Gems and Gemology

FALL, 1964

See Inside Cover

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On the Cover

A ring-and-earclip set, utilizing the ancient technique of granulation, which was perfected by the Etruscans in the Sixth Century B.C. This contemporary set, called "Amoeba," designed by Robert Johnson, of Gubelin of Paris, was one of twenty-six winners in the Diamonds-International Awards, New York City, October, 1964.

Photo courtesy N. W. Ayer & Son, Inc.
New York City

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The GIA Photoscope

by
Richard T. Liddicoat, Jr.
Executive Director of GIA

There is a wealth of excellent elaborate equipment available to the photomicrographer today. The problem with most of it is the difficulty of determining correct exposure. Photomicrographers who endeavor to obtain satisfactory photographs of gemstones, inclusions in gemstones, missile parts, tissue sections, bacteria colonies, metallographic polished sections, mineral grains, microfossils, or any of the multitude of other items viewed under binocular magnification find it necessary to bracket the apparent optimum exposure with a spread of five or more photographs. In addition, unless darkroom facilities are available, the results are not known for days.

Most of the elaborate photomicrographic equipment is exceedingly expensive; therefore, for practical purposes, the use of a binocular microscope for photography is impractical for the average jeweler.

In addition to its use with jewelry, photomicrography is of major importance in many other fields. In some of them, such as some branches of medicine and biology, immediate results are essential for optimum working conditions.

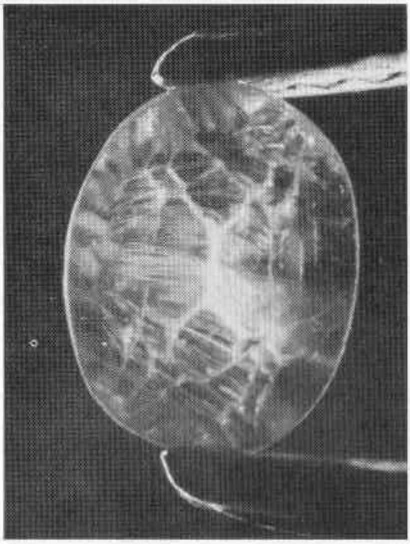
The announcement of the new *Polaroid Land Automatic 100 Camera* made it clear that it was revolutionary, since the shutter opened by the photographer is closed electronically when the photocell beside the lens records enough light to correctly expose the film.

At the Los Angeles Laboratory, we were intrigued by the possibility of placing the eye that activates the new camera over one eyepiece of the binocular microscope and the lens over the other. We were disappointed when this proved to be impractical, for several reasons; however, Kenneth Moore, GIA Instrument Department Manager, decided there was a way in which it might be accomplished. He had been interested for some time in fiber optics, bundled together to form a flexible "wire." His interest was in the possibilities offered by their ability to carry light around corners in almost undiminished intensity.

He first made an adaptor for the camera, so that it was possible to fit the camera snugly over one eyepiece of the binocular *Mark V Gemolite.* He next adapted a lightwire that would fit over the other eyepiece at one end and over the lightcell opening of the camera at its opposite end; to do this, he used an armored cable to protect the lightwire against excessive bending. It was essential that the end of the lightwire be placed at the focal point of the eyepiece, so that the amount of light coming through that eyepiece would travel through the lightwire and enter the lightcell. Since the lightcell controls the action of the shutter and its exposure time, when enough light has passed through the lens to the lightcell to expose the picture, the cell activates the mechanism that closes the shutter automatically. The only necessity for satisfactory results on every exposure is that the amount of light coming through the two eyepieces be approximately equal; when this is true, a satisfactory exposure will always result. However, for particular uses, it is possible to adjust the exposure time to give either lighter or darker prints, depending on the needs or tastes of the photomicrographer. On the following pages are a number of reproductions of prints made using this new device, which we called a *Photoscope.*

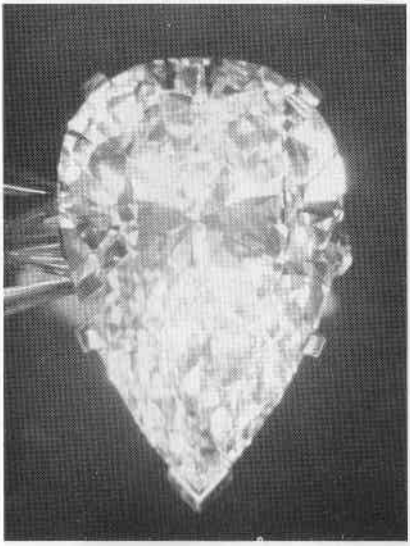
The jewelers' purposes served by

Trigon growth markings on the octahedral face of a small diamond

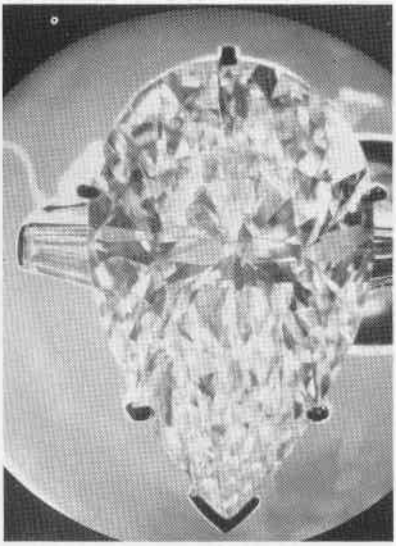


"Horsetail" inclusions in a demantoid garnet

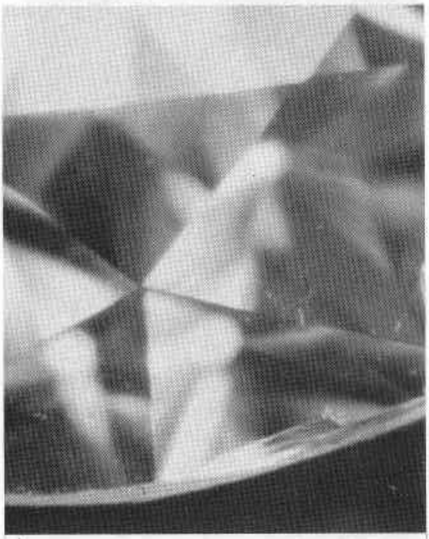
Silk and crystal inclusions in a sapphire



A 20-carat pearshape diamond with a pronounced "bowtie." The shield-shaped girdle symmetry, thin crown and bowtie detract from its beauty.

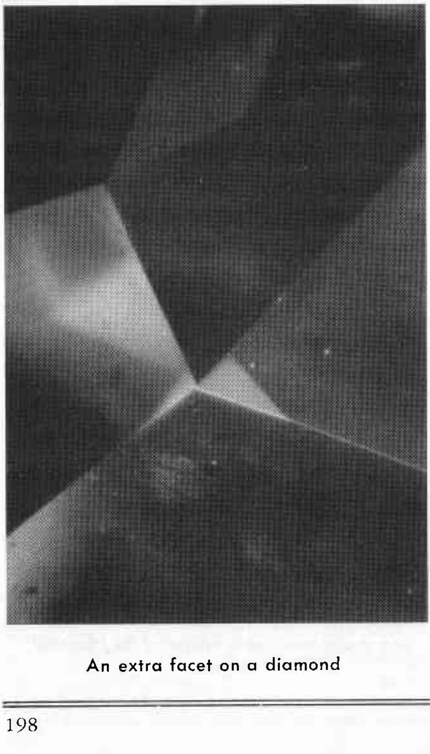


A nicely shaped and proportioned large pearshape diamond. Good pavilion angles and a drawn-in table minimize the "bowtie" effect.



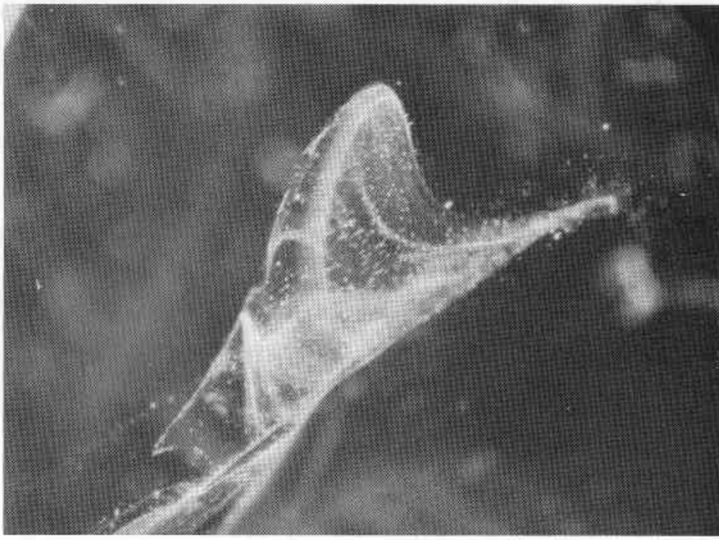
A natural on the crown side of the girdle

A group of gas bubbles in a synthetic ruby



An extra facet on a diamond

Typical inclusions in a North Carolina ruby



A swirl of minute gas bubbles in a glass imitation of emerald

such equipment are manifold. A photomicrograph of a diamond taken under 10x at the time of sale provides a permanent record for the appearance of the diamond. This is an effective sales tool when selling a flawless stone, but it is much more effective for goods with inclusions. The print shows what makes each such stone unique, becoming both a sales tool and a means of building customer confidence and reassurance.

Photomicrographs are often a vital part of an appraisal record, because they help to protect the insured by providing significant evidence of quality and condition at the time of coverage.

Photomicrographs often furnish evidence to substantiate an opinion in an insurance damage or loss claim. Some find it helpful in the repair department, to photograph any diamond or other stone that is cracked or seriously chipped.

The photographs that illustrate this article were taken with a *Photoscope.*

The International Gemmological Conference in Vienna

by

Richard T. Liddicoat, Jr.
Executive Director of GIA

Every two years for the last eighteen, the International Gemmological Conference has met in a European city. The meetings are usually held during the first week of October of even-numbered years. This year, the meeting was held in Vienna. In the belief that gemologists in Canada and the United States will be interested in an abstracted picture of the discussions, this brief of the Conference is included in *Gems & Gemology*.

The delegates to the Conference are made up ordinarily of two representatives from each of the European countries—usually the president of the national gemmological association and the educator who is in charge of the training of gemologists in that country. Some of the delegates are mineralogists, some are GIA trained, and others are trained by the gemological association in their own country. For example, famed Edward Gubelin, who holds a Ph.D. in mineralogy and also is a Graduate of the Institute, is the man who trains gemologists in Switzerland. He devotes two weeks in the summer to classes in which some of the leading jewelers of Switzerland are students. Most American and Canadian jewelers are familiar with the Gemmological Association in Great Britain. The London Laboratory's Basil Anderson, well known to jewelers and gemologists the world over and who has long been an examiner and a leading gemological educator, is a natural delegate from Britain, as are Gordon Andrews, the Association's Secretary, and F. H. Knowles-Brown, Chairman.

On the way to Vienna, I stopped for a day in Paris and visited a leading French jewelry manufacturer, M. Verger, who makes many types of colored-stone and diamond-and-gold jewelry. His designs are particularly intriguing and appealing, so it was a treat to be able to examine his operation, from the designs he initiated himself to the finished product. His technique for showing a Florentine finish on his color renderings gave an unusually realistic impression.

M. Verger was employed for a period of five years by Trabert & Hoeffer de Mauboussin, in Beverly Hills, California. He still numbers among his customers some American jewelers, although most of his production today remains in France or is sent to other countries on the Continent.

One of the particularly interesting facets of the European retail-jewelry business is the exciting quality of the designs that are visible in dozens of stores in every major city and the extent to which colored stones are employed in the jewelry that is on display. One gets the impression that every major city has more colored-stone jewelry on display than one is likely to see in the sum total of the important jewelry stores of at least a half dozen of the larger cities in the United States. The popularity of jewelry-store windows for passersby in Europe seems to exceed the attention they receive in this country. The conclusion that they may have had their attention attracted by vivid colored-stone and diamond jewelry is inescapable. Jewelry designs in windows in Paris, Geneva, Munich, Vienna, Berlin and Copenhagen all seem more exciting and less prosaic, on the whole, than one usually sees in American retail-jewelry-store windows. This is true also of both jewelry pieces and designs shown in European magazines, such as *Die Deutsche Goldschmied Zeitung; Watchmaker, Jeweller & Silversmith; Gold und Silber; L'Orafo Valenzano* and others.

Still on the way to Vienna, I stopped off in Geneva to visit the Rolex organization. One of the directors of Montres Rolex, M. Rene Jeanneret, showed me their impressive collection of early timepieces, including the first automatic wristwatch based on the rotor—a Rolex development, and the watch carried outside the Piccard Bathyscape to over 30,000 feet below sea level.

The organization is unusual in that Mr. H. Wilsdoof, the founder of Rolex, gave the company to a foundation, with control of Rolex in the hands of management and profits directed to specific charitable causes.

Rapid growth and the late founder's reluctance to leave the original site has led to a conglomeration of shops and offices, occupying various floors on many old adjoining buildings. Much of the assembly and administration is in Geneva; all of the testing is done there, as well.

An impressive new building that will rationalize the present crowding is nearing completion. One of the interesting aspects of the handsome structure is that it will stand above two feet of water and appear to float. It seems likely that it will be one of the showplaces of the beautiful city of Geneva. The main factory is in Bienne. I gained a high regard for Rolex and M. Jeanneret.

After a very short stop at Lausanne for the Swiss National Exposition, which is held only at twenty-five-year intervals, I went on to Munich.

One of the surprises of the trip was the beauty of the city of Munich. My tendency was to associate Munich with beer halls, rather than with its many impressive museums, lovely parks and appealing jewelry stores. At least a dozen stores had window displays of jewelry that would compare favorably with any that might be seen in the one or two leading stores in a city of comparable size in America. The Deutsche Museum (science and industry) is regarded by many as unequalled in the world. The Residenz Museum, with its *Schatzkammer,* or treasure room, showing some of the Bavarian Crown Jewels and many other royal treasures, including magnificent examples of goldsmithing and enamel work, is fascinating.

On Sunday afternoon, I traveled on from Munich to Vienna, where the Conference was to begin the next morning. The group had a preliminary social get-together on Sunday afternoon. It was good to renew friendships with many of the delegates who had attended the conference in Milan in 1960, and to meet the new delegates.

The Conference took place in the new Intercontinental Hotel, overlooking a lovely park in Vienna. The sessions lasted from 9 AM until 6 PM and were scheduled so tightly that there was no time for anything else.

On the first day, Dr. Gubelin gave a detailed report, with both rough and cut specimens and very attractive colored slides, showing and discussing a new gem material, an article on which will appear in the Winter 64-65 issue of *Gems & Gemology.* In the course of the discussion, he gave a very clear picture of the conditions in the jade-mining district near Mogaung, in Upper Burma, and various characteristics, including the geology, of the different types of deposits. He also discussed the mining methods and the problems facing the jade miners at present. Since the Burmese Government has banned the use of explosives, breaking out the jadeite in the primary deposits has become extremely difficult. Green material is exceedingly rare. A veinlet even a millimeter thick will be followed in the mining, regardless of its convolutions.

Prof. W. Eppler, manufacturer of the Star of Freyung, and former director of the school and laboratory at Idar-Oberstein, discussed the differences between primary and secondary negative crystals. The secondary type he referred to were those formed in the process of healing earlier open fractures by later solutions. He discussed some differences between chalcedony and quartz and made a few remarks on the origin of moldavite. The similarities between some of the different synthetic emeralds and their causes was also a subject of discussion by Prof. Eppler. In the course

Dr. W. Eppler, of West Germany, showing synthetic-emerald specimens to Dr. Edward Gubelin, FGA, CG, of Switzerland

of the discussion, he brought out similarities and differences in various basic methods of gem synthesis. Each of these subjects was followed by considerable discussion among those present, by relating both to identification and to future expectations.

M. Gobel, Director of the Paris Laboratory, discussed a method by which one could gain an impression or an indication of whether a pearl is cultured or natural. He brought this up because of the difficulty of distinguishing between natural pearls and spherical, non-nucleated cultured pearls by X-ray or endoscope. This is based on the spacing of the fine lines visible under high magnification on a pearl's surface. It has something of the drawback of the use of specific gravity as a means of distinguishing between the two, since there is an overlap; but if the number per 100μ is low enough or high enough to be out of the overlap area, it is a

M. Gobel, head of the Paris Gem Laboratory, with Dr. Edward Gubelin, the eminent Swiss gemologist

Mr. Basil Anderson, of the London Chamber of Commerce Laboratory (center); Mr. G. F. Andrews, Secretary of the Gemmological Association of Great Britain (right); and Liddicoat.

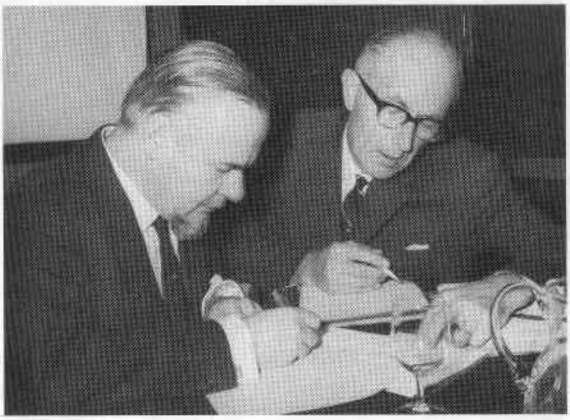
strong indication of origin. In general, cultured pearls show about 5 to 12 lines per 100μ and natural, 7 to 25. Presumably, M. Gobel will publish an article on this subject in the not-too-distant future. We will try to carry a digest in *Gems & Gemology.*

B. W. Anderson, Director of the London Laboratory, spoke on "Notes on Fluorescence in Diamond." A pioneer in gemological spectroscopy, as in many other facets of this developing science, Anderson reviewed the findings that have been made in this intriguing subject. One of the reasons for its fascination is that there is such a bewildering variety of fluorescence in diamonds. Anderson pointed out that the only constant factor about diamond luminescence is that all stones that fluoresce blue under long-wave ultraviolet show a yellowish phosphorescent afterglow that is directly proportional in strength to that of the fluorescence. He then discussed some of the generally dependable situations. It is hoped that the gist of Anderson's remarks can be carried as an article in the Winter 64-65 issue of *Gems & Gemology.* After the discussion following Mr. Anderson's comments, the subject turned to the determination of proportions of a diamond by eye.

This was an explanation and refinement of the article appearing in the 1962 Fall and Winter issues of *Gems & Gemology.* In the discussion that followed, several ideas were brought forward that will prove valuable in explaining this method in the future. Herbert Tillander was particularly helpful in having prepared a number of diagrams to represent his interpretation of the article as it appeared originally.

Prof. Eppler mentioned an article by E. Klüppelberg that appeared in Germany in 1940. In it, the author approached proportion judgment of diamonds with eight facets and table by viewing the stone from the side instead of the top. This depends on the position in the pavilion of the line repre-

Mr. Ove Dragsted, FGA, of Copenhagen (left); and Mr. Herbert Tillander, FGA, CG, of Helsinki



senting the reflection of the girdle. This would apply to full cuts as well.

Herbert Tillander pointed to the need for diamond services in Europe of the type offered by GIA in America. He outlined a program for a color-grading center at Stockholm for Scandinavian jewelers to be based on GIA grades, with master-comparison sets graded initially in Los Angeles. He expressed the feeling that complete diamond-quality-grading services were needed on the Continent, as well.

Professor O. Mellis, of Sweden, discussed the orientation of crystal inclusions in the pyrope-almandite-spessartite series of garnets and showed the relationship between direction of elongation of crystal inclusions and the orientation of crystal faces on the garnets.

F. H. Pough, Ph.D., discussed the new ruby find in Tanganyika, as well as the lovely rhodolite garnets from that locality. He felt that the fact that the rubies were from Tanganyika had led many jewelers to dismiss them without realizing that this was a new find. The quality of the rubies is considerably better than that of the familiar, brilliantly-colored but translucent, flat ruby plates in bright-green chrome-zoisite. Veins of vermiculite with corundum embedded are found in a serpentine over an area of about a square mile along the Umba River. Several tons of material have been removed from shallow pits. Dark red, pink and various colors of blue are found, and other ones as well.

Zaver Saller is a Munich manufacturing retailer and a gemologist who has developed his hobby of pearl identification to a very high level of professional competence. His subject was the future of synthetics and the need to organize and legislate the marketing and advertising, so there will be no possible confusion in the minds of the public.

That evening was devoted to a screening of Dr. Gubelin's new movie on

Mogok. This color film with sound is one hour and forty-five minutes in length. It is a thoroughly professional piece of work. I have no doubt that Edward Gubelin would be highly successful in travel or documentary films. How he finds the time for all that he accomplishes is one of the mysteries of the gemological firmament. His lovely home in Meggen, just outside of Lucerne, has been described aptly as a gemological laboratory surrounded by living quarters.

On Wednesday, Dr. P. C. Zwann, of the Rijksmuseum in Leiden, Netherlands, presented an interesting lecture on odd inclusions in a spinel. Zwann had spent three months in Ceylon on a United Nations assignment. Among the materials that he brought back was a blue spinel with very odd inclusions. He had made an effort to determine the nature of the inclusions and the methods he used were interesting and clever. Surprisingly, he had been able to scrape enough material from one point at which an inclusion reached the surface to get a satisfactory powder-diffraction pattern by X-ray. The powder pattern identified the material as apatite. The spinel weighed the same after the material had been removed, so he had accomplished his goal with less than .005 carat of material. His technique was interesting. He put a drop of rubber cement on a slide, scraped the inclusion with a needle, making sure the grains fell to the drop. He then ground the grains between two slides and rolled the powder-filled cement into a tiny rod for the powder camera. By this process, a powder pattern could be made on any faceted gem with a tiny scraping from the girdle, entirely without eye-visible damage. Efficient.

Basil Anderson's next contribution (again very interesting—and this time demonstrating his early training in chemistry) concerned metamict zircons. This was a subject that had been discussed by Mr. Anderson at Helsinki in 1962. He had added some experimental work since that time, in an effort to determine the cause for the shift in the absorption lines seen after heating zircons with specific gravities below 4.04 to about 900° Centigrade. It is interesting to note that this so-called anomalous spectrum had been encountered on only two or three occasions in green zircons that had not been heated. Upon returning from the conference in Vienna and checking through the low-property zircons at GIA, we found one of these very rare types.

Mr. Anderson had some very interesting remarks to make about his experiments with uranium-nitrate powder, which, after being heated to a very high temperature, started to show in reflected light the typical spectrum of zircon, with very small modifications. Mr. Anderson was reporting his efforts to prove the cause of this shift in spectrum after heating metamict zircons and found that he was unable to explain it fully, despite his own efforts and the assistance of a number of other investigators, including Dr. Zwann. He believes that the shift in positioning of the absorption lines is the result of the formation after heat treatment of one of the zirconium-oxide crystal structures.

Following the discussion of Mr. Anderson's remarks, M. Gobel showed the results of his efforts to prepare a chart for use in the store by graduates of the Paris Laboratory. The idea is to assist them in gem identification, using only a loupe and Polaroid plate. It is a highly complex chart, with characteristic inclusions illustrated beautifully by excellent drawings made by Miss Dinah Level, M. Gobel's assistant, with thirty years' experience in the Paris Laboratory. This is an unusual work and one that was of interest to all.

Following M. Gobel's remarks, the Conference was taken to the Vienna Museum of Natural History, where Professor Scholler permitted us to examine some of the remarkable mineral specimens and gemstones that are not on public view. The Colombian emerald-in-matrix specimens must be without parallel. Huge emerald crystals of very fine color in calcite were spectacularly magnificent. Many other items on display were of considerable interest; among other things, the cathode-ray equipment used in his studies of diamond fluorescence by Professor Michel, the famous European gemologist of the Twenty's. The Museum also had some very interesting colored diamonds and two notable alexandrites.

Later, the Conference reassembled at the Intercontinental for discussions of many of the problems faced in

Dr. P. C. Zwann (left), Leiden University, talking with Mr. A. Bonebakker, the Amsterdam jeweler-gemologist

common by gem-testing laboratories at the present time. Among the subjects discussed were the detection of various types of treatment in turquois and black opals, including some differences in the methods of reporting in various parts of the world. Some salt-water pearls, which, when radiographed, give results very similar to those encountered in the Biwa fresh-water pearls, were considered at length. Since this was a subject of great interest to many in attendance, the discussion continued until well after the official closing time. That evening was devoted to a delightful visit to a *weinstuben* in the famed Grensing.

We were glad to learn that the tremendous work *Gemmologia,* by Madame Esperanza Cavanago-Bignami, is now available in a greatly enlarged

Prof. Speranza Cavenago-Bignami, of the State Gem-Testing Laboratories in Milan and Valenza, with her husband

second edition. The first edition of some six thousand was sold out in only three years, in spite of its price of approximately $30. The new edition, of almost fourteen hundred pages, will sell for between $45 and $50. The volume has some of the finest color plates of gemstones ever to appear in print, so it seems certain that the book will be accorded the same warm reception.

The final day of the Conference was devoted to a number of talks and discussions of problems facing gemologists. The *GIA Photoscope* was demonstrated and a number of photomicrographs were taken through a *Gemolite* borrowed for the purpose from the Vienna Museum of Natural History, using the new photographic equipment. The response from the delegates to the revolutionary nature of the method was very gratifying.

Dr. Gubelin showed some interesting slides of a synthetic ruby in which very odd inclusions or color distribution, reminiscent of Burma ruby, were to be seen. Under high magnification, this apparently was caused by an odd distribution of minute gas bubbles.

Later, Professor O. Mellis discussed a number of optical phenomena and showed some very interesting slides to support his ideas.

Dr. Peter Zwann, of the Netherlands, showed an imitation of moss agate, in which a silhouette of a head appeared—it had been "painted" into chalcedony. Some experiments conducted by Dr. Zwann and colleague suggested that a silver-nitrate solution had been used to draw the portrait and had been permitted to penetrate well over a millimeter. When further polishing made it appear that the portrait was a millimeter from the surface, it seemed that it was something that couldn't have occurred, except naturally. However, the colleague was able to duplicate the appearance with another piece of chalcedony.

After the discussion of several other items, the Conference came to an end.

Jeweler-gemologists Wijkstrom, of Sweden; and Masso, of Spain

Later, that day, I responded to an invitation to visit the offices of Alois Sturmlechner, the Austrian jewelry wholesaler, who is world agent for Lechleitner—the manufacturer of synthetic-emerald overgrowths on natural beryl. Gordon Andrews, of the Gemmological Association of Great Britain; Kenneth Blakemore, Editor of *Watchmaker, Jeweller & Silversmith;* and Dr. P. C. Zwann, all of whom had joined me in a visit to the Schatzkammer Museum (in an unsuccessful attempt to track down the famous *Florentine Diamond,* once a proud possession of the Hapsburgs), came with me. The visit was one of the highspots of a fascinating trip. We were ushered into a high-ceilinged room, furnished with lovely Victorian furniture. A translator, hired for the occasion, made it possible for us to communicate easily with the charming Frau Sturmlechner, who was carrying on for Herr Sturmlechner, absent on a trip to the United States. We were shown the latest Lechleitner products, representing tremendous improvements over early efforts, as well as the extensive line of diamond- and colored-stone-set gold-and-platinum jewelry that the firm markets to Austrian jewelers. We had gathered in high-backed chairs about a lace-covered table and were served delicious *käsekuchen*—cheese pastries. All in all, it was a most pleasant visit.

After another museum visit the next day, plus a view of the training exercises of the world-famous Spanish horses and a trip to a lovely park along the Danube, I departed for Berlin and East Berlin. The bleakness of the latter leaves an indelible impression.

On Monday, I returned to Munich to visit the Xaver Saller Laboratory. Herr Saller's cordiality typifies the warmth of this fine group of people. I learned at the Conference that many retailers send to Saller only those pearls that have been the subject of controversy. The Laboratory is impressive and,

Continued on page 222

Trapiche Emeralds from Colombia

PART I

by
H. Lawrence McKague, Ph.D.

Description

The Institute recently acquired from the William V. Schmidt Company and Allan Caplan specimens of emerald from Colombia, called *trapiche,* the Spanish word for the cane-crushing gears it resembles. These emeralds have a rather unusual crystal habit *(Figure 1).* Three and sometimes four distinctly different developments of beryl are recognizable *(Figure 2).* Each specimen consists of a central hexagonal prism *(a, Figure 2)* with six trapezohedral-shaped prisms *(b, Figure 2),* extending from the six first-order prism faces $(10\bar{1}0)$. A colorless fine-grained beryl *(c, Figure 2)* separates the trapezohedral-shaped prisms from each other and from the central prism. Overgrowths of colorless to very pale-green *(d, Figure 2)* have developed on some of the trapezohedral-shaped prisms.

The diameter of the samples range from 4.5 mm. to 6.5 mm., and in length from 4.3 mm. to 7.3 mm. The specimens appear to be fragments of longer crystals.

Hexagonal Prisms

The central hexagonal prism is characterized by a deep-green color. Lack of inclusions and near absence of cleavages, parting and fractures permit the hexagonal prisms to be more transparent than the other developments of beryl *(Figure 3).* A poor to well-developed basal cleavage is present on these prisms. In all of the specimens the hexagonal prism is tapered towards one end. The longest axis across the prism in *Figure 2* decreases from 1.9 mm. on the end shown to 1.3 mm. on the opposite end.

Trapezohedral Prisms

The six trapezohedral-shaped prisms

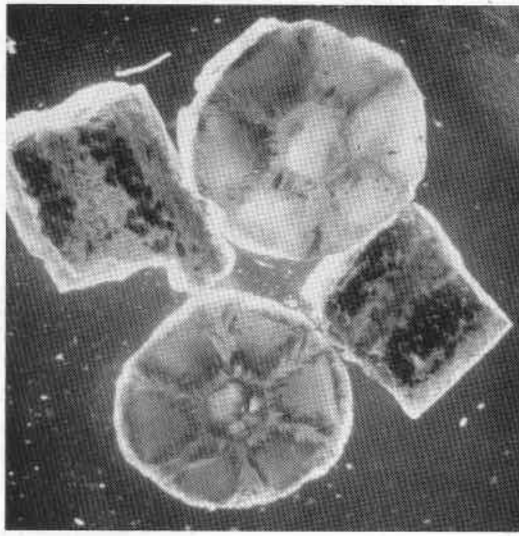


Figure 4 (Photoscope 22x)

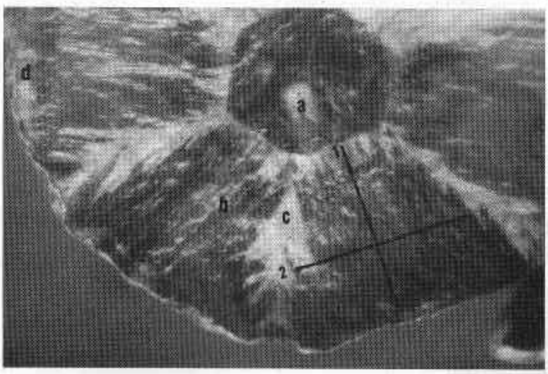


Figure 2 (Photoscope 12x)

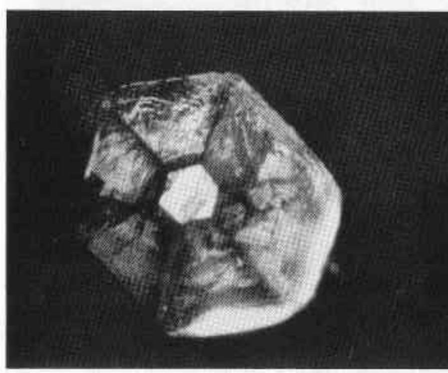


Figure 3 (Photoscope 5x)

extending outward from the first-order prism faces are always separated from the hexagonal prism by a zone of fine-grained colorless beryl. The color of these prisms is the same deep green as the central prism, but they are less transparent *(Figure 3)*. Opaque inclusions, evenly developed parting[1], and alteration along some of the parting planes contribute to the decrease in transparency. The opaque inclusions are more common away from the central portions of the prisms. Their mineralogic nature has not been determined. Within a given prism, the parting planes are parallel; however, with respect to the central hexagonal prism, the parting planes have a radial orientation *(Figure 2)*.

The trapezohedral-shaped prisms also change shape along the length (i.e., parallel to the c axis) of a specimen. Generally, the dimension that is parallel to line 1 in *Figure 2* varies antipathetically with changes in the size of the hexagonal prism, whereas the dimension that is parallel to line 2 in *Figure 2* varies sympathetically.

Fine-Grained Beryl

Fine-grained colorless beryl occurs between the trapezohedral-shaped prisms *(Figures 4, 5)* and between these prisms and the hexagonal prism *(Figures 1, 4)*. The size of the largest grains observed was less than 0.10 mm.

It is evident from *Figures 1, 2, 5 and 6* that the beryl of the trapezohedral-shaped prisms has been converted to fine-grained colorless beryl along the parting planes. In *Figure 4,* elongate remnants of green beryl, with an orientation parallel to the parting at *a,* occur above and below *b*. Similar remnants with an orientation parallel to the direction of parting at *c,* occur to the left and below *b*. Scattered rounded grains of green beryl occur in the colorless beryl *(a, Figure 5)*. These, too, are assumed to be remnants of the trapezohedral-shaped prisms.

A yellow powdery mineral (limonite?) occurs in scattered patches on and between the colorless beryl grains. The opaque mineral or minerals that occur in the trapezohedral-shaped prisms are not present in the fine-grained beryl. The yellow mineral may be an alteration product of these inclusions.

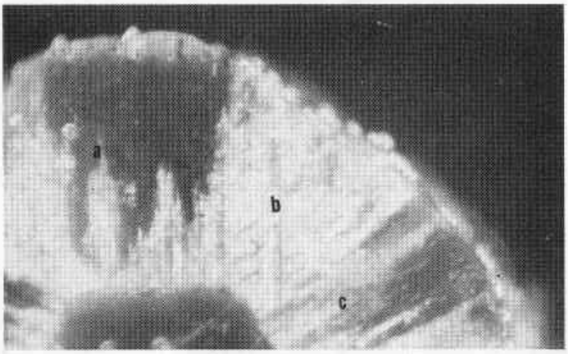
Beryl Overgrowths

Colorless to light-green beryl occurs as overgrowths on some of the trapezohedral-shaped prisms *(Figure 2, 6)*. Scattered opaque inclusions commonly mark the planes between the prisms and the overgrowths *(Figure 6)*. The overgrowths do not extend the full length of the prisms, but occur as scattered patches.

The relationship between the overgrowths and the fine-grained beryl is not absolutely clear. It appears that the fine-grained beryl has a cross-cutting relationship with the overgrowths; this was observed on the broken corner of one prism and is open to interpretation. Also, the fine-grained beryl seems to

[1]Parting in beryl is rare. In a brief literature search, only one reference to prismatic parting was found (Gordon, 1959, 84).

Figure 4 (Photoscope 22x)



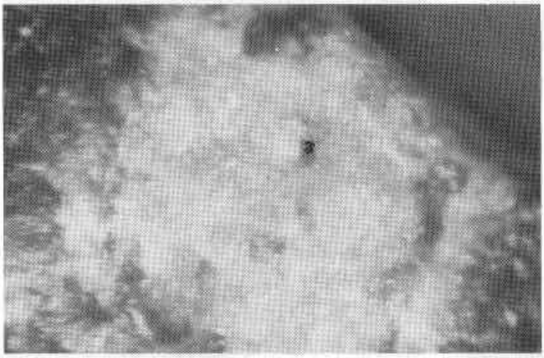
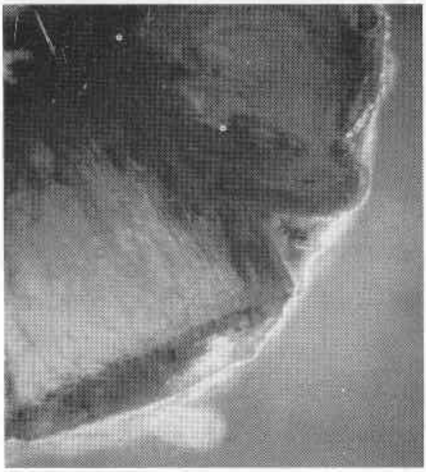


Figure 5 (Photoscope app. 40x)

Figure 6 (Photoscope 19x)



occur as patches on the overgrowths; however, again this is not clear cut, because of the patchy nature of the overgrowths. In addition, the negative evidence of the lack of overgrowths on the fine-grained beryl supports the contention that they are earlier than this beryl.

Sequence of Development

It is rather risky to develop a sequence of events based on the observation of only four specimens; however, the following tentative remarks can be made for their development:

Continued on page 223

Developments and Highlights

at the

GEM TRADE LAB

in New York

by
Robert Crowningshield

Multiple Reflections

Figure 1 is a photograph of a round brilliant-cut diamond in which a single crystal, seen just below the culet, is located in such a position that it is reflected 24 times around the culet and an additional 10 or 12 times under the star facets. This brings to mind an old-mine-cut stone with a single crystal inclusion that did not reflect. When the stone was recut into a modern brilliant, the new angles for the back facets caused the inclusion to reflect in each pavilion facet, to the severe detriment of the stone.

Crackled Synthetic Ruby

Figure 2 illustrates the inclusions in a quench-crackled synthetic ruby that could very easily be mistaken for natural. The stone had inclusions of the unmelted powder, which, in themselves, are often deceptive; but when fractures are deliberately introduced, some of which encompass these solid inclusions, the effect is very much like that of a typical so-called Siam ruby.

"Chameleonite" Tourmaline

A most unusual paper of 14 faceted tourmalines were examined recently. The stones appeared greenish brown to brownish green in daylight and intense brownish red to reddish brown in artificial incandescent light. Several of the stones showed a change of color, very much like that of alexandrite itself. These stones were evidently of the type for which a now-obsolete term, "chameleonite," was proposed before

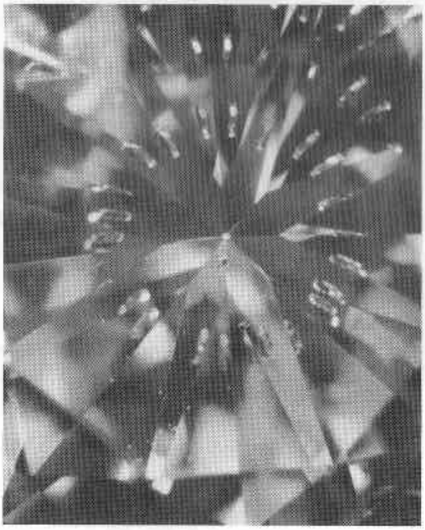


Figure 1

Figure 2

World War II. We have rarely seen such stones and never in such quantity. *Figure 3* illustrates the only inclusion found in the stones, since most were virtually flawless; it was a dark crystal with radiating internal fractures.

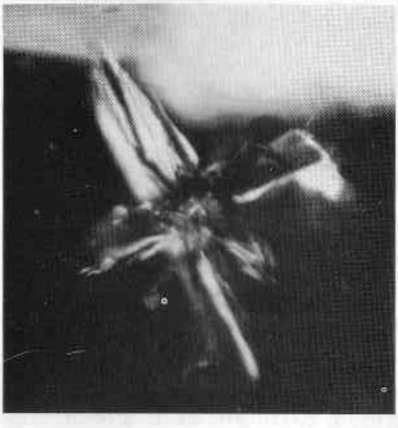


Figure 3

Superb Amazonite

Figure 4 does not do justice to a nearly transparent emerald-green ama-

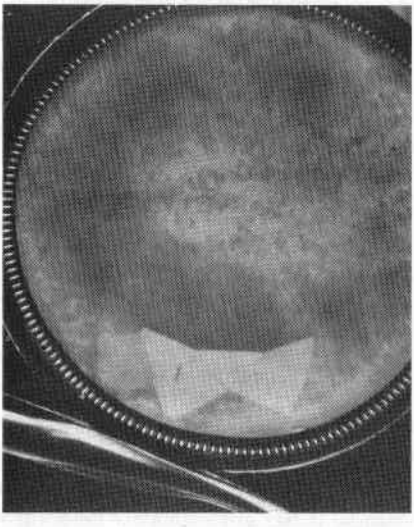


Figure 4

zonite in a pendant ornament, which was presumed to be emerald.

Diamond Watch Crystal

A most unusual watch crystal set in a yellow-gold case is illustrated in actual size in *Figure 5.* That the stone was originally a macle, or twin crystal, was suggested by its shallowness (2.10 mm.) and the triangular pattern of internal strain seen in a polariscope *(Figure 6).* It was estimated that the stone weighed approximately 7¼ carats.

Green Topaz

Although most reference works list green as a color for precious topaz, it is rarely seen and then only as a modifying color, such as greenish blue or as in the yellow green 3700-carat faceted stone submitted to the Laboratory this summer. At the same time, we examined a 750-carat blue topaz.

Chrysoprase Terminology

The introduction of superior chrysoprase from Australia, which was mentioned in the Summer, 1964, issue, has already caused some interesting problems in terminology. In one case, a traveling dealer insisted that his term "Queensland Jade" was correct and that he was selling jade. Another material was called "genuine green onyx," a term so long misused for dyed chalcedony that when it is applied, it debases the stone it is used for. In truth, the term onyx is proper only for straight-banded chalcedony; however, with the dyed green and black material without bands, it has unfortunately been incorrectly used.

New Synthetics

The Laboratories of the GIA have had the opportunity in the past few months of examining several interesting, potentially-commercial synthetic materials that have been mentioned recently in the press. A number of colors of a synthetic garnet that may be doped with various rare earths have been fashioned as components in a solid-state optical maser that can operate continuously at room temperature. Since some of the crystals, particularly those grown slowly from a flux, are strain free, transparent and weigh as much as 100 grams, suitable material for jewelry purposes may be in the offing. When and if this occurs, the Institute will publish a full report. The initial announcements appeared in a recent issue of *Applied Physics Letters* and the September, 1964, *Bell Laboratories' Record.*

Synthetic Alexandrite

Another manmade product, mentioned by Dr. A. E. Alexander in the September issue of *National Jeweler,* is synthetic alexandrite. The Laboratories of the Institute have examined several very beautiful small crystals that changed color much as a light-colored Russian alexandrite and were free of inclusions. *Figure* 7 illustrates the great transparency of these stones.

Multicolored Grossularites

Figure 8 is a photograph of a lot of variously-colored grossularite-garnet cabochons, ranging from light yellow-green through dark green, some spotted, and some unmottled, to light

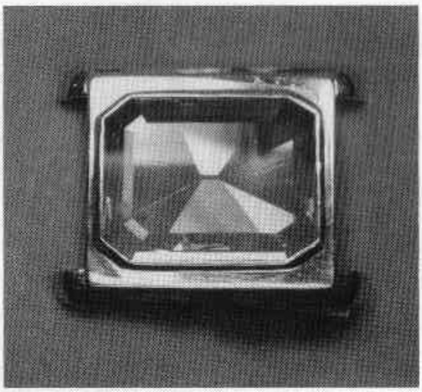


Figure 5

grayish violet to light orange to orangey pink. We have never seen such a range of color all at once. A piece of jewelry made from these stones would be a most unusual conversation piece. One can almost hear the remarks, "All garnets? You must be kidding!" when the

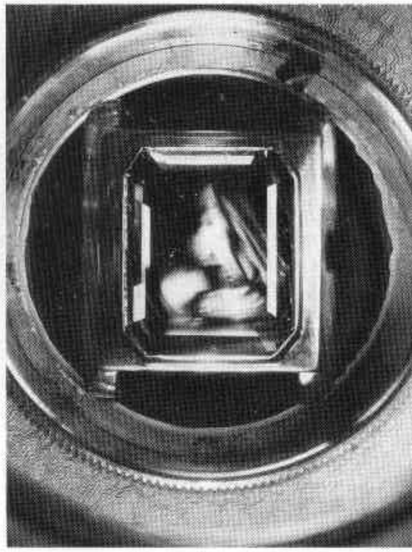


Figure 6

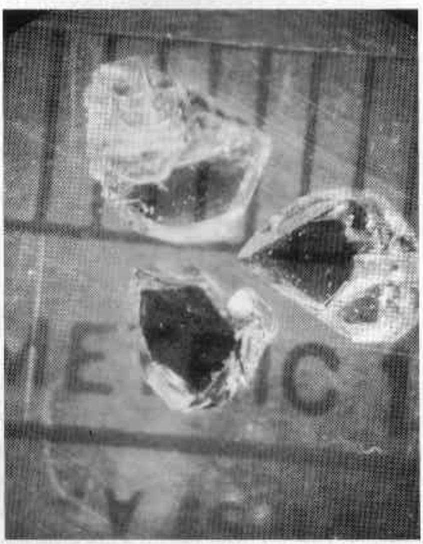


Figure 7

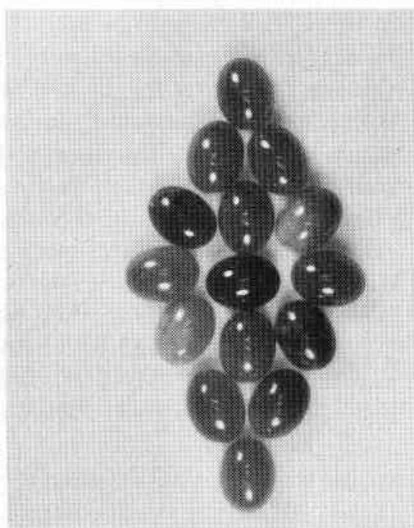


Figure 8

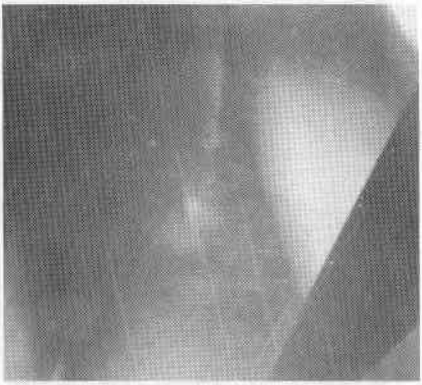


Figure 9

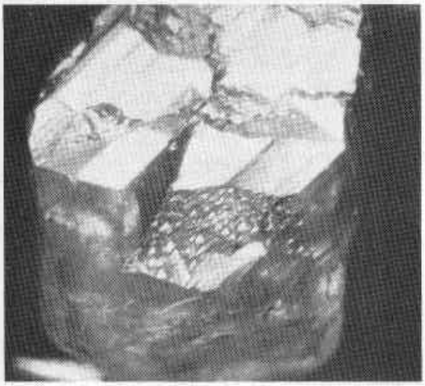


Figure 10

wearer disclosed the nature of the stones. We are indebted to Mr. Weber, of International Gem Co., New York, for the loan of these stones for lecture purposes.

Symerald

We received a visit from Mr. Alois Sturmlechner, Viennese jeweler, who is in the United States to accept a Diamonds International Award and to investigate the market for the improved synthetic emerald overgrowth on beryl, which was originally described in this journal under the trade name of "Emerita." Mr. Sturmlechner is now a partner of Johann Lechleitner, the manufacturer, and the product has been named *Symerald* in Europe. We were happy to see the tremendous improvement in the stones, and were very delighted to receive as a gift a specimen of the material overgrown on an irregular fragment of yellow-green beryl. *Figure 9* illustrates this specimen and indicates that in certain directions the synthetic has "found" the hexagonal direction and grows more rapidly than in the unoriented directions.

Needlelike Inclusions in Diamond

In the GIA Diamond Course, symbols for all the types of flaws or irregularities normally encountered in diamond are given. However, occasionally a diamond comes to our attention with inclusions not covered by the symbols. Such was a colorless and otherwise flawless diamond with oriented needlelike or filamentlike white streaks throughout the stone; these are dimly seen in *Figure 10*.

Pearl Expert Dies

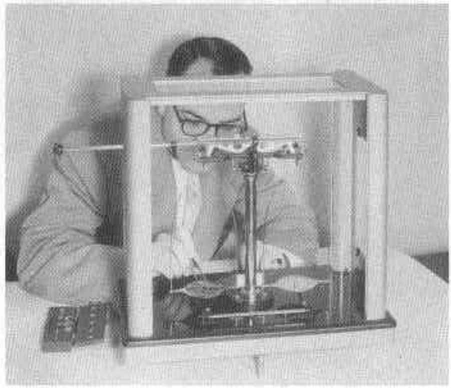
We were saddened to learn of the death this summer of Mr. Hans Schilling, the jeweler and goldsmith of Salisbury, Maryland. Mr. Schilling was an acknowledged collector of, and authority on, edible clam pearls. He made much of his collection available to Mrs. Miles for her talk at the AGS Conclave in New York in April.

Developments and Highlights

at the

GEM TRADE LAB

in Los Angeles



by
Richard T. Liddicoat, Jr.

Dyed Cultured Pearls

Dyed cultured pearls are very common today, but a strand that we saw recently was rare in our experience. The beads had been subjected to such a drastic dying process that they wer completely saturated to the center of the mother-of-pearl bead by the unnatural-colored dye. They resembled antique rosepetal beads more than pearls.

Alabaster and Fluorite Jewelry

A group of pieces of inexpensive antique jewelry contained green and pink colored beads that proved to be dyed-and-heavily-waxed alabaster. Other beads in the same jewelry were fluorite.

Unique Brooch

We were intrigued by another relatively inexpensive old brooch. It was interesting because the frame was made of tortoise shell, and the carved figure mounted thereon was limestone.

Glass Hololith Ring

A green-and-white hololith ring, which appeared to be jadeite, is pictured in *Figure 1*. A second piece of material had been molded over the bezel. Both portions proved to be glass.

Periclase — Synthetic or Natural

A representative of a scientist sent a piece of periclase to the Laboratory, asking for a report as to its synthetic or natural origin. The inclusions were

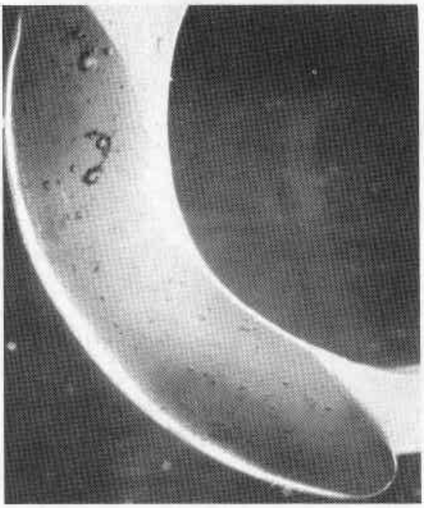


Figure 1

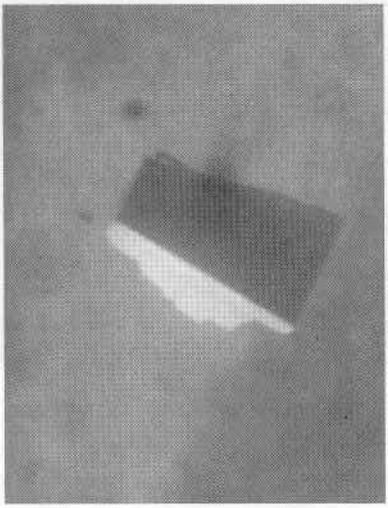


Figure 2

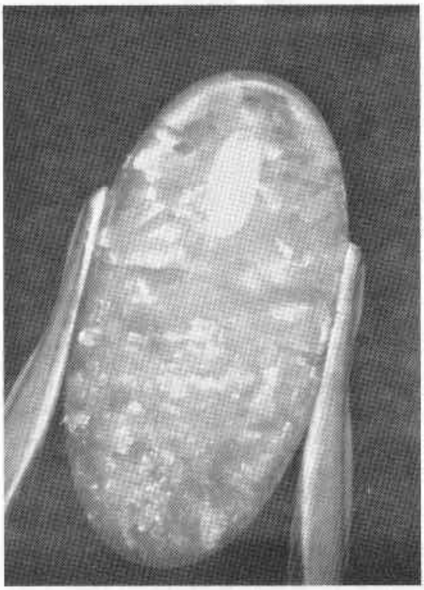


Figure 3

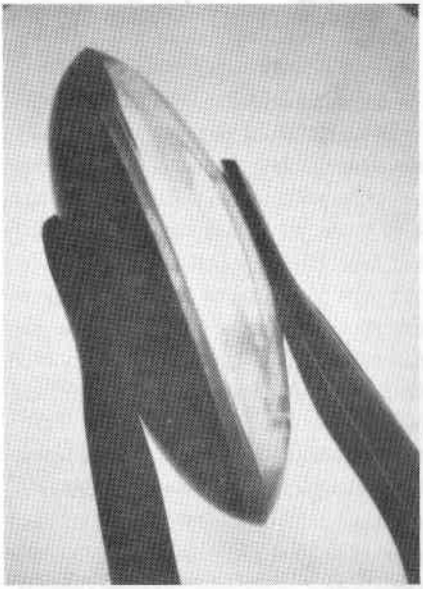


Figure 4

negative crystals, similar to that shown in *Figure 2.* Since there were no characteristics that were clearly those of a synthetic, we were forced to admit that it was impossible to give a conclusive report. He implied that it was synthetic.

Pleasantly Surprised

Frequently, dealers who are not in the antique-jewelry business, but who simply obtain small quantities of gem-set jewelry as a part of large-estate purchases or from the purchase of a complete household, make use of our Laboratory. Usually, they are disappointed by the results. One was delighted about two years ago, however, when what she assumed to be citrine proved to be a very attractive golden sapphire of 40 carats. The dealer was startled, when, having come in for the third time since the initial visit, she found that another "citrine" was a large, attractive golden sapphire.

Unusual Assembled Stone

A rather interesting assembled stone is shown in *Figures 3 and 4.* A gentleman from northern California had backed a thin piece of very attractive opal both for increased strength and color, with black onyx and covered the top with rock-crystal quartz. The result bore a strong resemblance to attractive, natural black opal.

Enigma

A jeweler sent us a large brooch set with a large piece of faceted glass and surrounded by cultured pearls. After repairing the piece, the jeweler had placed it under a 100-watt bulb to dry. After removing it, the surface appeared to have been severely etched. We were at a loss to account for such severe damage as the result of this low heat. The etched appearance had to be misleading, because the pearls had not been attacked. This would seem to rule out an acid capable of attacking the glass.

Figure 5

Odd Emerald Inclusion

A ring set with an attractive emerald was sent in for identification. Under magnification, it was easy to see why the jeweler had been disturbed by the appearance of the stone and slightly dubious about its identity. There were several odd, round inclusions that resembled bubbles somewhat. Near them, the emerald seemed to distort light passing through it much in the manner of the effect on light produced by a Burma ruby. One of the rounded inclusions is shown in *Figure 5.*

Book Review

GEM CUTTING SHOP HELPS by Hugh Leiper and Pansy D. Kraus. Published by Lapidary Journal, Inc., San Diego, California. 230 pages, numerous black-and-white illustrations. Price $3.95.

During the nearly sixteen years that have elapsed since the first issue of the Lapidary Journal appeared in April, 1947, its columns have contained practically a complete cross-section of every phase of the gem-cutting art in articles written by the most highly skilled craftsmen in each type of work. Following repeated requests for the reprinting of articles that have appeared in past issues of the Journal, the editors solved the dilemma by publishing the most important articles in GEM CUTTING SHOP HELPS.

Chapters on various methods of sawing, grinding, sanding, polishing, drilling and lapping, cabochon cutting and faceting, novelties and individual treatment of numerous gemstones furnish the reader inestimable know-how from the experiences of skilled craftsmen. For instance, would the reader like to fashion beads or even make a bead-making accessory that can be used on his present equipment? Or, maybe, the reader would like to polish some abalone shell!

For one who has carefully hoarded all of the informative issues of the Lapidary Journal for future reference to instructive articles contained therein, this compilation offers an invaluable substitute. For the newcomer to the hobby, the experiences of pros in the field are at his fingertips.

Our one criticism is that, for one who wishes to avail himself of pertinent information concerning the treatment of a particular gemstone, an alphabetical gemstone index would undoubtedly facilitate the use of the book.

GEM CUTTING SHOP HELPS should be a welcome addition to the gem cutter's library.

Continued from page 209

apparently, his results as well. He has a number of one-of-a-kind items tailored to his needs by Sieman's Electric, of Berlin, and his techniques are thoroughgoing. I was impressed.

The one aspect of the X-ray equipment in every European laboratory I've seen that disturbs me is the lack of safeguards for the operator. In Los Angeles and New York, regulations require that everything be lead encased, and if the slightest stray radiation is recorded on film badges or radiation counters required to be worn by operators, changes are mandatory. In Europe, everything is open. The users, well aware of the spread of the direct beam, avoid it carefully, but secondary radiation is disregarded. Health scientists emphasize to us that longer-wave secondary radiation is especially dangerous. All the X-ray people over there seem healthy, so we may be overly concerned, but I doubt it.

Herr Saller is not just a scientist—he is a highly effective retailer. He seldom creates jewelry for less than several thousand Deutsche marks for his clients. Many of his creations have great appeal. Here is a successful amalgamation of the jeweler with the scientist.

Before returning to Los Angeles, I visited GIA student Jorgen Möller, at the Georg Jensen firm, in Copenhagen. Two of his assistants are also studying. They were anxious to learn more about proportion judgment by eye. The Jensen firm had on display many attractive, masterfully constructed diamond-and-stone-set pieces. Copenhagen has literally tens of impressive jewelry stores, if one may judge from window displays.

It was a thoroughly enjoyable trip that left me with the impression that we still can learn much from the European jeweler.

Continued from page 213

1) Formation of a hexagonal prism.
2) A change in temperature, pressure or chemical composition or in some combination of these three followed by development of a second generation of beryl now represented in the trapezohedral-shaped prisms. Development of opaque inclusions in the beryl of the trapezohedral-shaped prisms suggests some change occurred in the chemistry of the system.
3) Another change in the system, followed by the development of the colorless overgrowths of beryl.
4) Later, a more drastic change in the system produced partial conversion of the second and third generation beryls to a colorless, fine-grained beryl. This transformation was much more effective at the intersections of the first-order prism faces than at centers of prism faces. The conversion extended inward to the central prism. But the central prism is not at all, or only very little, affected. This suggests that the earliest formation of beryl was more resistant to the attacking solutions than were the second and third generations.

The proposed sequence of events is tentative and based only on observation. Work on determining the physical properties of these beryls is currently underway and may suggest other possibilities.

Literature

Gordon, S. G. (1959). The Mineralogy of Pennsylvania: Spec. Publ. No. 1, Acad. Natural Sci. Philadelphia, p. 255.

ABOUT THE AUTHOR

H. Lawrence McKague, Ph.D., has recently joined the GIA Staff. Dr. McKague was born in Altoona, Pennsylvania, June, 1935. After graduating from high school in Hollidaysburg, Pennsylvania, he attended Franklin and Marshall College, graduating in 1957 with a B.S. in geology. He combined further study with duties as a teaching assistant at Washington State University, in Pullman, earning an M.S. in geology, in 1960. McKague acted as research assistant during his preparation as a doctoral candidate at Pennsylvania State University. His doctoral thesis was entitled "The Mineralogy, Petrology and Geochemistry of the State Line Serpentinite and Associated Chromite Deposits." He has been employed by the Canadian Geological Survey's Department of Mines and Technical Surveys and by the Pennsylvania Topographic and Geological Survey. At the present time, Dr. McKague is completing his study of the GIA courses while undertaking a number of brief research problems, using the new X-ray diffraction equipment in the GIA Laboratory. Later, he will divide his time between instruction and research. Dr. McKague's article on Trapiche Emeralds appears on page 210 of this issue.