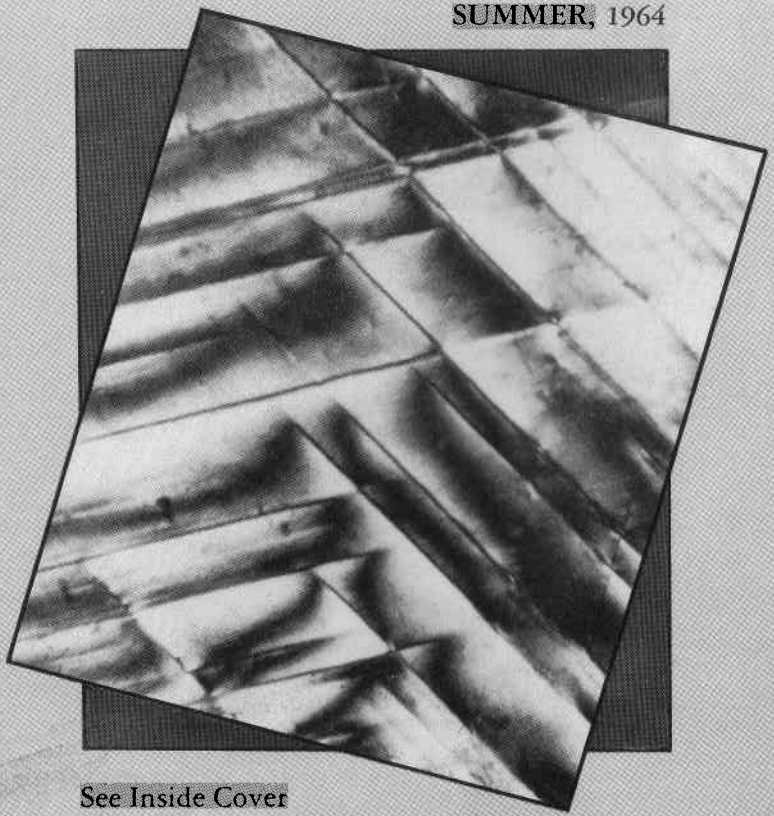
Gems and Gemology

SUMMER, 1964



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Gems & Gemology

VOLUME XI SUMMER, 1964 NUMBER 6

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On the Cover

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GEMS & GEMOLOGY is the quarterly journal of the Gemological Institute of America, an educational institution originated by jewelers for jewelers. In harmony with its position of maintaining an unbiased and uninfluenced position in the jewelry trade, no advertising is accepted. Any opinions expressed in signed articles are understood to be the views of the authors and not of the publishers. Subscription price $3.50 each four issues.

Coated Diamonds

by
Eunice Robinson Miles, G.G.

Editor's Note: This is a supplement to the article on coated diamonds that appeared in the Winter 1962-1963 issue of Gems & Gemology.

Essentially, nothing of vital importance has been added, but this is intended to show the nature of experimental work undertaken since that article appeared and the rather reaffirming findings that this experimentation has provided. Coated diamonds continue to appear frequently in the Institute's Gem Trade Laboratories, so that the problem continues to be current.

Two factors are important to remember by those who handle diamonds — particularly large diamonds. One is that coatings vary greatly in their detectability at low magnification and secondly, that the first clue frequently is an unclassifiable color encountered when endeavoring to grade the stone for color; a light green has been noted in some stones recently. Proof that coatings are detectable, or at least suspected, is evidenced by the fact that the alert appraiser is made suspicious when examining coated diamonds under only a 10x loupe. It is these stones that are referred to the GIA Laboratories by appraisers for verification.

Although there is no question but that some of the coatings are quite resistant to chemicals, the same is not true of their physical durability. This is important to remember. Many persons who are aware of the coatings' resistance to ordinary solvents assume that they are also abrasion resistant.

One of the avenues explored by the writer in an effort to study diamond coatings more thoroughly was phase

microscopy. This is not a practical jewelry-store tool, but it was felt that it might yield further information that would prove useful in detection with more common equipment.

With this in mind, E. Leitz, Inc., was approached. Doctor Manfred Nahmmacher, of their microlaboratory, made available his skills and technical knowledge in phase microscopy and permitted us to examine and photograph coatings under such high magnification that their nature could be studied more thoroughly.

To this end, a Leitz Ortholux Microscope equipped for incident-light phase-contrast work was used. The usual purpose for this instrument is to study surface structures and coatings in industry. The sensitivity of the phase-contrast method is so high that even extremely thin coatings can be examined. Even though this exacting method made it possible to study coated surfaces in great detail, the principal finding was simply that coated diamonds that have not been subjected to wear are very easily scratched; this shows clearly that even though subjected to no powerful solvents, the life of a coating is distinctly limited. In addition, the texture of the coating proved extremely uneven, due to the resistance of the diamond to permitting a foreign substance to adhere to its surface. Also, the characteristics noted in localized areas under low magnification proved to be gross defects in coating.

Figures 1 through 6 show coatings under various magnifications. The broken bubble seen under high magnification suggests an important characteristic that may be used as a clue to detect the coatings although types of coatings and methods of applications may vary.

Fortunately, some of the recent efforts at "artistry" that have passed through our Laboratories have been more heavy handed than some of the earlier efforts, which were difficult to detect. However, there have been other skillfully applied coatings that were detectable as a result of our better acquaintance with their characteristics and our improved detection techniques. No doubt more careful applications will be tried that will necessitate further research in detection.

A practical method by which coated diamonds may be lighted to increase their visibility is to place the stones in the white, translucent plastic trough of the GIA Color Grader. This may be used when viewing the diamond in reflected light and for subdued base illumination, to show the color concentration in the coated areas. However, many gemologists prefer the regular illumination provided by a Gemolite or Diamondscope for detecting bluish streaks, followed by the overhead light source to detect the metallic luster of coated areas.

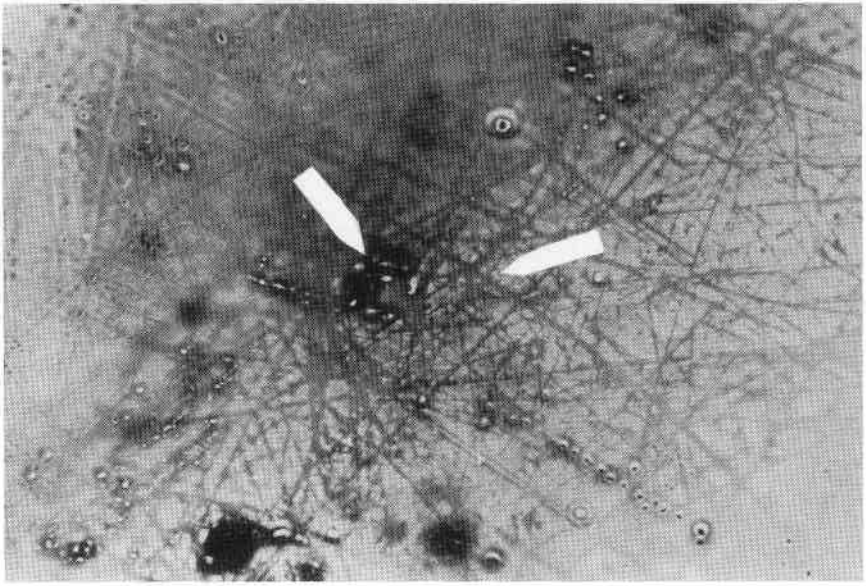


Figure 1. The coating on a diamond facet under 500x. Note the numerous scratches and the large, circular dark area that was once occupied by a bubble. Note uneven texture of applied coating at lower left.

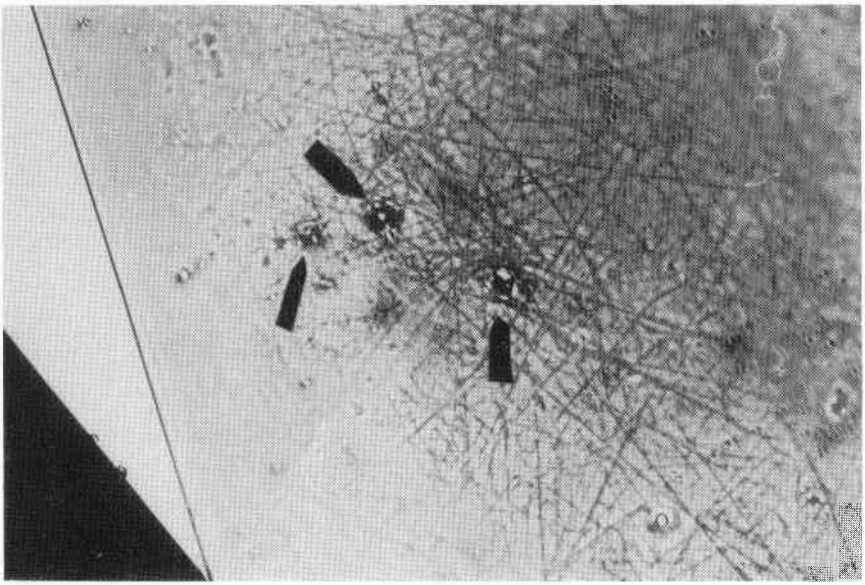


Figure 2. Three small bubbles under 200x; again, many scratches.

Editor's Note: Disregard tiny white spots. These are dust particles.

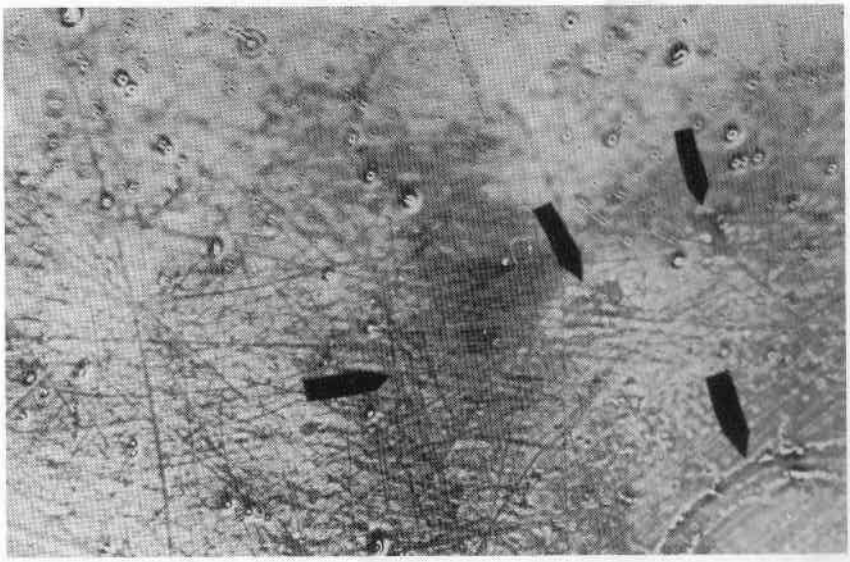


Figure 3. Bubbles and scratches; in the lower righthand corner, a gross defect in the coating.

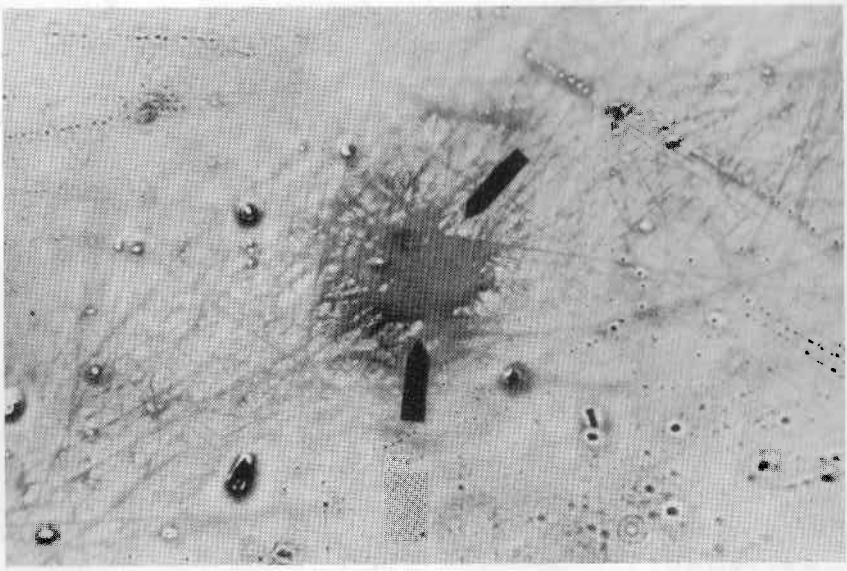


Figure 4. A bubble and scratches under 1000x.

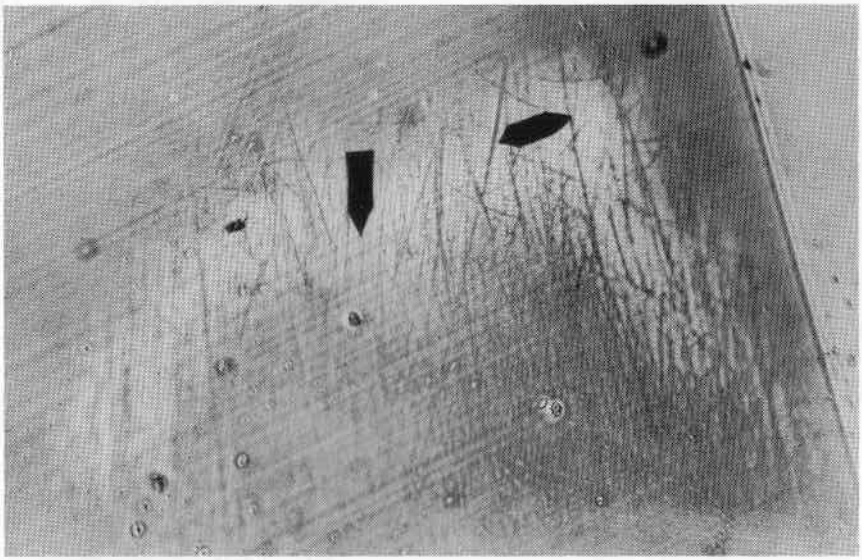


Figure 5. Under 200x, the metallic appearance of a coated zone in reflected light is clearly shown as a white arc. The narrow lines running diagonally from lower left to upper right are polishing marks.

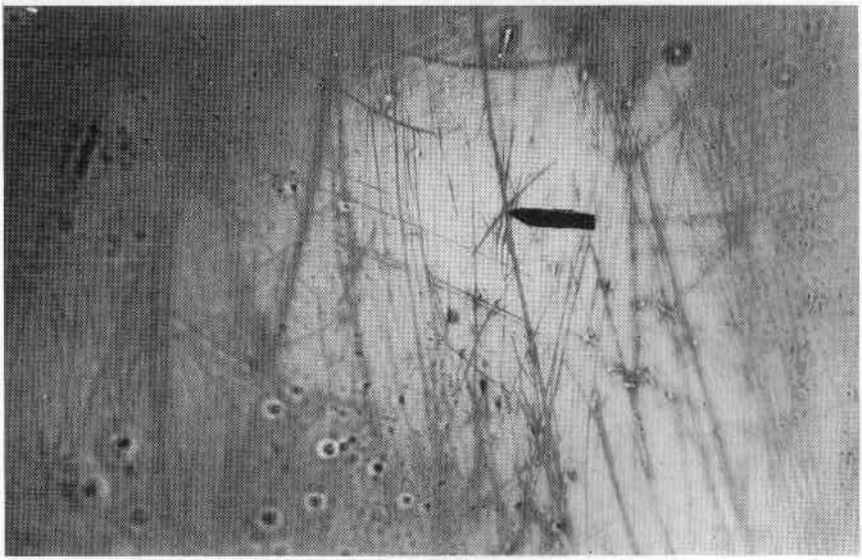


Figure 6. Here again, both the metallic appearance of the coated area in reflected light and obvious scratches are notable.

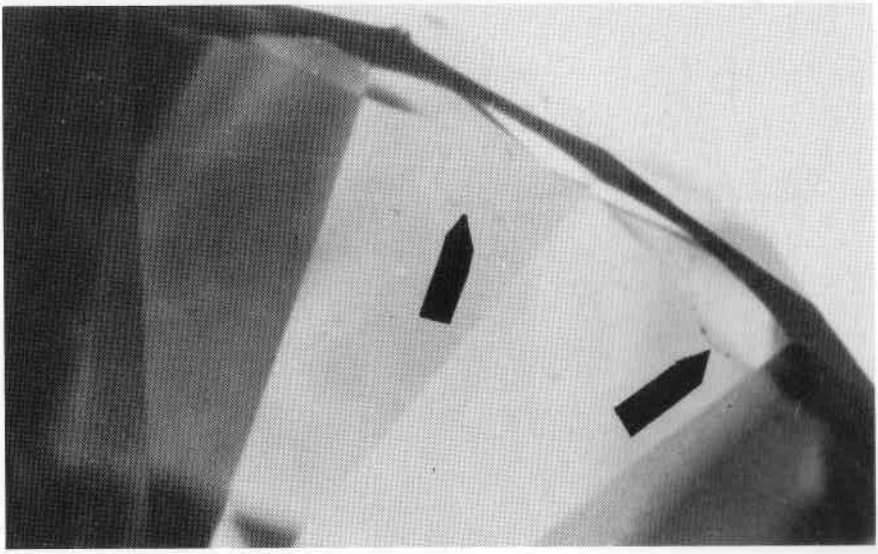


Figure 7. In transmitted light, the stringers of coating have a bluish cast. It is only when they are reflecting light that the metallic appearance is obvious.

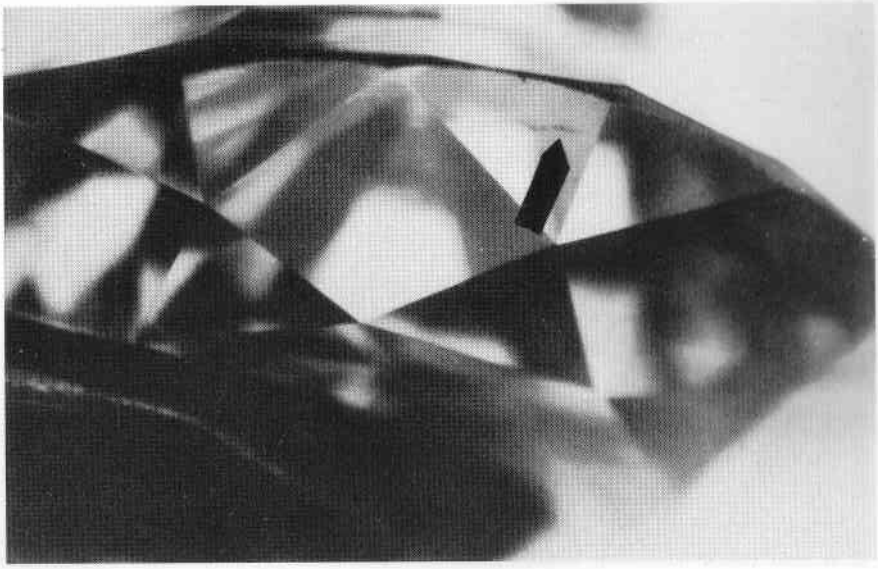


Figure 8. A line of coating near the girdle. Approximately 30x.

Polysynthetic Twinning In Synthetic Corundum

by
W. F. Eppler

Polysynthetic twinning usually consists of a repeated sequence of very thin lamellae that are in twinning position to the host crystal. In natural corundum (ruby and sapphire) they form, if they are present, a *straight* striation that can be observed easily under the microscope, even at a lower magnification. With crossed polarizers, the lamellae appear bright, provided that the host crystal (or the cut stone) is in the dark position *(Figures 1 and 2)*.

For a long time, these straight twinning lamellae have been regarded as a characteristic feature of natural corundum; they were unknown in the synthetic. But about 1920, Mr. Sandmeier, of Locarno, Switzerland, observed in synthetic corundum a strange striation that was confirmed afterwards by Mr. Plato, of Frankfurt, Germany. Some time ago, the author determined that this "Sandmeier-Plato striation" was a polysynthetic twinning (Deutsche Goldschmiede Zeitung, February, 1956, pp. 62-64). It is relatively rare, and can only be observed with crossed polarizers in the direction of the C-axis. It exhibits a lozenge-shaped pattern *(Figure 3)*, which is originated by two sets of straight twinning lamellae intersecting each other at 120° and 60°. The lamellae are parallel to the prism zone; consequently, they are also parallel to the X-axis. Their thickness is approximately 70 microns (.070mm.) This kind of polysynthetic twinning has never been observed in natural corundum; nevertheless, it is noteworthy to keep in mind that in synthetic corundum a straight twinning striation can occur, even if it consists of a system of intersecting twinning lamellae.

Surprisingly, an early hint of a "true"

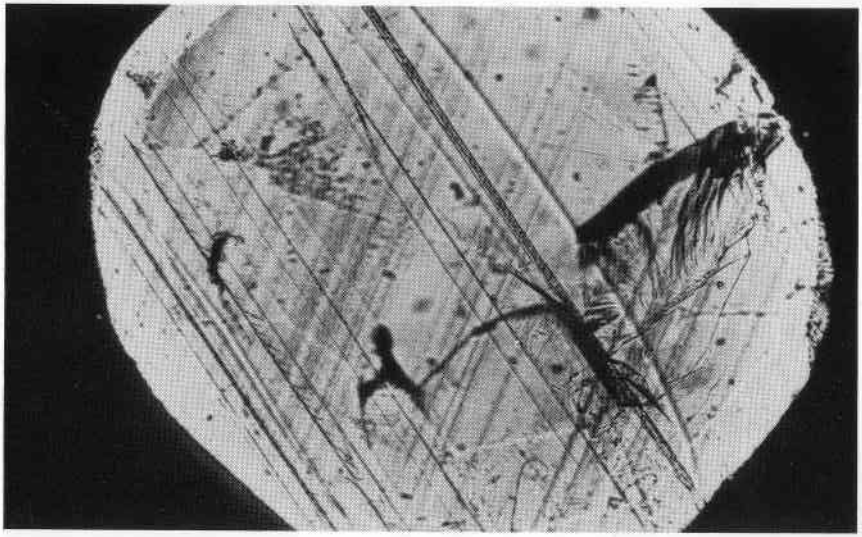


Figure 1

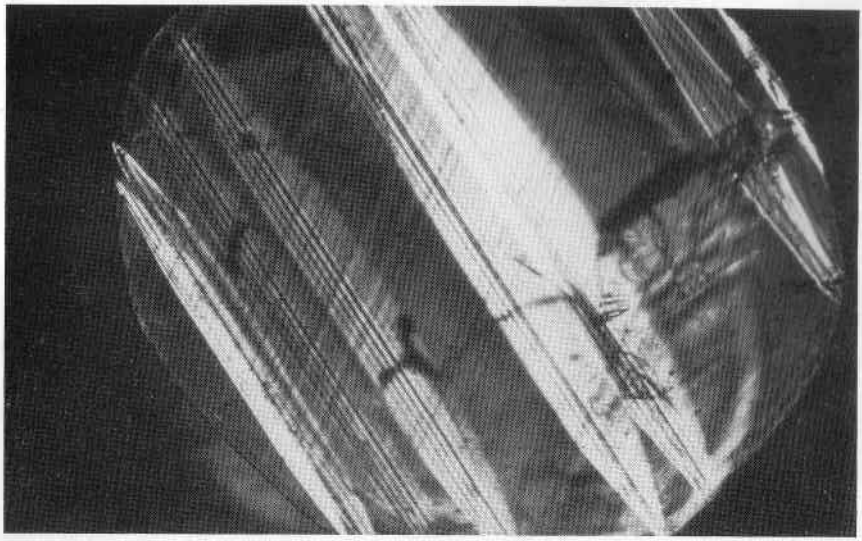


Figure 2

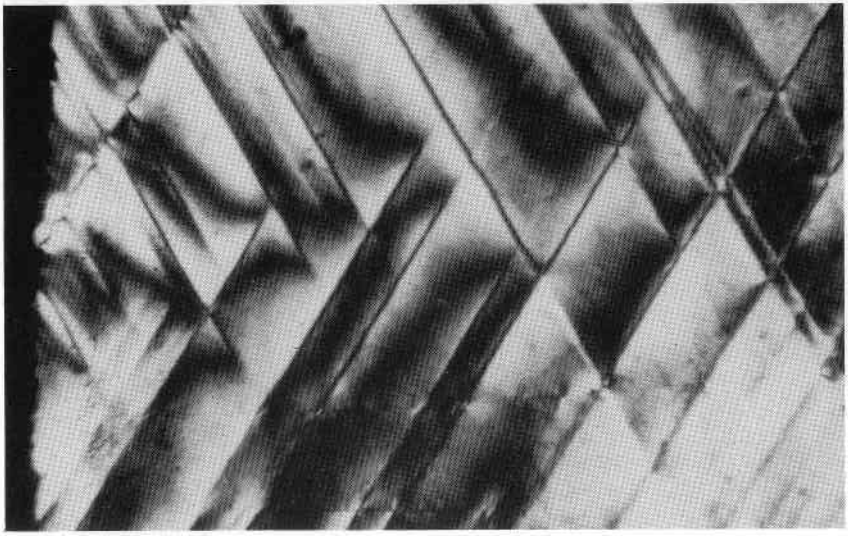


Figure 3

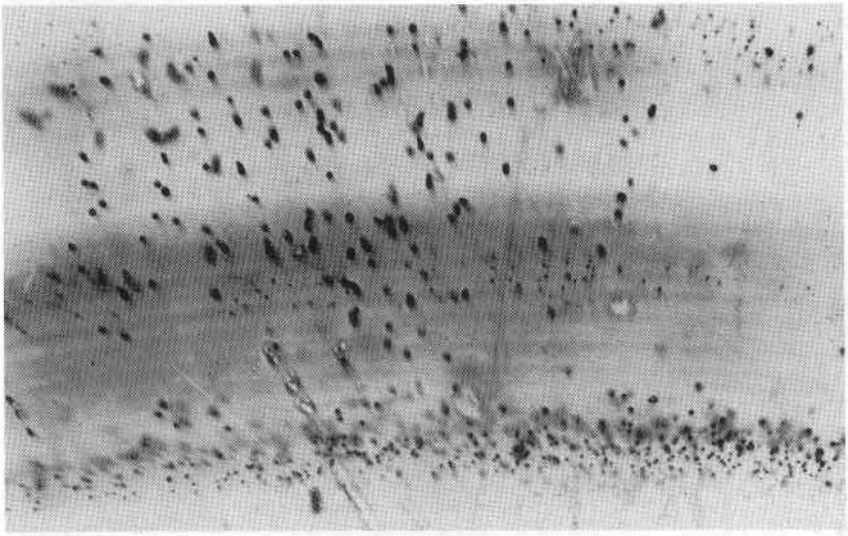


Figure 4

polysynthetic twinning in synthetic corundum, corresponding exactly to the twinning in natural corundum, did not enter the gemological literature. In 1934, the fact was reported by B. W. St. Clair (*Gems & Gemology,* November-December, 1934, pp. 173-174), unfortunately with a few words only. He mentioned:

> *Polysynthetic twinning occurs fairly frequently in crystallized corundum and is present in synthetic sapphire, despite statements to the contrary. Imperfect crystallization that has the appearance of twinning in polarized light is quite common in synthetic sapphire.*

After all, twinning in synthetic corundum seems to be infrequent, and the phenomenon must be regarded as an exception rather than the rule. In any case, such a twinning in a synthetic corundum was considered by the author as a remarkable rarity, and he was surprised to observe it in a stone shown to him by Professor Cavenago-Bignami, of Milan, Italy. It was a 5.05-carat blue synthetic sapphire of irregular "Ceylon cut." Under the microscope, it revealed curved growth lines and spherical gas bubbles *(Figure 4),* both of which are typical of synthetic corundum. At two places, it exhibited several twinning lamellae parallel to each other *(Figure 5)*; these did not show the pattern of the Sandmeier-Plato striation, but they corresponded effectively to the polysynthetic twinning in natural corundum.

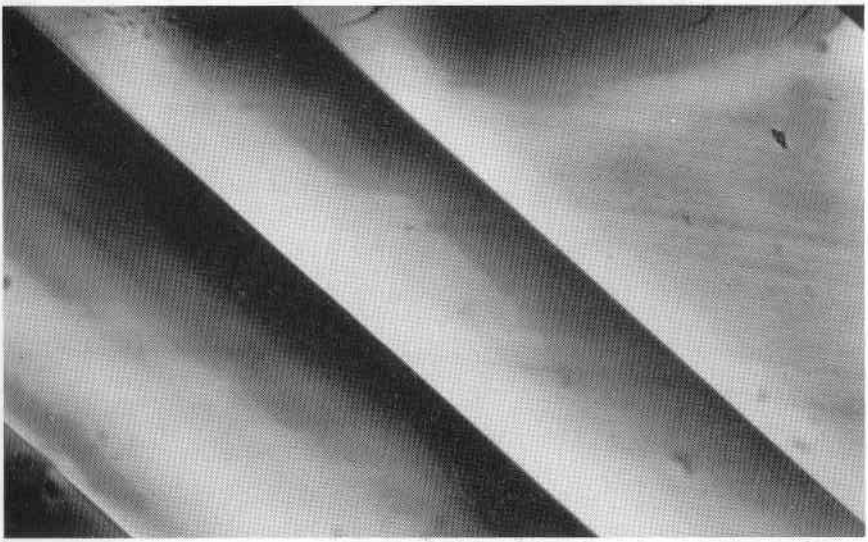


Figure 5

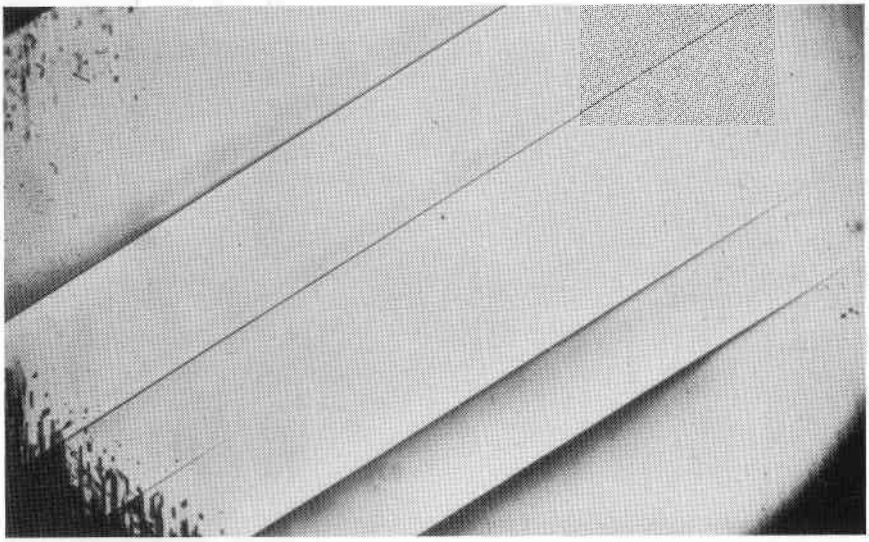


Figure 6

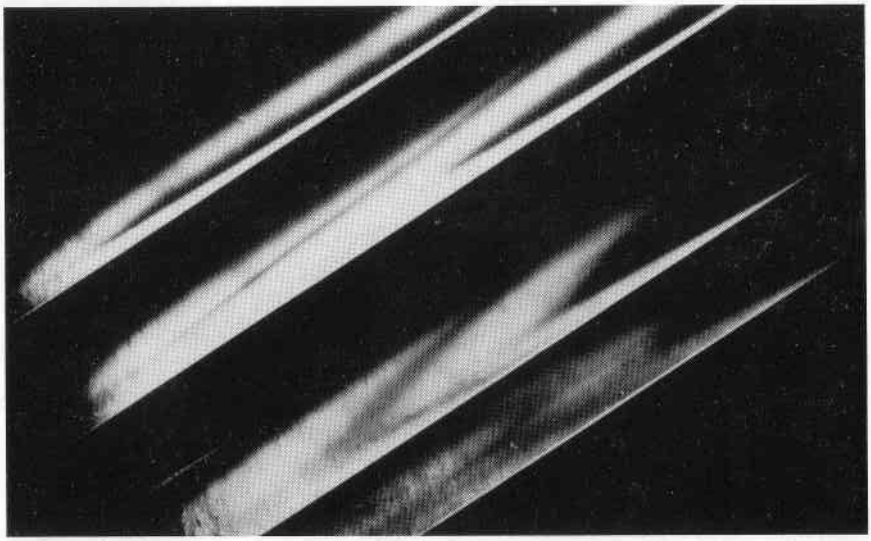


Figure 7

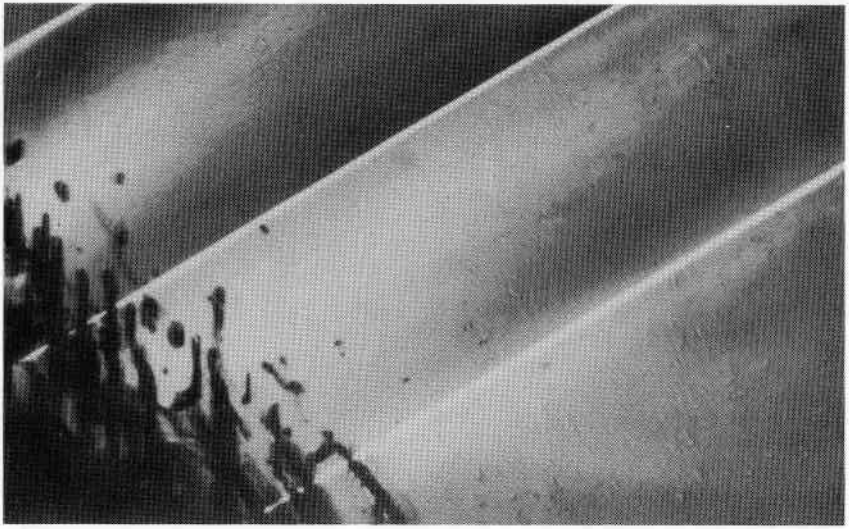


Figure 8

The lamellae had a thickness of about 90 microns (.090mm).

Just by chance, the same phenomenon was observed in a small boule of brown synthetic corundum *(Figure 6)*. Here, the parallel twinning lamellae started at the rim of the boule and were wedge-shaped in the direction toward the interior of the boule. It was found that they were parallel to the face of the primitive rhombohedron. Although very thin (about 15 micron), they could be observed with a magnifying glass.

A peculiarity was the form of the lamellae: the sides were longer than the middle part, reminding one of a fork with two prongs *(Figure 7)*. But it must be mentioned that this particular form could only be seen with a very inclined illumination and with the lamellae in a position in which the incident light was reflected.

In *Figure 8*, an enlarged section of the two preceding pictures is given in partly polarized light, to demonstrate again the parallel arrangement of the twinning lamellae.

It is understandable to ask for the reason for this long-known but newly-observed twinning; possibly, a very slow growing rate is the cause. But this theory does not explain the circumstances under which the Sandmeier-Plato striation originates in one case and the differently oriented "true" polysynthetic twinning in the other.

In summary, two kinds of straight twinning striation occur occasionally in synthetic corundum. One kind com-

Continued on page 191

The Pink Pearls of Pakistan

by
Barbara Anton*

The natural pink fresh-water pearls of Pakistan have never been shown previously outside that country. They are now on display at the Pakistan Pavilion at the New York World's Fair. It is hoped that enough interest will develop as a result of this display to catapult this natural resource into a national industry.

In keeping with the theme of the Fair, "Peace Through Understanding," the Pakistani Government commissioned an American artisan to design and manufacture twelve pieces of jewelry. This collection, combining American design with the natural pink pearls of Pakistan, may be viewed at the Pakistan Pavilion from July 15 to October 14, 1964, from 10 AM to 10 PM.

The Pakastani were harvesting pink pearls as far back as the Mogul period of Indo-Pakistan history. In those days, every beautiful, exceptionally large pearl was taken directly to the King for his adornment or to be passed along to the Queen or Princess. The donor was given a *zimindary,* or land grant, in proportion to the size and beauty of the pearl. This land was to remain free from taxes.

Today, seventeen years after the founding of Pakistan, there is still no organized cultivation or gathering of pearls. Bands of gypsies, and nomad fishermen, who camp on the banks of the almost inaccessible lakes and ponds, far removed from any town or village, are the only people currently engaged in this means of earning a living. The pearls are found in Government waters and are free to all.

*After completing the GIA Jewelry Design Class in 1962, Barbara Anton entered a winning design in the Diamonds International Awards Competition. Since that time she has been very active in the jewelry-design field.

Mr. M. F. Islam and author, Barbara Anton.

Steps are now being taken to try to organize the harvesting operation and have it controlled by the Government; it would be a source of great revenue, if handled properly. It is difficult to establish nationalization, since the areas are so difficult of access. The Government agents who are sent to survey the situation usually give up after the initial ten miles and return without a report. It is hoped that this situation will be remedied in the near future.

It has been suggested that the Government purchase X-ray equipment for examining the molluscs so that only mature pearls would be harvested. Now, they are often wrested from the mollusc when still immature and sold for use as medicine. Thus, instead of selling for 25,000 rupees per *tola* (58.32 carats; 233.28 pearl grains) as gems, they are sold to local doctors for 80 rupees per *tola.*

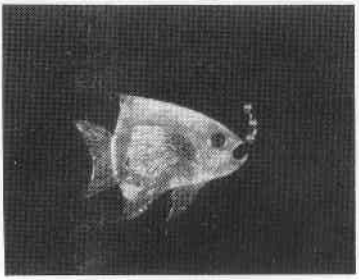
The Pakistani believe that when these immature pearls are ground and taken with cream, they prevent heart trouble, strengthen bones and the teeth, improve eyesight, and provide immunity against smallpox. Old men are especially conscientious about taking powdered pearls, since they believe this produces virility.

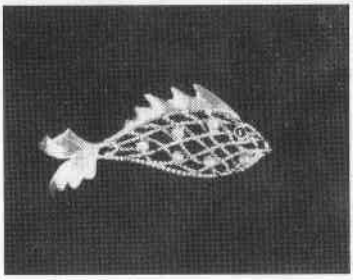
At present, the value of the annual output, including both mature gem pearls and immature medicinal pearls, is approximately 1,000,000 rupees, or $200,000. The pearls are sorted first with sieves of various sizes, after which they are examined and separated into four quality grades. The first three grades are called *special, first* and *second;* these are used for jewelry. The remainder is sold for medicinal purposes. The only step necessary to prepare the pearls for use in jewelry is a thorough washing in tepid water.

The harvest is divided into the following approximate quantities of various sizes and types; fifty pounds of baroques, five pounds of half rounds, two pounds of three quarter, two pounds of egg shape, one-fourth pound of rounds (two to three out of 100).

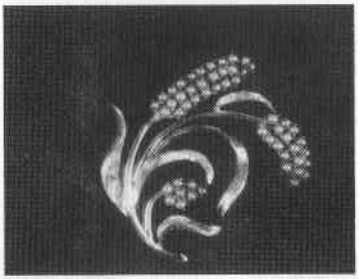
A button shape is the most common. It took fifteen years to make one matched graduated strand, which is now being offered for sale for $2000.

In 1963, fifteen pieces were found in a large round pastel shell. One pink 10 millimeter that was harvested at Sitalakha is priced at $600. Pearls the size of a sparrow's egg were taken from the waters about thirty years ago. Al-

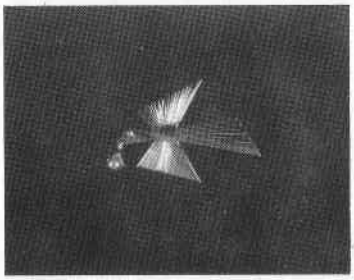




A fish, which was widely used as a symbol of prosperity in Early American folk art, was included to express our good wishes for the prosperity of the new nation.

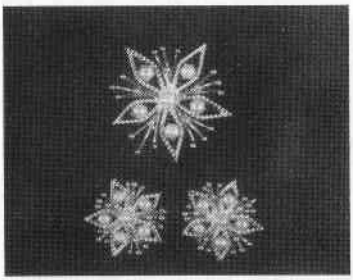


A pin titled, "The Fruits of Freedom," was inspired by the growth and productivity of the vigorous young nation. The stem represents the strength of Pakistan's industries, the leaves signify the products of the soil, and the pearls exemplify the treasures of the waters.

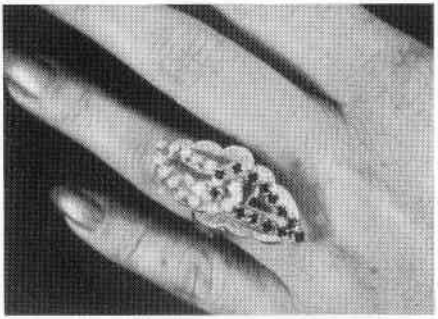


The "Dove of Peace" pin and pendant carries a pearl of wisdom in its bill. This is an inexpensive piece, designed especially so those on a limited budget can wear and enjoy the lustrous pink pearls.

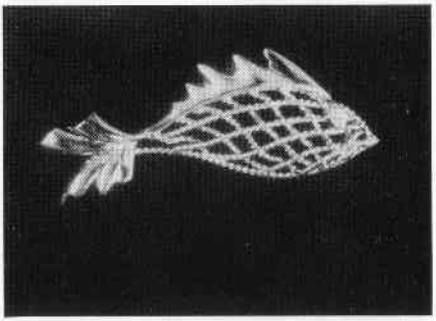
A ring that extends the entire length of the finger, and is hinged at the joint to allow complete comfort and freedom of movement. This ring is called, "The Branch of Life, Bearing the Flowers of Friendship."



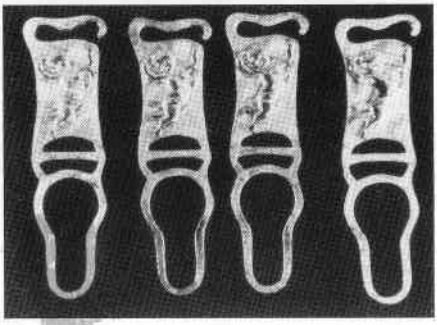
A pin or pendant with matching earrings is "A Tribute to the Prophet Mohammed." The five sides of the design represent the five prayer sessions, the six pink pearls in the pin represent six of the major prophets, and the twelve pearls in the earrings signify the twelve pilgrims from Yathrib.



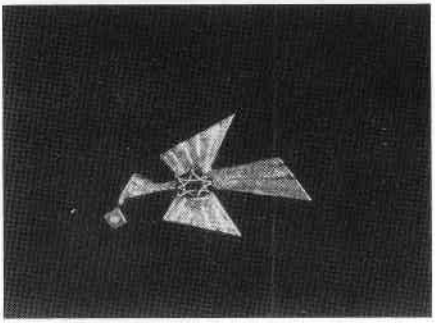
The "Brotherhood" ring features an interlocking design, the pink pearls of Pakistan entwined with the garnets of the Western world.



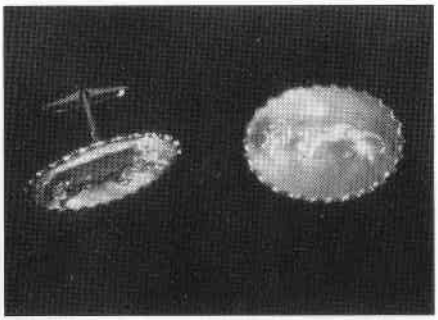
Same as top left, page 177, but without body pearls.



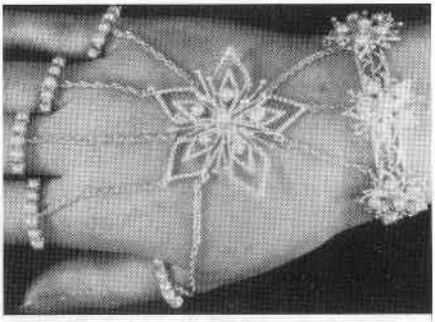
Trousseau Garters, featuring a diamond in the umbilical terminal and a pink pearl in the hand.



Same as center right, page 177, but with a garnet in the body.



Cufflinks featuring Bengal tigers, animals of great strength and intelligence, are a tribute to the dynamic leader of Pakistan, President Mohammed Ayub Kahn.



Hand jewelry, consisting of a ring for each of the five fingers, connected to a bracelet. This is a piece inspired by the jewelry traditionally given a Pakistani bride by her husband.

though one or two of these are still owned by the Panni Family, of Karachi, most were smuggled out of Calcutta years ago.

When Queen Elizabeth II visited Dacca in 1960, she was gifted with a lovely, matched three-strand necklace of pink pearls.

The many lots of pearls that I have seen have all been beautiful, lustrous, and of gem quality. The large sizes, up to approximately 10 millimeters, have been evenly colored exquisite pinks and mauves.

The natural irritant that forms the nuclei of the pearls either was not visible on X-rays taken by the Gem Trade Laboratory in New York or was very tiny. These X-rays were taken of a group of pearls approximately 3½ millimeters in diameter. Pink pearls form in *Lamelliden Perreysia* and *Lamelliden Marginolis, Jenjinsianus.* A pearl matures in about three years.

The meat from these pearl-bearing molluscs is not eaten by the Pakistani; it is discarded. Some persons recommend using it as food for fowl, since chicken and duck food is scarce and fowl is one of the mainstays of the Pakistani diet.

The mother-of-pearl lining of the shells is used for buttons, toys, decorative inlay in furniture, etc. The broken or unattractive shells are burned to make limestone for whitewash or combined with bittle leaves and eaten; this helps digest food and makes the lips red. Some eat this mixture only twice a day, but others eat it intermittently throughout the day, as one would smoke or chew gum. The women use it for lipstick.

There are nine pink-pearl-producing districts in East Pakistan: Dacca, Mymensingh, Comilla, Pabna, Sylhet, Rajshahi, Bakerganj, Jessore and Kulna.

The pearls of Sylhet are mauve or a darker tone of pink and have a lovely luster. Unfortunately, there is no organized collecting agency in that village at the present time, and each villager must be contacted individually for his harvest.

It is interesting to note that, although all conditions appear to be the same in Faridpur as in the above-mentioned nine districts, the pearls in this area are pure white. It is hoped that scientific tests will solve this riddle in the near future. At Mahiskhali Island, of Cox's Bazar, salt-water white pearls are available.

Because of the large quantities of pearl-bearing molluscs found in explored waters, it is hoped that pink-pearl beds will be discovered in areas that are presently inaccessible even to the gypsies and nomad fishermen. One of the men with whom I spoke had braved the inconveniences to travel fifty to sixty miles through shark-infested waters and Bengal-tiger territory to explore the rivers and creeks, in order to make a first-hand survey of the possibilities of development. He also encountered bandits, who were aware he was carrying rupees to pay the gypsies. The gypsies do not accept travelers'

Continued on page 191

Developments and Highlights at the GEM TRADE LAB in New York

by
Robert Crowningshield

Synthetic-Emerald Overgrowth

In the past few months we have identified more beryl with synthetic-emerald overgrowth than in the entire time since the material was announced in the Spring, 1960, issue of *Gems & Gemology*. Several articles of jewelry contained stones that, to the unaided eye, appeared to be fine emeralds. Under a loupe, the typical strain cracks in the overgrowth were clear to the initiated. If the quality continues to improve, we will be seeing very similar-appearing materials from several sources, in addition to Mr. Chatham's pioneering synthetic emerald; these include the Linde overgrowth on beryl and the French synthetic emerald, described in the Spring, 1964, issue of *Gems & Gemology*.

Green-Dyed Chalcedony

The appearance on the market of excellent-quality chrysoprase, reportedly from Australia, has brought up the fact that many firms have been selling green-dyed chalcedony as chrysoprase without disclosure. Most of the dyed material, and all we have examined, is colored with a chromium-base dye that shows up in the absorption spectrum as two indistinct lines in the red. The natural material shows no lines.

Chrysoprase-Colored Opal

We recently examined some uncut chrysoprase-colored material, presum-

ably from Australia. The stones had a low specific gravity, a glassy fracture and were about five in hardness. We assumed that the material was nickel-bearing opal.

Stable Color in Dyed Jadeite

We have commented on the variable fastness of the colors used in dyeing jadeite. We recently tested some dyed stones of excellent color. The owner stated that he had purchased them in 1955 — a full year before we first encountered the stones in the course of our testing work. He further stated that to his recollection they had not faded.

Bytownite

Two unusual stones that we had an opportunity to examine, both rough and cut, proved to be bytownite. One resembled the strongly dichroic green to reddish andalusite. The other contained spangles of a reddish inclusion, which gave it the appearance of a faceted sunstone.

Stained Marble Beads

A necklace of graduated white to light-pink opaque beads resembling white coral proved to be stained marble. With the reduced supply of desirable white coral for summer jewelry, it is possible that marble may become a substitute.

Diamond Doublets

Figure 1 illustrates the largest collection of diamond doublets we have ever seen. The crowns of the stones were diamond and the backs were probably synthetic colorless sapphire (the stones were in closed-back settings). To complete the deception, the coral-colored center intaglio was glass.

Figure 1

Imagination

Figure 2 is a photograph of an un-

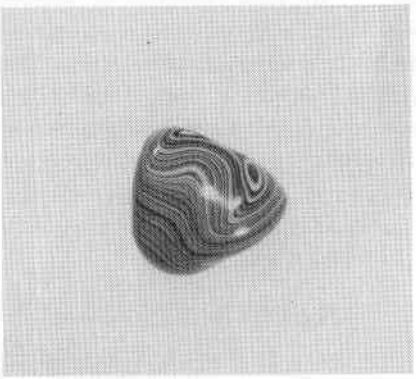


Figure 2

usual product of an amateur lapidary. Normal gem testing indicated plastic, but the origin of the varicolored bands, some of which contained metallic spangles, puzzled us. We were informed that it was Lucite paint drippings from the painting room of one of the major automobile manufacturers that had been worked into "gemstones" by a hobbyist.

Unusual Hololith Ring

An opaque white hololith ring that we tested recently had the unusual refractive indices of 1.52-1.72, with the enormous birefringence of .220. All other properties indicated the mineral magnesite, though we were unable to obtain material for an X-ray diffraction test.

Dumortierite-Quartz

We have tested several dark-blue stones that proved to be dumortierite and quartz, reportedly from Brazil. Because the material is difficult to polish and the tiny blade-shaped crystals of dumortierite have a tendency to splinter, several beads we tested had been paraffin treated, to improve the polish. We are indebted to **Mr. Joseph Dattoli** for some rough specimens of this stone. On the thinner edges, the extremely strong blue and colorless dichroism of the dumortierite crystals could be tested with a Polaroid plate.

Magnetite in Tiger's-Eye

We were particularly interested in *Figure 9* on page 121 of the Winter 1963-1964 issue of *Gems & Gemology* that illustrated the fact that a tiger's-eye had "taken" the plating solution across one broad band. We were wondering if the band that accepted the solution could have been a layer of magnetite, which often accompanies tiger's-eye. Several tumbled stones in our collection are attracted by a magnet, due to the presence of a layer of magnetite.

An Unusual Deception

An unusual deception that we were unable to photograph consisted of a very flat pear-shape diamond with an enormous culet in an engagement ring; beneath this stone, but not touching it, was another much smaller pear-shape stone. When one measured the main stone, the resulting weight estimation was highly inaccurate. We saw the ring when it was clean, but it is doubtful if the deception would have been as successful if the stone had been worn.

Plastic-Coated and Dyed Jadeite

A necklace of round jade beads showed the treated spectrum and the normal jadeite absorption line at approximately 4370 Å, but the refractive index was approximately 1.55 by the spot method. Magnification revealed that the stones were plastic coated, in addition to being dyed; hence, the "wrong" refractive index for jadeite.

Clam, or Shore Pearls

Twice since the last issue of *Gems & Gemology* we have had the unpleasant task of telling clients that their "black pearls" were edible-clam concretions commonly called clam, or shore, pearls. In both cases, long-distance calls were

made and we attempted to dissuade the client from making a flight to New York after hearing the description. We were not successful with the first young man, and he was patiently waiting at the door the next morning. We were more successful with the second client, who said he would not fly from Cincinnati for the test. Imagine our surprise when he appeared the next day. He had not flown, he had driven all night! Both gentlemen had edible-clam pearls of good shape and luster, but no orient and no commercial value. The only mollusc without a nacreous lining to its shell that produces a marketable pearl is the rare West Indian conch. The calcareous concretions from edible clams and oysters, although often well shaped and of good luster, color and size, are not recognized as true pearls by the trade and no ready sale for them exists.

Linde Synthetic Emerald

We recently examined a Linde synthetic-emerald overgrowth on beryl and found the refractive index of the table, which consisted of a layer of synthetic emerald, to be 1.595-1.605—the highest reading we have yet encountered in the Lechleitner-process stones.

Steam Cleaning Alters Jadeite Color

Figure 3 illustrates a small, flat, oval cabochon of jadeite, one of a group that a manufacturer stated had altered radically in appearance following normal steam cleaning of finished jewelry. What had originally been evenly colored medium-green stones became mottled with numerous white, intersecting cracks. The only suggestion we could offer was that perhaps the stones had been oiled to camouflage the cracks before they reached the manufacturer.

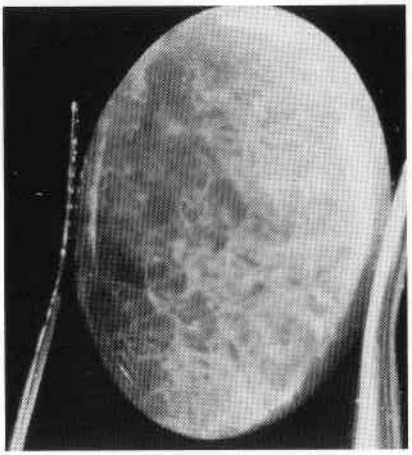


Figure 3

Two N.Y. Jewelers Guilty of Misrepresentation

A recent New York City court decision ruled that two retail jewelers were guilty of misrepresentation, by selling dyed-green chalcedony as "genuine chrysoprase." The present availability of fine-quality genuine material and the considerable difference in appearance between the two was partially responsible for the decision.

Fine-Green Enstatite

What one ordinarily would consider a collector's item, fine-green enstatite, was identified recently in an attractive lady's ring set with diamonds.

Acknowledgements

We are indebted to **Mr. William**

Weber of International Gem Corporation, New York, for two fine specimens of the chrysoprase from the new locality in Australia.

We are also indebted to the above-mentioned organization for a fine specimen of rough, dark-blue dumortierite in quartz.

We wish to acknowledge with thanks a gift of tumbled blue amazonite and blue dumortierite quartz among many others, from **Mr. Herbert Walters,** of Craftstones, Ramona, California. The writer enjoyed a visit to this fascinating tumbling works and a most pleasant evening with Herb and his family, during a recent trip to California.

Through the good offices of **Mr. Fred Weisberger,** of New England Lapidary, Inc., New York City, we received a highly translucent oval cabochon of pink grossularite garnet—our first specimen. This material displays the strong orange-yellow X-ray fluorescence that is typical of green grossularite.

We are very much indebted to **Mr. Gus Miller,** of Miller & Vic, New York City stone dealers, for a selection of many kinds of stones and imitations ideally suited for adding to student study sets.

We want to extend our thanks to **Mr. Bill Collison,** ex-GIA instructor of Philadelphia, for an excellent fluorite-on-matrix specimen and a large blue zircon crystal.

From **Mr. Tom Gorman,** of J. C. Keppie Co., we received highly valued examples of rough and sawed diamonds.

Student **William Werner,** McMurray, Pennsylvania, gave the Institute several broken diamonds for which we have several good uses.

From **Mr. Marvin Zuckerman,** Hempstead, Long Island, we received perhaps our most attractive specimen stone: a beautifully cut, pear-shaped twentieth-century-cut kunzite. It makes a fine addition to our stone cabinet.

From student **Charles Whitely** we received a welcome selection of small stones and imitations of all descriptions, in answer to our continuing plea for such stones.

From **Martin Ehrmann,** a frequent GIA benefactor, we received a large emerald-cut tourmaline of an unusual brown color.

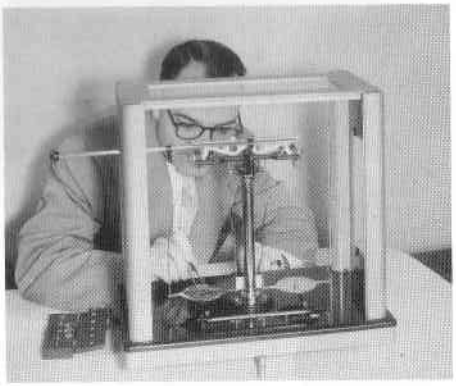
From **Mr. George Schuetz, Jr.,** we received a nice selection of lapis-lazuli tablets.

Developments and Highlights

at the

GEM TRADE LAB

in Los Angeles



by
Richard T. Liddicoat, Jr.

Unevenly Colored Emerald

We were asked to examine an emerald that was rather unevenly colored. The jeweler who sent it in felt that the color was caused by stain that had been introduced into fractures. *Figure 1* shows an area along a fracture that appeared to contain a concentration of green color. However, when the stone was turned slightly, it was seen that the color was reflecting from air spaces along the fracture. These air-filled openings were acting as mirrors and were reflecting a zone of slightly more intense natural coloration, thus creating the illusion that the color was in the fracture. If color is concentrated in a fracture, the obvious assumption is that it is the result of dye. The stone showed a normal emerald absorption spectrum and, upon immersion, it was apparent that the areas of major color concentration were not along the fracture but some distance away. When the plane of the fracture was turned so the light beams exceeded the critical angle of emerald, the total reflection that resulted carried an image of the more strongly colored zone. Turning the plane more nearly perpendicular to the line of sight allowing light to pass almost without coloration, thus proving that the fracture was without the concentration of color that would have proved the presence of dye.

Interesting Three-Phase Inclusion

We encountered another emerald

Figure 1

Figure 2

with an interesting inclusion—quite the largest crystal in a three-phase inclusion we have ever seen. The crystal pictured in *Figure 2,* just below and to the right of the bubble, was not the usual, almost two-dimensional square or rectangle. In fact, magnification suggested that a cross-section just below the bubble would have probably had a square outline.

50-Inch Natural-Pearl Rope

Usually, every pearl in a necklace is counted before being identified at the Laboratory. The one pictured in *Figure 3,* however, contained so many that we could only estimate the number at 7500 to 8000. Made up of nine interwoven strands, the total length of the rope exceeded fifty inches; in addition, it incorporated several faceted yellow and blue sapphires. It was a handsome piece of jewelry. There was no way to take an X-radiograph without disassembling the piece, so we made a qualified identification based on X-ray fluorescence and magnification.

Surprised!!

We are frequently the recipients of all manner of colorless rough materials believed by the owners to be diamonds. It is a rare day, indeed, when the unknown proves to be other than the rock crystal variety of quartz. Usually it is accompanied by awed reports, implying that the hardness is beyond any known mineral and that the brilliance surpasses anything less than diamond. One gets the impression that the sender already has careful plans laid to spend his first million or two.

Last week, we received a breezy communication from a gentleman in an area from which, to our knowledge, no diamonds have been reported. The letter asked the usual questions and, typically, the little pieces of rough were wrapped with a security that only this type of identification ever seems to require. It took us fully five minutes to extricate

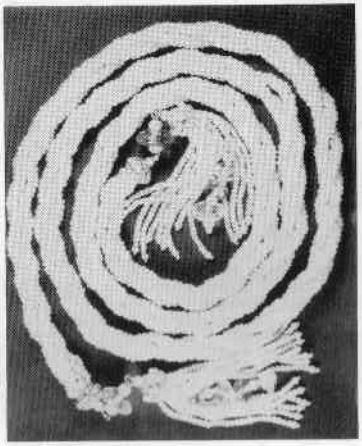


Figure 3

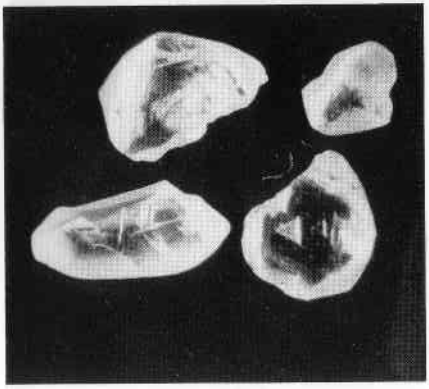


Figure 4

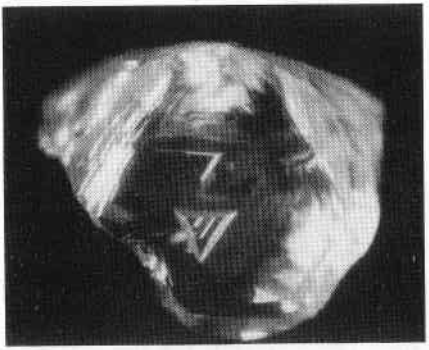


Figure 5

four little crystals from the wrappings. Their luster and the equidimensional nature of some of them came as a surprise. At first glance, it was apparent that this was no usual submission. The four crystals pictured in *Figure 4* are diamonds—a fact that is even more readily apparent in *Figure 5,* a more highly magnified picture of the largest of the four. The crystals varied in weight from .06 to .22 carat. The sender is not yet ready to divulge their source, but judging by his response to our letter of inquiry, he is about ready to lay the cornerstone of his mansion.

Assembled Opal

One of the jewelry manufacturers in the East uses an attractive assembled stone that is not described precisely by the usual terminology. In this relative of a doublet, a thin piece of opal is inlaid into black onyx; this offers the stone better protection than that afforded to a doublet and provides the desirable background appearance of black opal. Since the background is black, a transparent or translucent adhesive is practical (See *Figure 6*).

Star Effect Result of Too-Deep Pavilion

Although a wide variety of cutting proportions is employed in the cutting of diamond solitaires, an even greater range is common in melee. Many melee, even in a price range considerably above

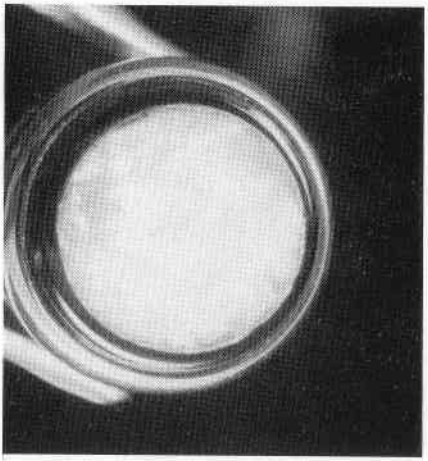


Figure 6

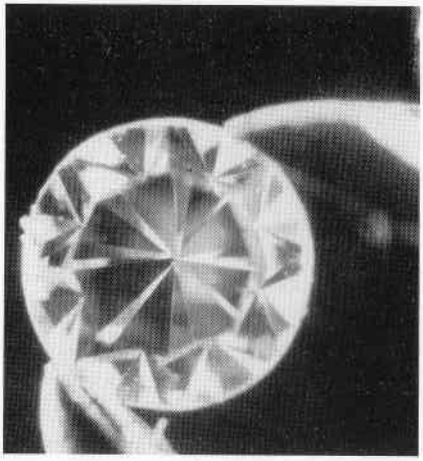


Figure 7

minimum figures, are so thin or thick below the girdle that their brilliancy is very seriously reduced. Earlier articles in *Gems & Gemology* discussed the estimation of pavilion depth by means of the appearance of a stone through the table. *Figure* 7 shows a .025-carat diamond that was so deep that the opposite facet junctions were reflected from pavilion facets, giving the peculiar star effect standing in contrast to the black center. This stone was photographed under 60x.

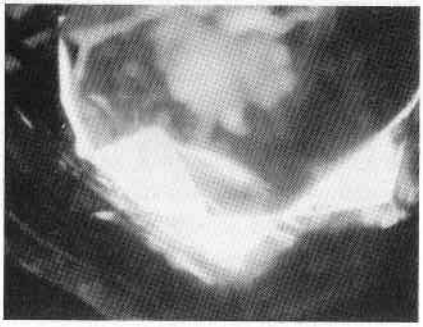


Figure 8

Swirl Lines in Aquamarine

A worried gentleman brought in an aquamarine that he had bought overseas, only to have an appraiser cast doubt on its true identity. Testing proved it to be natural, but it was easy to understand the appraiser's reaction, for there was a large area of swirled lines resembling the wavy lines common in glass. Something of this is seen at the lower edge of the table in *Figure* 8.

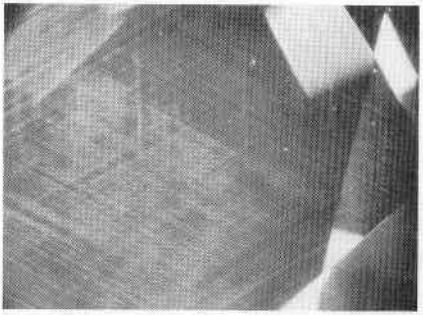


Figure 9

Silk in Sapphire

Figure 9 is included only because the lovely purple sapphire of which it was taken had such an even distribution of silk.

We Appreciate

The gift of an opal-inlaid-in-black-onyx tietack from **George Schuetz,** Larter & Sons, Newark, N. J.

We are grateful to the peripatetic **Martin Ehrmann** of Beverly Hills, California, for a beautiful brazilianite crystal group from a new source at Cruzeiro, Minas Gerais, Brazil — a find made on the most recent of his many wide-ranging trips.

We were pleased to get a nice selection of stones from **Clifford R. Millsap,** Millsap Jewelry Company, Kansas City, Kansas. We can always use these to advantage for our practice sets.

From GIA student, **George F. Harvey, Jr.,** Denver, Colorado, we received several rough peridot specimens, crystals of quartz and garnet, and a large amazonite aggregate.

We are grateful to **Roger Wilbur,** Wilbur Jewelry, North Vernon, Indiana, for the selection of spectacular calcite crystals.

A most useful selection of fifty or more stones that consisted of obsidian, aquamarine, turquois, nephrite, jadeite, synthetic corundum, malachite, sodalite, fluorite, rhodonite, opal and miscellaneous varieties of the quartz family was received from **Phil Thompson,** Springfield, Mass.

Book Reviews

AMERICAN GEM TRAILS, by Richard M. Pearl. Published by McGraw-Hill Book Company, New York, N. Y. 167 pages, 45 black-and-white illustrations and several maps. Price $5.50.

The dust cover of this latest in a long line of books by Richard M. Pearl states, "This exciting and fully illustrated book is a colorful, down-to-earth guide for the gem hobbyist and rockhound in search of America's gemstones. It covers not only the practical aspect of the subject — the best areas for discovery and how to recognize gemstones — but the history, romance, and whole adventure of gems and gem hunting, as well."

This is an ambitious set of goals to attempt in 167 pages. There are many pages that show outline maps of the entire United States without state boundaries, on which the coast-to-coast area occupies a width of about three and one-half inches and localities are marked by triangles that cover several hundred square miles. One chapter labeled "Gems of the Fifty States" occupies fifteen pages and consists of blank outline maps of large sections covering a number of states and a list of the stones to be found in each state. For example, catlinite and diamond are listed as the two gemstones to be found in Ohio.

At the head of each of the fifty chapters, Mr. Pearl has included a quotation. Chapter 47 on Petosky stone carries this quotation: "These fossils — who are they?" — Bert Leston Taylor: *So Shall it Be.*

The chapters entitled "Gem Trails Before Columbus" and "Red Man and Blue Gem" are interesting.

This work was prepared for novices in the hobby field. Surely they will find it pleasant reading and possibly a worthwhile purchase.

Book Reviews

MINERALOGY FOR AMATEURS, by John Sinkankas. Published by the D. Van Nostrand Company, Inc., Princeton, New Jersey. 570 pages, 136 black-and-white illustrations, 191 line drawings. Price $12.50.

In a science-oriented nation, the tendency is to regard only the person with a thorough formal training in a scientific discipline as a scientist. In the late Lester Benson, the gemological science had proof that formal training was not the determining factor in a man's effectiveness as a scientist. John Sinkankas, the author of *Mineralogy for Amateurs,* regards himself as an amateur in this field; however, his new book offers proof that he has carried his investigation of mineralogy to a level that must be considered professional.

Sinkankas approached the preparation of this volume with a vivid memory of some of the frustrations facing one who attempts to learn mineralogy purely from texts that have been prepared as aids to those taking classroom instruction, rather than for those attempting to learn without the aid of a professor. One result is a series of drawings that serve admirably to clarify and simplify some of the particularly abstract concepts that form a basis for the science. Without doubt, the drawings that Sinkankas has made to assist the reader are the most instructive we have encountered in a basic mineralogy text. Some of the better examples are those in the chapter on the geometry of crystals, two of which we have reproduced *(Figures 53 and 60).*

Of the 570 pages of the book, the first 272 are devoted to explanations of the nature of the atom, ions and valances, atomic bonds, crystal design, complex ions, basic classification of minerals, crystal growth, geometry of crystals, physical and optical properties, formation and association of minerals and identification procedures and tests. The bulk of the remainder of the book is given over to descriptive mineralogy, followed by a 14-page appendix that is made up of identification tables and a seven-page set of recommended references and reading material.

The book is so intelligently conceived and the author's major goals so effectively met that one is inclined to be entirely complimentary. If the book can be faulted, there are two possible criticisms. The first is that the identification section seems somewhat skimpy, in relation to the excellent coverage provided elsewhere. However, he does include a useful section he calls *Distinctive Features and Tests* under many of the major mineral species. Secondly, the voluminous descriptive mineralogy section raises a question regarding apportionment of space.

With the availability of such fully descriptive sources as *Dana's Textbook* and the three volumes published to date of the revision of Dana's *The System of Mineralogy,* this rather complete treatment of some hundreds of minerals seems essential only to the reader who has no other mineralogical text. Certainly, decisions on where to draw the line are difficult. Perhaps a reasonably complete but not exhaustive coverage is best suited to the special audience that John Sinkankas had in mind. In any event, this is a fine effort for which the author deserves the highest praise and a large audience.

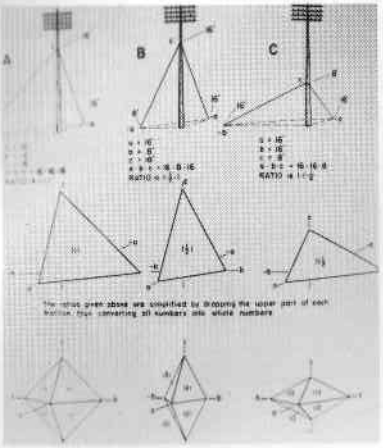


Figure 53 (from Mineralogy for Amateurs)

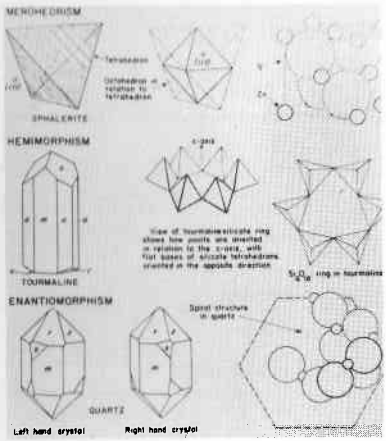


Figure 60 (from Mineralogy for Amateurs)

Continued from page 179

checks, bank drafts, money orders or diners' cards. Despite the drawbacks, he feels there is sufficient potential to warrant his expending much time and money to develop and help nationalize the pink-pearl industry.

The middleman, or dout, as he is called, gives the gypsy very little. Each succeeding transaction mounts, until the pearls have passed through about twelve hands and finally come into the possession of the merchants, who then sell them to tourists.

At present, the pearls are weighed in *tolas* and *chows,* and marketed in rupees, but conversion to the millimeter-and-dollar system is being discussed, to accommodate American buyers.

Time must be allowed for the collection of a specific order. Spring is when harvesting begins, and desired sizes and shapes can be obtained from the *douts* as they come into their possession.

Arrangements are now being made for an exclusive American distributorship at the wholesale level. This is a result of the unprecedented interest shown to the display at the Pakistan Pavilion at the World's Fair. All concerned feel that there will soon be a major market in America for these lovely, lustrous, natural pink pearls.

Continued from page 174

prises the already-known Sandmeier-Plato striation, with a lozenge-shaped pattern of the twinning lamellae running parallel to the first-order prism (1010). The other kind consists of twinning lamellae parallel to a face of the primitive rhombohedron (1011). They correspond with those in natural corundum; therefore, they are no longer a reliable sign for the natural origin of a corundum.