole consists of two, three or many parts. For example, a stone that is made up by heating and compressing a powder into a turquois imitation could aptly be called "bonded" as could two pieces of synthetic spinel held together with cement. We quarrel too with the reference to such a substitute as a gemstone. If we want our terminology to be highly descriptive, perhaps we should call them "cemented imitation emeralds." Somehow, this seems less than appealing.

We Appreciate

Martin Ehrmann, Beverly Hills, California, dropped in before leaving on another of his globe-encircling trips, to give the GIA a number of fine crystals of gem minerals.

Maurine Price Harvey, Highland Park, Illinois, sent the GIA a number of gemstones from the collection made by her and her late husband, Erwin Harvey.

Harold Tivol, Kansas City, Missouri, sent a number of stones for use in GIA's practice sets, plus a fine little cat's-eye for our display case.

Dave Dubinsky, Beverly Hills, California, gave the Laboratory a copy of his diamond-weight-estimation figures for small sizes in various shapes, and a gauge that he altered to take measurements in tight places.

From **Lawrence Reiner**, Phoenix, Arizona, we received a carved tiger's-eye fish and a Mexican-opal turtle.

Our thanks goes to **C. D. Parsons**, Burbank, California, faceter and collector of gemstones, who donated four tourmaline cat's-eyes to the GIA collection.

We are indebted to **John Rauschert**, Elgin, Illinois, for a selection of stones that can be used to good advantage in our practice sets.

A large, faceted, 15mm., brilliant-cut opal now graces our display case through the generosity of **George Nagle**, Long Beach, California.

Developments and Highlights

at the

GEM TRADE LAB

in New York

by

Robert Crowningshield

Emeralds with Green Aventurine Pavilions

In the Winter, 1962, issue of *Gems & Gemology,* we illustrated a pair of emerald earrings in which the emeralds had been set into dark-green plastic cups, which were not attached to the stones. *Figure 1* illustrates an elaborate brooch that consisted of numerous round and baguette diamonds and a carved, very shallow emerald behind which (but not cemented to it) was a flat cabochon of dark-green aventurine quartz. The effect, again, was to deepen the color of the emerald when observed face up and to lend strength to the stone. The carved emerald, in itself, was of interest, since in several places the carving had exposed included crystals of calcite *(Figure 2).*

Girdle-Reflecting Fisheyes

In recent months, two diamonds have been submitted to us with a request to determine if they were doublets. In both cases, the stones were girdle-reflecting "fisheyes;" *Figure 3* is a photograph of the most recent one. It also exhibited a single, very pronounced, repeated-twinning line just within the areas of the girdle reflection.

Orthoclase Cat's-eyes

Figure 4 illustrates four of a lot of several dozen exquisite orthoclase (moonstone) cat's-eyes. We have seen individual stones of this kind and have two in our collection, but we have never seen so many in a parcel.

Pink Grossularite Garnet

Figure 5 illustrates the first occur-

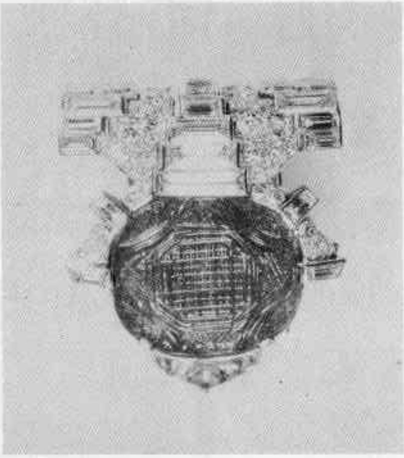


Figure 1

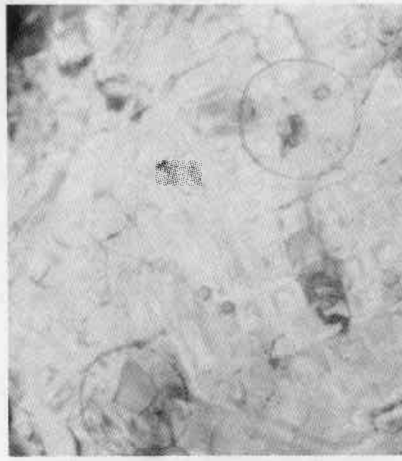


Figure 2

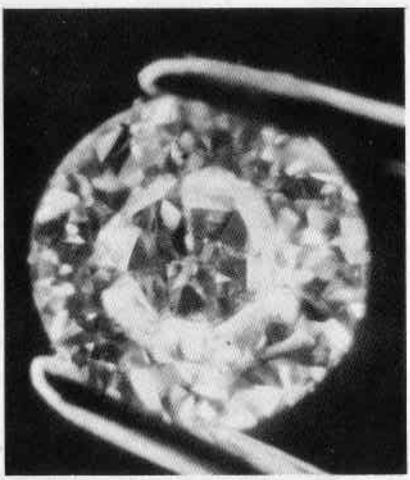


Figure 3

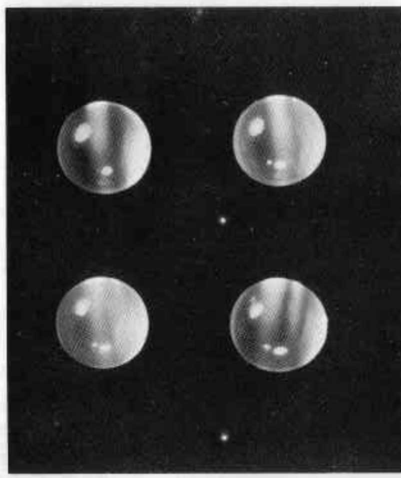


Figure 4

rence of lovely translucent, pink, massive grossularite that we have seen in jewelry. We understand that some of this interesting material will soon be available commercially. It is reported to be from the Transvaal, and we have noted at least one reference to it as "pink jade." Since green grossularite from this locality is frequently referred to as "Transvaal jade," it is easy to see how the pink material could also be misnamed.

Grayish-Yellow Type IIb Diamond

Figure 6 illustrates a large, oval,

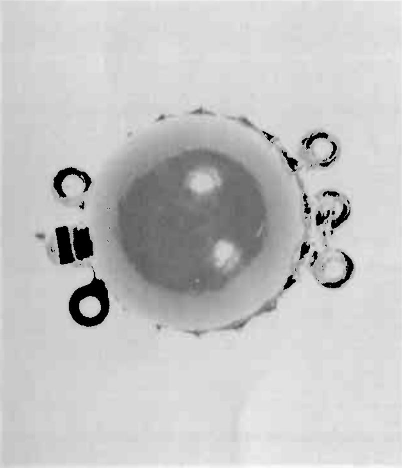


Figure 5

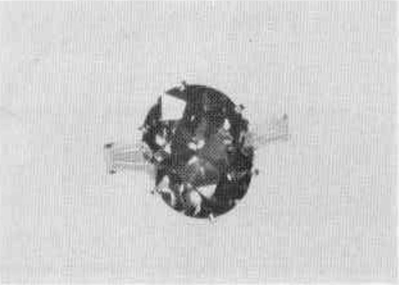


Figure 6

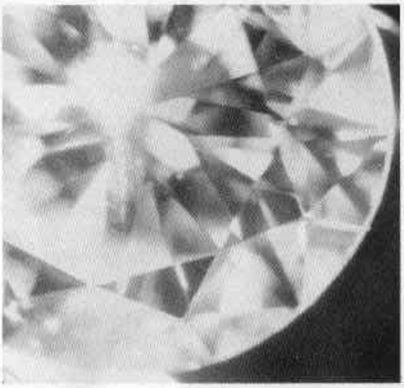


Figure 7

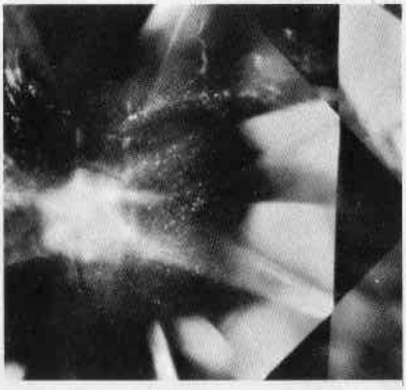


Figure 8

grayish-yellow brilliant-cut stone that proved to be a Type IIb diamond. It was semiconductive and phosphoresced after being exposed to short-wave ultraviolet light. It displayed the typical laminated structure of Type IIb stones. We have reported one other diamond of this kind that we have encountered in a color other than the typical blue.

Natural-Color Brown Diamond

One of the characteristics that we have noted as fairly typical of certain natural-color brown diamonds that show no absorption spectrum are dense clouds within the heart of the stone. Sometimes the cloud is so dense as to obscure the culet, and frequently it has a symmetrical shape. *Figure 7* illustrates a dense irregular cloud, and *Figure 8* shows a most unusual snowflake-shaped cloud that obscures the culet. Most of these natural, brown-cloud-containing diamonds fluoresce under long-wave ultraviolet light with a yellow to

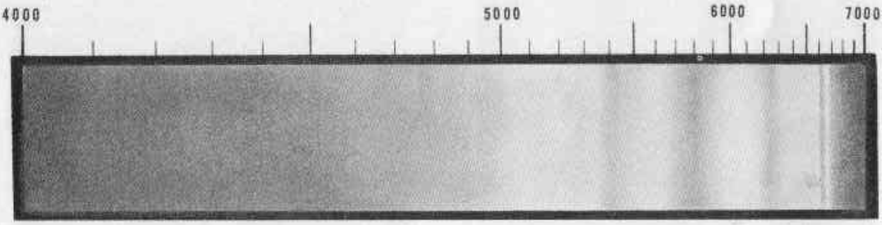


Figure 9

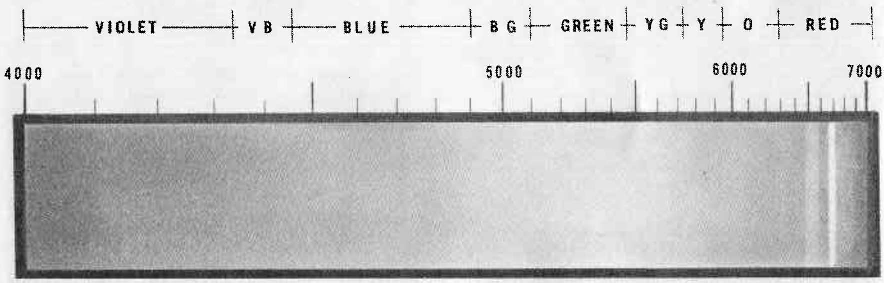


Figure 10

whitish-yellow cast — sometimes, with almost a sulphur-yellow glow.

Synthetic Alexandritelike Spinel

Figure 9 illustrates the absorption spectrum of a synthetic spinel that is the best imitation of an alexandrite we have seen. The stone was cushion-antique cut and set in 18-carat gold. It must have passed as an alexandrite at one time. The spectrum was unlike that of the ones we have seen to date, a drawing of which appears in the latest edition of Liddicoat's *Handbook of Gem Identification* and the *Gem Identification Course (Figure 10).*

Cyclotron-Treated Diamond

We are rarely called on to identify the color origin of green diamonds, probably because the dark, tourmaline-green colors produced by treatment are just not characteristic of natural-colored diamonds. We received a pale-green stone set in a gypsy-style man's ring *(Figure 11)* with the request that its color origin be determined. In the process of checking depth percentage by use of table reflection, a thin band of color was noticed just outside of the table. When the stone was examined through the culet direction and focused on the table edge, we could see a distinct band of color. *Figure 12,* which was taken under 60x, shows clearly the depth of penetration in a table-up cyclotron-treated diamond.

Acknowledgements

We are indebted to **F. & F. Felger,** Newark, N. J., for the samples of treated opal that were used in making

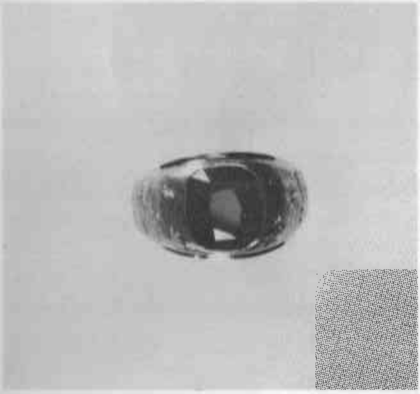


Figure 11

the tests reported in the N.Y. Lab Column in the Winter, 1962, issue of *Gems & Gemology.*

We also acknowledge, with thanks, the work of **Miller & Vic,** opal dealers, New York, for their assistance in the same project.

From GIA student **Joseph Kelrick,** we received a welcome "direct import" of a specimen of chrysocolla in matrix from King Solomon's Mine, in Israel.

From precious-stone dealer **Allan Caplan,** we received a handsome emerald specimen, a welcome addition to our mineral cabinet.

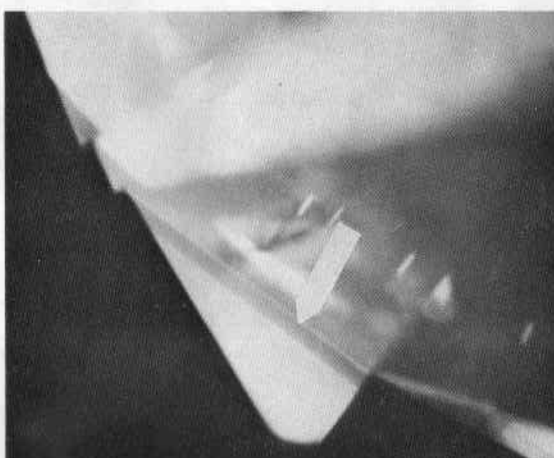
From JCK's gemstone consultant, **Dr. Frederick Pough,** we received several specimens of Finnish labradorite, which illustrates the fine quality of the mineral from that source.

From gemstone dealer **Joe Smith,** New York City, we received a nice selection of black-star sapphires, which are much needed in student study sets.

From New York City gem dealer, **Frederick Armany,** we received a very fine chrysoberyl trilling and an early imitation turquois.

We are indebted to **Mr. Albert E. Britton** of Jobe-Rose Jewelry Company, Birmingham, Alabama, for a nice selection of various cut stones for student study purposes.

Figure 12



Book Reviews

JADE, STONE OF HEAVEN, by Richard Gump. Published by Doubleday & Company, Garden City, New York. 256 pages, 112 black-and-white illustrations, 18 color plates, numerous line drawings. Price $7.95.

There are many books on jade, most of which are short on fact and long on legend. As a life-long student of jade and perhaps the foremost jade fancier in the retail field, Richard Gump, the third generation in the management of Gump's, a San Francisco store famous for its jade carvings, was well qualified to write this book.

The book is profusely illustrated with reproductions of black-and-white and colored photographs of carved jades from earliest periods to the present. In the line drawings by Zoray Andrus are shown clearly the basic nature symbols and other subjects commonly depicted in Chinese jade carvings.

Gump traces the history of jade carving in China, pointing out how recent has been the use of jadeite in that country. He discusses methods of mining in China and Burma, and then mentions the major sources elsewhere. He points out that with the exception of the deposits in Wyoming and Alaska, which appear to have yielded the bulk of fine quality they possessed, no jade sources discovered on the North American continent have proved important in view of the quantity of good quality yielded.

He discusses dating by establishing stylistic parallels with other dated art forms in Chinese history and by the quality of the carving. In his illustrations, Gump has carefully dated everything possible by dynasty or actual date.

Chapter headings include the following: What is Jade?; Nephrite: Stone of Heaven, Earth and Man; The World of Jade; The Stone of Immortality; The Jade Dynasties; The Precious Jade of Ho; Jadeite: The Most Sumptuous Jewel; The Anonymous Artists; Modern Jade; and Buying a "Piece of Heaven."

In the final chapter, he discusses a number of cautions and gives some good advice with respect to buying jade. He discusses the recent problems with dyed material and also gives the characteristics of the many jade substitutes. He discusses how to distinguish between antique carvings and those executed more recently. Gump also gives a bibliography and lists the American museums that have important jade collections.

In our opinion, *"Jade, Stone of Heaven"* is a worthwhile addition to the literature on jade. It is a useful addition to any gemologist's library.

THE BONANZA WEST The Story of the Western Mining Rushes, 1848-1900, by William S. Greever. Published by the University of Oklahoma Press, Norman, Oklahoma. 390 pages, 30

Book Reviews

black-and-white illustrations and 8 maps. Price $5.95.

Greever's fascinating work begins with the discovery of gold in California and follows with an analysis of the California mines and miners. He then takes up the discovery and development of the Comstock Lode, continuing with a chapter on "Life in the Nevada Mines." A chapter on the early days in Colorado precedes a more detailed look at Leadville, Creede and Cripple Creek. Later chapters cover "Montana Gold and Silver Mines," "Butte Copper Mines," "Idaho Mines of the Sixties and Seventies," "The Coeur D'Alene Labor Troubles," "The Black Hills: Indians and Gold," and "The Black Hills: Deadwood and Lead." He concludes with the initial Klondike rush and the development of the Klondike.

This is a most interesting book, in that Greever has made an already appealing subject particularly entertaining by careful research into the life as it existed in each of the areas at the time. Since each of these periods wrote so colorful a chapter in the history of the West, *The Bonanza West* makes fascinating reading.

Dana's THE SYSTEM OF MINERALOGY, seventh edition, Volume III Silica Minerals, by Clifford Frondel. Published by John Wiley & Sons, New York City. 329 pages. Price $7.95

Dana's THE SYSTEM OF MINERALOGY was published first in 1837. In successive editions, it grew in size as more minerals and localities were discovered and more information was gained about each mineral. Since publication of the sixth edition, in 1911, the seventh edition has been rewritten in parts; in the process it has been greatly enlarged, because developments have been so rapid in this period. Volume I, covering the elements, sulfides, sulfosalts and oxides, appeared in 1944; this was the work of the late Charles Palache, the late Harry Berman and Clifford Frondel. Volume II, another monumental work by the same three authors, appeared in 1951; it covered halides, carbonates, nitrates, borates, sulphates, phosphates, arsenates, etc.

The third volume of the seventh edition covers the silica minerals in great detail in its 334 pages. Undoubtedly, it is one of the few books in existence in which about thirty-five percent of the indexed items are found under the letter "Q." This volume covers quartz in all of its many forms; plus high-temperature quartz, tridymite and cristobalite, as well as opal, keatite, coesite, stishovite and natural highly siliceous glasses. Its coverage in the portions of interest to gemologists is thorough. To one interested in the many gem varieties of quartz, the wealth of information in this book makes it a must, even though much of the information contained is rather more detailed than the average

Book Reviews

gemologist would find important to his needs; e.g., etching phenomena, trace-element percentages, some of the twinning discussions, axial ratios and angle tables, and X-ray powder-diffraction data. On the other hand, the exceptionally complete discussions on the occurrence of the many gem varieties and discussions as to causes of various colors and other factors are of great interest.

Professor Frondel is to be congratulated on the exceptionally fine work. We look forward with anticipation to the publication of Volume IV.

GEM CUTTING A Lapidary's Manual, second edition, by John Sinkankas. Published by the D. Van Nostrand Company, Inc., Princeton, New Jersey. 286 pages, 8¼ x 11", 191 Black-and-white illustrations. Price $11.75.

The first edition of Sinkankas' *GEM CUTTING* was heralded as an outstanding contribution to the lapidary art when it was published in 1955. The new second edition represents a significant improvement over the first. The format is considerably larger and the illustrations are much more numerous and often more explanatory, so the book is much easier for the amateur lapidary to use. Sinkankas plans his books very carefully and speaks from experience as an outstanding lapidary in his own right. As a result, each of the sets of instructions for sawing, grinding, lapping, sanding, polishing and drilling are thorough and easily followed. The instructions on how to cut cabochons and how to facet are also thorough. Sinkankas has included chapters on cutting spheres and beads, tumbling, carving and engraving, and mosaic and inlay work. As in his first edition, he has a separate chapter on the treatment of a wide variety of gem materials and of unusual minerals sometimes cut by, or for, collectors. Included among the latter are such minerals rarely encountered in a gem collection as covelite, cobaltite, bornite, bayldonite, etc.

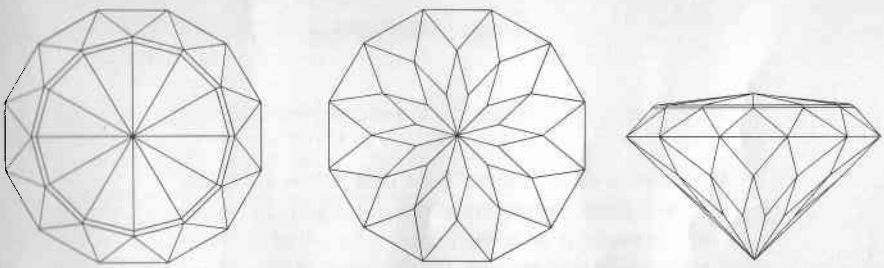
In comparison to the detail with which he handles cutting instructions, Sinkankas is cavalier in his treatment of proportions and angles. Since these are keys to beauty in a transparent stone, more attention seems merited. In the 2.0 to 2.5 refractive-index range, he recommends 37° to 40° for pavilion angles. A 37° pavilion on a strontium titanate or diamond brilliant gives it a "dead" center.

For the amateur cutter, the Sinkankas book is one of two or three to be regarded as almost a must.

Continued from page 16
ros, proved to be remarkably rich in a thin layer lying on bedrock, overlaid by soft *massa* that was devoid of diamonds. Unfortunately the overburden is increasing and may eventually affect its future.

A phenomenal occurrence of alluvial diamonds has been discovered in the Tocantins River, near Marabá, but the depth of the water and swiftness of the current render recovery of the diamonds by divers extremely risky. Even though they are tempted by half the proceeds, many have already lost their lives. No satisfactory alternative has hitherto been found practicable. These diamonds appear to be derived from the Garças field, lying in the triangle formed by the junction of the Tocantins (Araguaya) and the Rio das Mortes.

(To be continued in Summer, 1963 issue)



The above diagrams illustrate top, bottom and side views of an attractive new type of cut devised by GIA Graduate, Bapu Mahajan, Bombay, India.

Leo J. Vogt

Leo J. Vogt, C.G., former chairman of the Board of Governors of the Gemological Institute of America (1944-1948) and a board member (1933-1950 and 1952-1957), died March 2, at the age of 79. Mr. Vogt began his 56-year career with Hess & Culbertson Jewelry Company, St. Louis, Mo., as an errand boy. He was president of the firm from 1926 until his retirement in 1958

Over the years, Leo Vogt's contributions to the advancement of GIA were manifold. He led meetings with skill and charm — a quietly effective chairman. His counsel in times of stress was willingly given and unfailingly wise.

His wife, Grace, and son, Gupton, survive him. He will be missed.