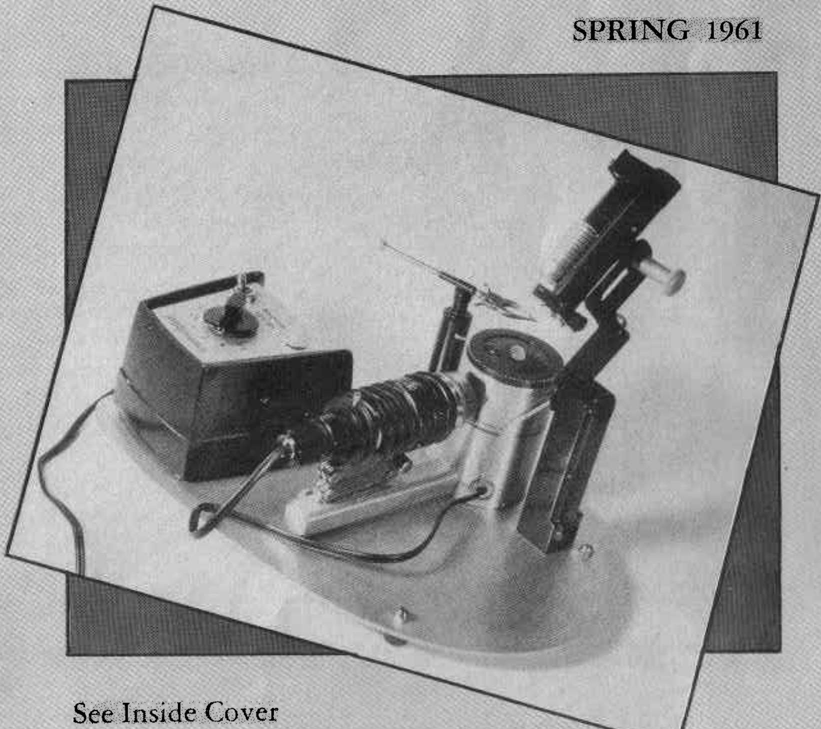
Gems and Gemology

SPRING 1961



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Gems & Gemology

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A Report on European Laboratories

by

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

Introduction

Most readers of *Gems & Gemology* have seen references to one or more of several European gemological laboratories. The names and many of the accomplishments of their staff members are also familiar to many Canadians and Americans. However, readers may be interested in more detailed first-hand information about some of these laboratories and their people. Before and after the Eighth International Gemological Conference, held in Milan, Italy, the first week of October, 1960, we had the opportunity to visit a number of European laboratories. The purpose of this article is to portray by word and photograph those that were visited.

Each of the major laboratories visited seemed well equipped to identify any type of natural gemstone and those substitutes now on the market. With the exception of the London Laboratory, which is devoted exclusively to gem-testing, each functions in the dual capacity of a commercial testing laboratory and a training facility. For the student-practice function, the equipment seemed to limit practical class size to a few students. Instruction apparently is confined largely to gem identification.

The natural tendency for American and Canadian gemologists is to be most familiar with the writings that have appeared in English. Thus, the writings of the famous gemologists associated with the London Laboratory and those of Dr. E. J. Gubelin are more familiar than the contributions of those German and Italian gemologists, whose writings have been confined to their respective languages. The staff members of the GIA were least familiar with the laboratories and the activities of our Italian colleagues. Publication of the large, attractive volume entitled *Gemmologia,*

Professor Bignami prepares pearl for X-ray diffraction.

Jeweler training at Valenza.

written by Madame Speranza Cavenago-Bignami, underscored the fact that gemology has made great strides in Italy. The visit provided further enlightenment on progress there.

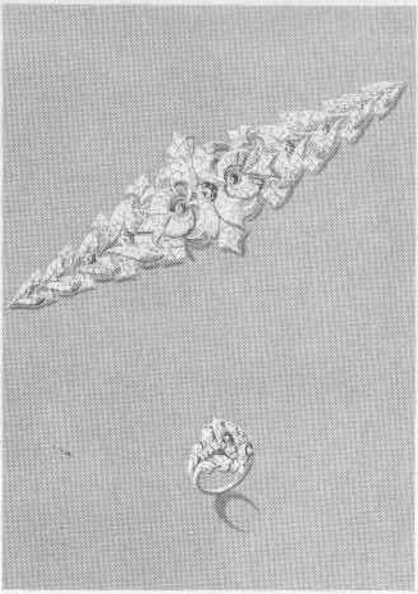
Italy

There are four laboratories in Italy, we were told, three operated by an association of pawn shops and the *Laboratorio Gemmologica del Servizio Pubblico di Stato,* directed by Madame Bignami. The one we were privileged to see was that operated by Madame Bignami, in Valenza-Po, a city almost entirely devoted to jewelry manufacturing. About 130 firms are occupied in making gold and platinum jewelry, as well as jewelry in a complete spectrum of qualities.

A school in Valenza, with an attendance of about 400, teaches all phases of the jeweler's art, including gold- and platinumsmithing, engraving, jewelry designing, stonesetting and gemology. Madame Bignami has an efficiently equipped laboratory and classroom in which some of the students are taught gemology.

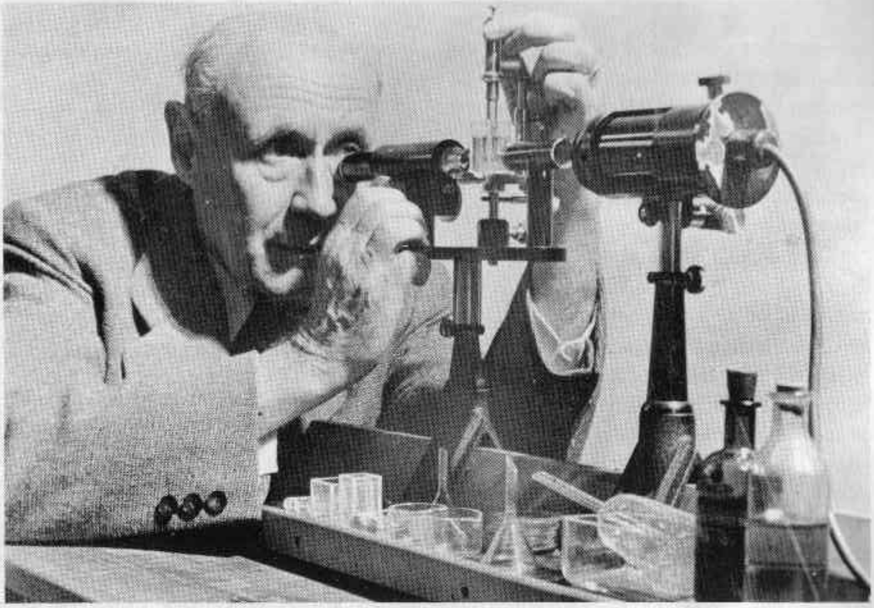
The school, called the *Benvenuto Cellini Scuola di Oreficeria,* is government supported. It is equipped with up-to-date instrumentation of excellent quality. Polarizing and binocular microscopes, X-ray diffraction and radiographic equipment, photographic equipment, balances, ultraviolet lamps, an endoscope and many other instruments were evident.

Judging by the finished work of students and the excellence of the facilities, *Benvenuto Cellini* offers a thorough training in the jewelry-manufacturing field. It is clear that Professor



Example of a student design at the Cellini school.

Professor Bignami places a pearl on an endoscope.



Professor Dr. Karl Schlossmacher uses a horizontal microscope of his own design.

Bignami has the enthusiastic support of the school administration. Her own enthusiasm and knowledge of the subject should make her an outstanding teacher.

The Italian laboratory and that of M. Gobel, in Paris, follow one practice not employed in London or U.S. Laboratories: stones submitted for testing are identified by number rather than by the owner's name, and they are sealed in a transparent envelope.

Germany

Professor Dr. Karl Schlossmacher is in charge of the German laboratory and gemological school in Idar-Oberstein. Professor Schlossmacher, a man in his early seventies, is known for his revision of Bauer's famous *Edelsteinkunde,* and since that time, other books and many articles on gemstones and gem identification. The laboratory-classroom and offices are located on the floor above the main gem museum of Idar-Oberstein. The laboratory has an X-ray diffraction and radiographic unit, in addition to binocular and polarizing microscopes, balances, ultraviolet lamps, spectroscopes and other equipment. One unusual instrument is a horizontal polarizing microscope designed by Dr. Schlossmacher. It enables him to immerse stones in liquid in a strain-free glass-walled vessel, an arrangement by which a holder mounted in a vertical position permits easy manipulation of the stone. Classes for beginning students of 20 or more are given periodically. Professor Schlossmacher limits advanced instruction of two weeks duration to two students at a time.

France

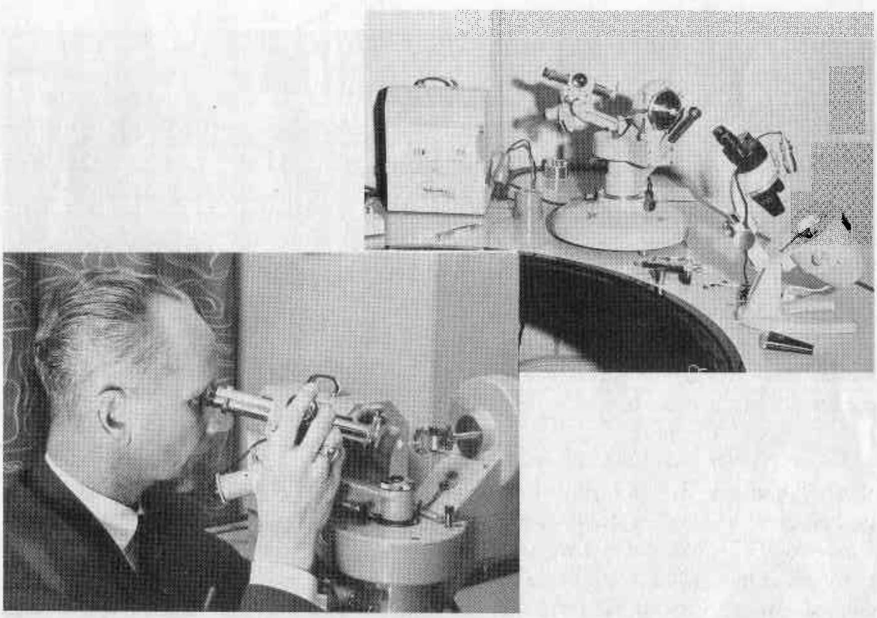
Mr. G. Gobel, of the Paris Laboratory (full title: *Inspecteur de Service Public du Controle des Pierres Precieuses de la Chambre de Commerce de Paris*), is assisted by two feminine gemologists, one of whom, Mlle. Dinah Level, has been with him for over thirty years. The articulate Miss Level is an enthusiastic student of inclusions. She has made up literally thousands of microscope slides on which rough specimens with flat facets have been mounted to show inclusions to advantage.

Gem identification is taught over a four-year period, with about thirty evenings comprising the first year, a week or so the second and third, followed by two weeks, I believe, as the fourth year. After the first year, emphasis is placed on the use of inclusions in identification.

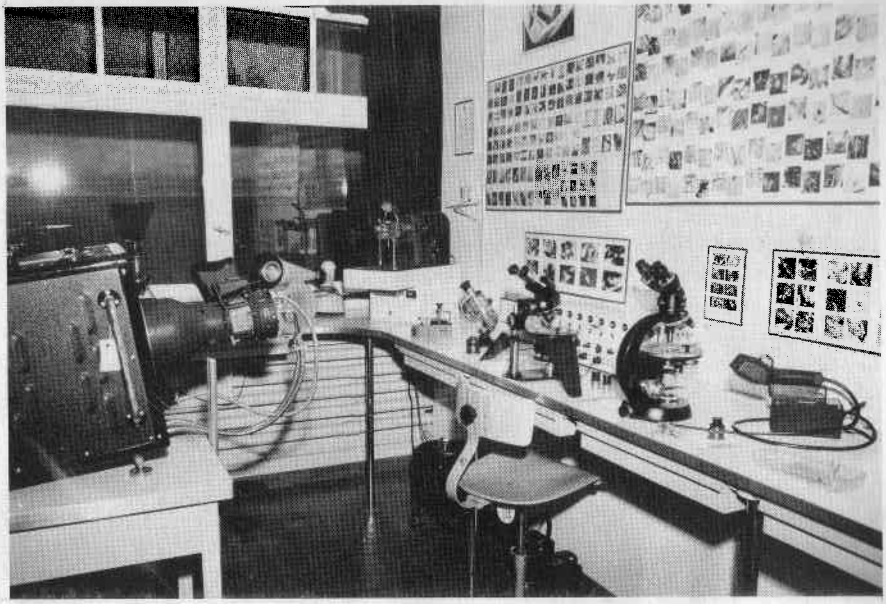
The laboratory is well equipped, with endoscopes and X-ray equipment for pearls, plus binocular and polarizing microscopes, refractometers, ultraviolet lamps, spectroscopes, and other equipment for stone identification.

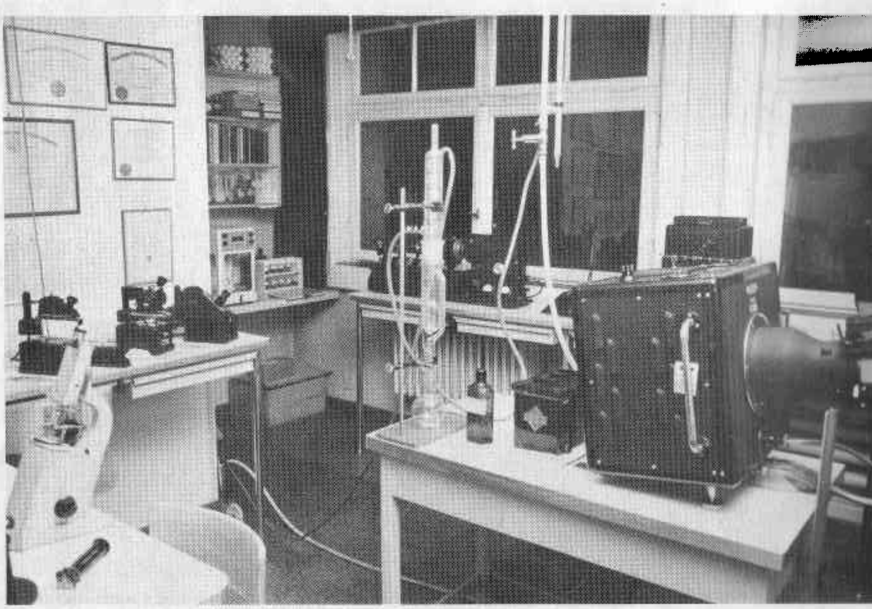
Switzerland

In Lucerne, we visited the remarkable gem-testing facilities of Dr. E. J. Gubelin, who maintains one complete laboratory and two special-purpose laboratories, the least of which would do credit to the term. Actually, the laboratory in a diamond room on the main sales floor of the Gubelin firm in Lucerne is purely for diamond grading, rather than a gem-testing facility.



Dr. Edward Gubelin measuring the angles of a brilliant-cut diamond with the two-circle goniometer in his diamondroom.





Two views of the Gubelin Gemological Laboratory.

Gubelin's private gemological laboratory

Note the Leica camera backs in position on the diffraction-grating photospectroscope, far right, and on both horizontal and vertical microscopes.

Gubelin's private gemological laboratory — the study corner.

The main laboratory, also in the store, is probably without peer. Certainly, the GIA Laboratories and the fine London Laboratory do not have the full variety of equipment that the Gubelin Laboratory boasts. Here Dr. Gubelin maintains X-ray diffraction and radiographic equipment; a quartz spectrograph; a variety of spectroscopes and spectroscope light sources, including a versatile light and spectroscope mount of his own design; a variety of ultraviolet light sources; separate balances for weighing and S. G. determinations; petrographic and binocular microscopes of recent vintage (and the only darkfield-illuminator-equipped binocular microscopes we saw in European laboratories) ; and many other instruments. Each of the three refractometers, including one of the three Rayner has made with a diamond hemisphere, is equipped with its individual monochromatic sodium light source. Each of the instruments set up for photography has its own Leica back in position.

Edward J. Gubelin earned his Ph.D. at the University of Zurich in 1938. Subsequently, in 1939, he traveled to Los Angeles to study at the GIA, earning a diploma that year. Since then, he has been equally successful as a scientist and a jeweler. The family firm, long concerned primarily with the manufacture and sale of Gubelin watches, is now a major Swiss, and even a major European, retailer of fine jewelry; in fact, it is one of the fine firms in Europe. Dr. Gubelin's enthusiastic appreciation of the beauty of gemstones and fine jewelry craftsmanship, as well as his knowledge of both, permitted him to increase jewelry sales rapidly.

He has always had a keen interest in both the scientific and esthetic aspects of gemstones. His inclusion studies have been of great value to the practicing gemologist, and his incomparable photomicrographs in color are the work of an artist. His invaluable articles on the diagnostic value of inclusions, both in identification and in determination of source, are familiar to all gemologists. Much of his early work on the subject is summarized in his book, *Inclusions as a Means of Gemstone Identification.* He has written valuable articles on many other gemological subjects. His prolific output is even more remarkable because it is accomplished during evenings and holidays, in addition to a heavy business schedule.

Dr. Gubelin trains other Swiss jewelers in short gemological classes, scheduled annually. His gemstone study collection for this purpose is outstanding.

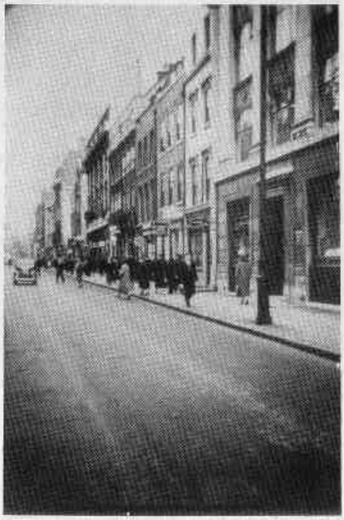
Edward Gubelin is an able motion-picture photographer. A movie in sound and color on gem mining in Ceylon, his most recent effort, has a thoroughly professional quality.

England

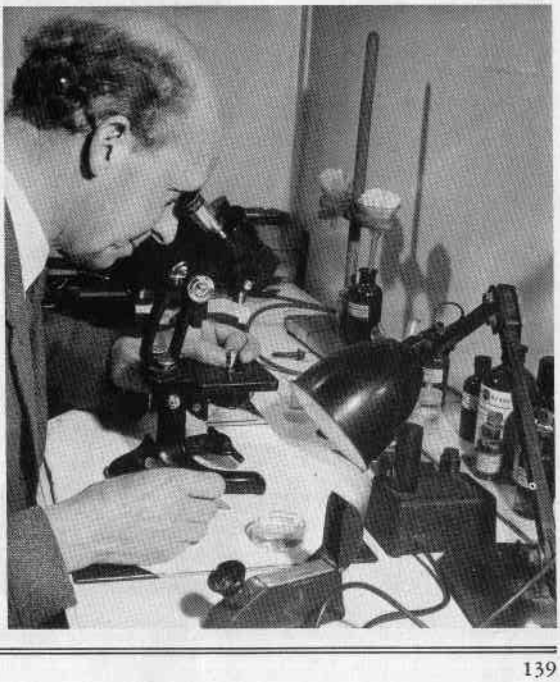
The London Laboratory was founded in 1925 by Basil W. Anderson, B.Sc., and is still under his direction. He is assisted by an outstanding staff, consisting of C. J. Payne, Robert Webster and A. E. Farn. The Laboratory occupies quarters a few steps below street level in a building dating from the 16th century. Although some of the equipment is less than elaborate, it has been used to great advantage over the years. The contributions of the staff to the fund of gemological knowledge has been nothing short of remarkable.

Anderson received his college training at King's College, London University, graduating in chemistry with geology as a minor. Payne, too, graduated from King's College, receiving his degree in geology, and joining Anderson in 1928.

Before undertaking the study of gemology, Robert Webster was in a family pawnbroking business. His studies at Chelsea Polytechnic led to his fellowship in the Gemmological Association in 1934. He was engaged in research while still at Chelsea. In 1946, he joined the Laboratory at an exceedingly busy time, "because he was," said Anderson, "the only man in the country of value to us without further extensive training."



Hatton Garden on a rainy day. The Laboratory is beneath the second sign.

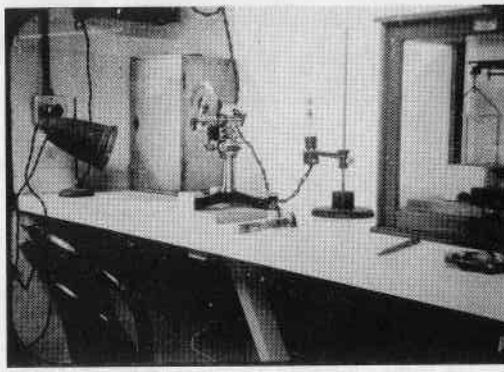


B. W. Anderson examines a ring under one of the London Laboratory's Greenough-type binocular microscopes.

Payne and Webster study a ring.

A. E. Farn weighs a lot of stones.

The London Laboratory's Abbe-Pulfrich Refractometer and special specific-gravity scale.



A. E. Farn joined the Laboratory in 1946 as a trainee when he was discharged from the service. He had been employed by a pawnbroking firm prior to the war and had passed his preliminary examinations for the FGA. He received his fellowship in 1947. Farn has been with the Laboratory for fifteen years. His name is beginning to appear frequently on articles in the gemological journals.

The London Laboratory was established by the Committee of the *Diamond, Pearl and Precious Stone Section of the London Chamber of Commerce* to provide a facility for distinguishing natural from cultured pearls. Anderson, who had just graduated from King's College, was recommended by his geology professor for the position. He established the first independent gem-testing laboratory in the world.

Since Paris was the center of the pearl trade and the seat of what pearl-testing research was being carried on, he went to that city to learn what he could. He started work with "a telephone, a balance and a 'Lucidoscope,' which tested pearls inefficiently by candling." The next year, the endoscope made its appearance and ended what had been a nightmarish period of attempting to make identifications without adequate equipment. The endoscope made possible the accurate identification of all drilled pearls. Soon in this heyday of the pearl there was too much work for one man, so Payne joined Anderson. They moved to larger quarters and installed X-ray equipment to identify undrilled pearls.

During the depression, the serious business decline provided the two men with the opportunity to engage in highly productive research. Much of the basic property-value information in gemology at the time was inaccurate; errors were passed on from author to author. Many errors were discovered and corrected by these two men during that period. They were responsible for the 1.81 refractive-index liquid (sulphur-saturated methylene iodide) used throughout the world today. They prepared the tetraiodoethylene (C_2I_4) that made it possible to provide this stable liquid. Both worked with Rayner in experiments that led to the use of a prism instead of a hemisphere and ultimately to their present

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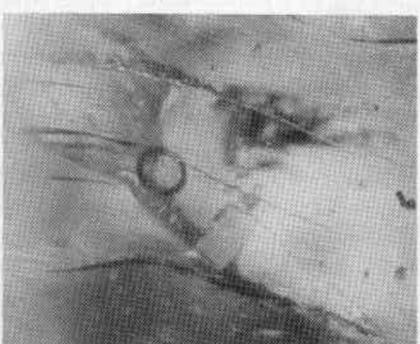
A New Emerald Find In Colombia

Colombia, long the major source of fine emeralds, has suffered a severe shortage of material for several years. Muzo reportedly has been worked steadily by the Colombian Government for more than two years without producing any high-quality stones. Therefore, the discovery of a new source of fine emerald rough was most welcome.

A few fine crystals were examined in the Los Angeles GIA Laboratory recently. Each of the clear, deep-green stones showed prism faces, and the two or three with basal pinacoids also had very small bipyramid faces of the same order as the prisms. We understand that production has ranged in size from one carat to about thirty carats. The rich, velvety color of the few we saw was reminiscent of the Muzo product.

Large three-phase inclusion.



Since the stones were available to the Laboratory staff for less than an hour, the number of property determinations was limited. Readings on sufficiently flat crystal faces gave refractive indices of 1.569-1.576. The single S.G. determination made was on a 20-carat crystal; it was 2.704.

Three-phase inclusions were noted in each of the crystals; one contained two large cavities with movable bubbles. Most of the stones were less flawed than material of comparable color from other sources examined in the past.

One interesting characteristic from an identification standpoint was the fact that the stones fluoresced to some extent, appearing to be slightly stronger than that of other natural emeralds. The fluorescence differed from that of the Chatham product, in that it did not seem to make the entire stone opaque; it still appeared to be transparent. It would be necessary, however, to make a side-by-side comparison of the two, in order to distinguish between them on the basis of fluorescence.

The new find was made at a point four hours by muleback from the village of Borur. This is about one hundred miles northwest of Bogota, and somewhat south of Muzo. It has been the scene of a wild rush of perhaps fifteen hundred miners. At this writing, the

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Developments and Highlights

at the GEM TRADE LAB in Los Angeles

by

Lester B. Benson, Jr.

Director of Research and Laboratories

Synthetic Spinel Doublets

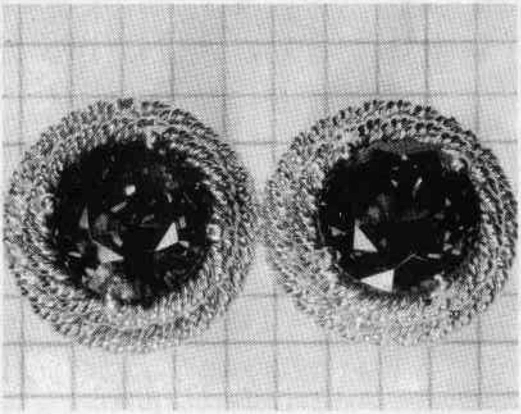
A selection of synthetic spinel doublets was submitted by a former student for comment. They are presently available in sixteen different colors, duplicating most of the common gem materials, including a black, almost jet-like variety. All consisted of transparent synthetic spinel crowns and pavilions joined together with a colored cement. A refractive-index reading detected them readily. Of interest, however, was the fact that they all fluoresced green under X-rays and, except for the peridot color, appeared red or reddish through the color filter. The latter turned an almost aquamarine blue.

Black-Opal Collection

The GIA staff was privileged to inspect an outstanding collection of approximately one hundred fifty black opals. Fifty-four representative stones were selected for recording and were photographed in stereo with the GIA's new equipment. The collection, which was started about fifty years ago, included a few stones in the 3½- to 5-carat range, but the majority were from 10 to 27 carats. Almost every conceivable type of play of color was represented.

Ruby Cufflinks!

The new cufflinks shown in the accompanying photograph contained very well-matched rubies. They had been offered as natural and were submitted for confirmation of identity. Tests revealed one to be natural and the other synthetic.



Cufflinks of natural and synthetic ruby.

The stones were so well matched that we were curious as to what led the owner to have them tested.

Carved Opals

Received for identification was an attractive strand of carved, oval-shaped white opals, ranging from approximately 12 millimeters to 25 millimeters in length. They exhibited only average play of color, but were beautifully carved. Of special interest was the fact that for years the owner had assumed they were glass and had kept them with her costume jewelry.

Hambergite

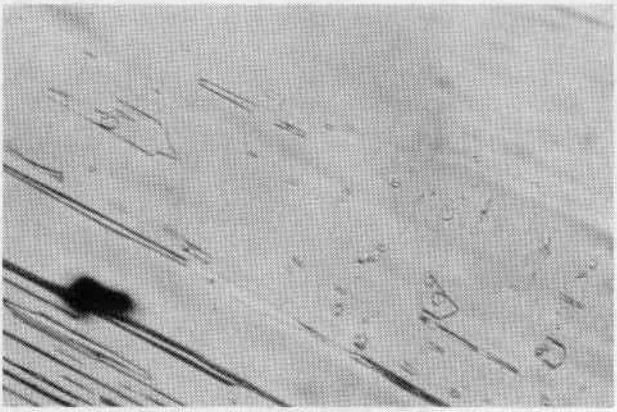
We examined a transparent to semi-translucent colorless piece of gem rough measuring 3.70 x 14.5 x 7.5 millimeters that could easily have been confused with colorless spodumene in appearance. The unusual properties of this rare mineral are unmistakable in testing however. The huge birefringence of .07, in the 1.55-1.62 refractive-index range and the low (2.35) S.G., plus excellent cleavage, identified the specimen as hambergite.

Natural Pearl with Color Change

A natural pearl measuring approximately 11.8 millimeters in diameter possessed a violetish-rose hue that was very obvious in daylight. Under standard fluorescent lamps, however, a very strong green overtone was present, resulting in a distinct color change between the two types of illumination. Had the violetish-rose and the greenish color been associated with incandescent and daylight illumination, respectively, it would have been easier to understand because of the predominance of long wavelengths in incandescent light and of shorter wavelengths in daylight. The color under incandescent light was approximately that produced by daylight illumination.

Unusual Three-Phase Inclusions

The included crystals in the three-phase inclusions of Colombian emeralds are noted for their cubic shape. In the September, 1951, issue of the Gemmologist (Vol. XX, No. 242), an exception was reported; namely, a hexagonally shaped crystal. A similar



Unusual three-phase inclusions.

specimen was encountered recently, and the inclusion is illustrated in the accompanying photograph. As explained in the Gemmologist, this is probably the result of an inclined orientation of the cube form, the outline of which then constitutes a six-sided form. A flattened dodecahedral crystal could also account for this, but it would be an unusual form for halite, which is assumed to be the mineral constituent.

Increased Demand For Marquise Diamonds

A number of comments recently from diamond dealers indicates an increased demand for marquise diamonds in this country and a shortage of rough that is practical for marquise cutting. The result has been an increase in price relative to other shapes. There is always a variation in pricing practices among importers of this fancy shape, but the demand has tended to accentuate it recently. The differential over comparable rounds has moved from the usual range of parity of 10 or 15% more for marquises to a range of about 10 to 30% higher.

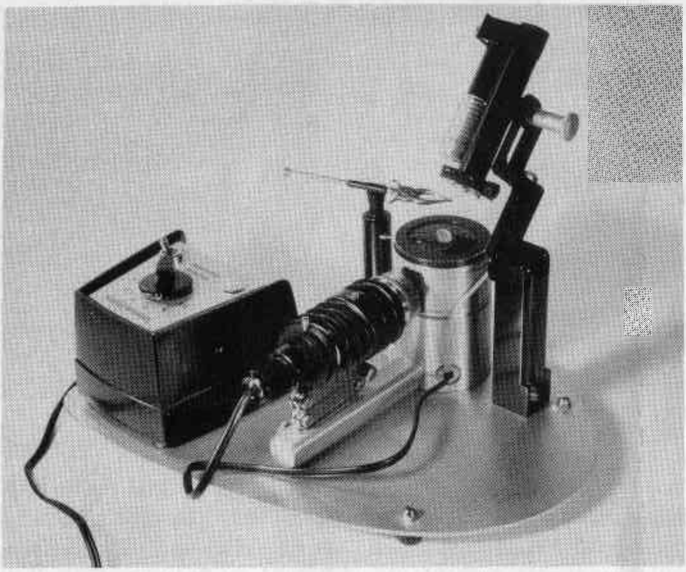
New Opal Substitute

A new opal substitute was encountered recently: a rock-crystal cabochon backed by abalone shell. It is a very good imitation.

GIA Spectroscope Unit

Teaching the use of the spectroscope in resident classes has always presented difficulties not encountered with other instruments. The need for both reflected and transmitted light for different stones, as well as high-intensity, heat-filtered focusable illumination, has required a number of accessories such as stands, diaphragms and baffles that could be assembled to meet specific requirements.

The time needed to teach effective setups has been reduced greatly by using the new unit shown in the accompanying photograph. Essentially, it consists of a small base platform on which is mounted a voltage regulator connected to a small, high-intensity, focusable spotlight. The spotlight is mounted on an arm attached to a cylinder containing a right-angle prism



GIA spectroscope unit.

and capped with a diaphragm. The cylinder and light source can be rotated within a 90° horizontal arc, whereas the spectroscope can be rotated in a 90° vertical plane (i.e., from a horizontal to a vertical position) while remaining focused on the stone. The stone may be placed on the freely rotating diaphragm, which is located on top of the drum just above the prism, or it may be held in the stone tweezers and positioned above the diaphragm. By resetting the level of the light source and tilting the spectroscope, light may be passed directly through the specimen to the spectroscope. As a rule, transmitting the light through the prism permits the highly efficient analysis of almost all specimens. The prism acts as a heat-absorber, which is particularly important when testing diamonds and other treated stones, whose absorption characteristics are affected by heat. A light baffle to shield the observer from the direct glare of the lamp is not needed, since it does not scatter the light. The lamp may be focused to a spot one-eighth inch in diameter, with a resultant intensity equivalent to that obtained from a 1000-watt projector through one-fourth-inch aperture at a distance of one foot. The horizontal rotation of the light source about the cylinder axis permits the light to be directed through the stone at right angles to the spectroscope axis, thus permitting the ready analysis of fluorescence emissions, as compared to absorption characteristics of direct transmitted light. The free rotation of the diaphragm makes it possible to orient the stone to assist in locating directional absorption.

The voltage regulator is of great assistance in setups, since initial adjustments can be made with low-intensity illumination. Moreover, lower voltage causes a higher percentage output in the red end of the spectrum, which results in easier analysis of characteristic absorption in the 6500-to-7000-A.U. range.

This is the first time that a highly compact spectroscope assembly has been made available that incorporates the variety of adjustments and setups required for diamond and colored-stone analyses. Production units, which are now available through the GIA, are equipped with the standard **Beck Wavelength Hand Spectroscope,** modified with the addition of a fixed intensity scale illuminator.

Acknowledgements

Los Angeles gemstone dealer, **Martin Ehrmann, C.G.,** increased the Institute's gem collection considerably when he donated fashioned stones of sphene, andalusite, kyanite, amethyst and citrine and also rough specimens of amblygonite and andalusite.

Boulder opal from Mexico has now been added to our collection through the courtesy of **Bill Ilfeld,** Santa Fe, New Mexico.

GIA student **John Krzton,** Chicago, presented the Institute with cabochons of jasper and myrickite (cinnabar-stained chalcedony).

A brown baguette diamond, donated by **Benn Davis,** Louisville, Ky., now graces a shelf in the Institute's diamond display.

Our thanks to **Samuel Frost** for the cerise-dyed, aventurine quartz, which will be a valuable addition to our practice sets.

When **Clarence Millsap,** Kansas City jeweler and a GIA student, visited the Institute recently, he presented a miscellaneous selection of stones that can be used to good advantage in our practice sets.

William G. Rowbury, GIA student, San Francisco, furnished the Institute with a rough and a cut specimen of "atomic glass." The yellowish material appears similar to the glass used in refractometer hemispheres. It has a high R.I. and S.G. and the dispersion approaches that of synthetic rutile. It is quite attractive when fashioned.

Following are students who have recently been awarded diplomas in the Theory of Gemology:

Norman Lentz, Norman Jewelers, Salisbury, North Carolina; **Curtis W. Lewis,** Hudson Belk Company, Raleigh, North Carolina; **James David Gainsley,** State Jewelry Company, Minneapolis, Minnesota; **Clifford R. Millsap,** Millsap & Johnson Jewelry Company, Kansas City, Kansas; **Alexander Jung,** La Canada, California; **A. G. Cuquet, Jr.,** Cuquet Jewelers, St. Louis, Missouri; **Edward E. Kern,** Michaels Jewelers, West Hartford, Connecticut; **Bernard H. North,** Toronto, Canada; and **Jacques Forgues,** Quebec, Canada.

Developments and Highlights

at the GEM TRADE LAB in New York

by

Robert Crowningshield

Director of Eastern Headquarters

Synthetic Quartz

A dark, tourmaline-green stone was presented to us for study as synthetic green quartz. No similar color has been reported in nature. It will be interesting to see if other shades more closely approaching that of emerald will appear. *Figure 1* illustrates the absorption spectrum of this handsome stone.

Unusual Stickpin

An unusual stickpin consisted of a 20th-century-cut diamond set into a drilled diamond rondelle and mounted in a gold collar. Both cuts of diamond are unusual, and all the more so to be found together.

Beryl Triplets

We have seen more examples of the beryl-and-beryl triplets cemented with green cement, which shows up red under the color filter. With natural beryl inclusions present, and mounted in a closed-bezel setting, a quick check of a stone of this type with only a color filter and a refractometer could lead one astray. The need to examine everything under the microscope is pointed up here.

Star Sapphire Doublet

Figure 2 is a photograph of a stone that appears to be a very fine, blue star sapphire. However, when observed in the microscope, under immersion in methylene iodide, it was found to be a doublet consisting of two parts of natural sapphire. The top was light gray and had an excellent star. The back provided the blue color. Although it is assumed the stones were joined by one of the new epoxy cements, the separation

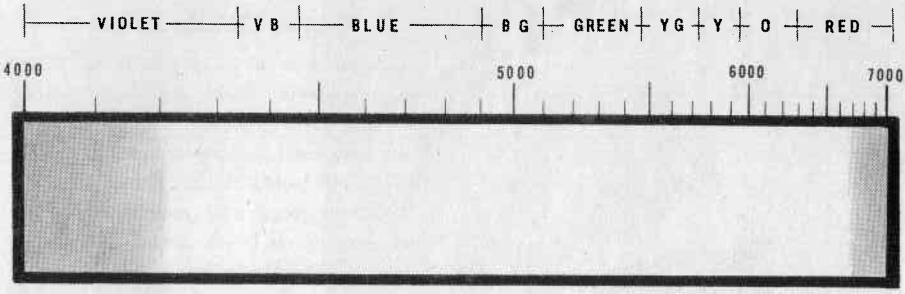


Figure 1

plane could be seen, as well as the rough sawed surface of the top section. The client had suspected the stone only because the back section appeared too "clean." If a poorer quality sapphire had been used for the back section, the stone possibly would have been accepted without question and a very high price paid, since the platinum setting aided in the subterfuge. Again, we cannot stress too highly the need to examine all stones carefully under magnification.

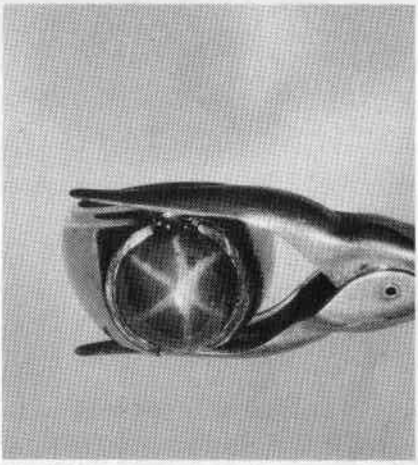


Figure 2

Dyed-Black Cultured Pearl

Figure 3 is a radiograph of a dyed-black half-drilled cultured pearl. Note that the nucleus has moved slightly, thus giving rise to difficulty in setting. This same movement of the nucleus occasionally gives a pearl-stringer difficulty.

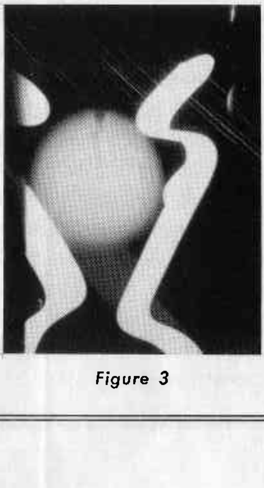


Figure 3

Hollow-Center Pearl

A pearl driller working on large Australian cultured pearls encountered one in which he did not feel the increased resistance as the drill passed through the mother-of-pearl core. The very lustrous and nearly round pearl was submitted for testing and proved to be a hollow-center cultured pearl. It measured approximately 10 mm. The

Figure 4

hollow center measured about 3.5 mm.

Treated Turquois

On two occasions, we have tested attractive turquois that did not show evidence of oiling or wax treatment, nor of plastic impregnation. However, in one instance, a strong hot light focused on a small spot on the back of the stone for a few minutes produced a bleached spot, indicating, perhaps, that the stone had been merely dyed with aniline dye. Another stone was boiled in water by the client and, according to him, the color faded appreciably. When we tested the stone, we could find no evidence of dye; and with the high specific gravity of 2.84 and the medium color remaining, it appeared to be natural in color at this point.

Ruby in Chrome Zoisite

Figure 4 is a photograph of some rough material from which attractive cabochons have recently been cut. It has been identified as ruby in chrome zoisite with black hornblende. The stones are a striking green and red combination with occasional black areas. The material is reportedly from an area between Kenya and Tanganyika. In the same area, in alluvial deposits, small rubies have been found that have been cut into stones up to one carat in weight. It is reported that the potential supply of these is adequate to commence commercial cutting. To date, we have tested three separate parcels of calibre-cut rubies reported to be from these deposits. Although they appear somewhat like the dark-red Burma ruby, they differ in that they do not fluoresce under longwave ultraviolet light.

Danger in Hardness Tests

The danger of the hardness test was illustrated to us when an attorney submitted for his client, a pawnbroker, a fine-quality three-carat emerald-cut diamond mounted in a lady's engagement ring. The only flaws we observed were the deep scratches resulting from a hardness test that had been applied by the client when he found that the owner of the ring had furnished a nonexistent New York address. Concerned with the possibility of having accepted a diamond substitute, he proceeded to make a hardness test on the table by using another diamond. We do not know what the owner of the ring had to say when he later redeemed the ring, since the scratches could be seen with the unaided eye, but the fact that the pawnbroker's attorney brought it in gives us a good

Figure 5

idea of the dialogue.

Wormlike Inclusions

We were very much amused by Lester Benson's note and photograph in the Summer, 1959, *Gems & Gemology,* illustrating a chalcedony cameo in which the client noted a "worm" that was recent in origin and increasing in size. We are very happy that we had his note as a reference, since we recently had a client with precisely the same complaint. *Figure 5* is an enlarged view of a round agate tablet showing very clearly the "wormlike" markings that the client was sure were organic. It was his claim that they had spread over the past few years, pushing the topmost bands closer together, in addition to showing up more clearly with the passing of time. At one point, convinced that there was a worm in his stone, he applied heat, but all that happened was for the holes to darken. It was our observation that the "wormlike" inclusions became visible only when they were exposed at some point by the cutting. Deep within the stone were some characteristic chalcedony whorls with what appeared to be "wormlike" inclusions; however, because of the semitranslucent nature of the stone, it was impossible to determine if they were merely unexposed inclusions or something entirely different. We wonder if anyone else has observed "worms growing in agate."

Absorption Spectra

Two somewhat different absorption spectra for diamonds are shown in *Figures 6 and 7. Figure 6* was taken from a very beautiful atomic-treated dark-blue diamond. In addition to the 5820 Å "treated" line, there is an additional, moderately strong line just past 6200 Å.

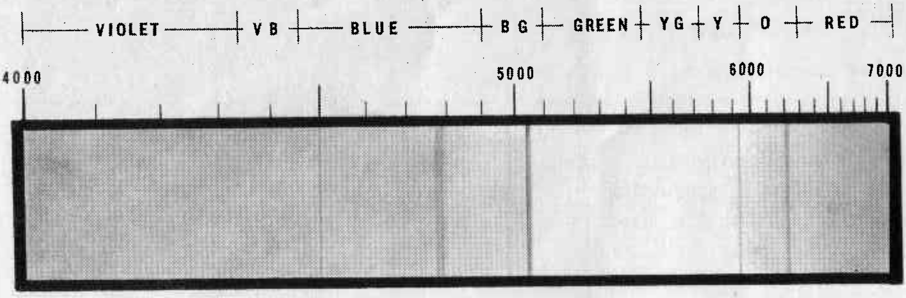


Figure 6

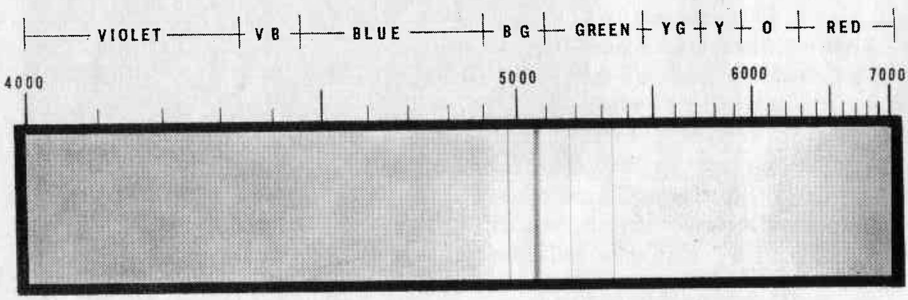


Figure 7

The stone had no fluorescence, possibly because of the dark color. The absorption spectrum in *Figure 7* was taken from a matched pair of greenish-yellow natural color diamonds with bluish fluorescence under long-wave ultraviolet light. It is the same absorption spectrum that we have come to expect from natural brown diamonds that show up green when a strong pinpoint of light is passed through them, with the exception of the 5180 Å line, which is rarely encountered in any diamond.

Misrepresentation

Figure 8 is a photograph of one of the most flagrant misrepresentations that we have seen recently. The photograph does not illustrate the deception, since it was printed on the inside of the well-tailored gift box and stated, "Genuine Fresh-Water Pearls." In fact, they were ordinary imitations with iridescent-glass stones ornamenting the metal.

"Coated" Diamonds

During the course of studying known natural-colored diamonds, we were fortunate in acquiring some rough Sierra Leone stones that the importer called "coated" stones. A different term would be preferable, because of the possible confusion with the existing term used in reference to the troublesome man-applied coatings on diamonds. One stone, illustrated in *Figure 9,* showed

Figure 8

a zonal distribution of color paralleling the octahedral faces. In the photograph, we are looking through a "window" polished by the cutter. Inside, the stone was virtually colorless. We were unable to discover any absorption characteristics in these stones that differed from the ordinary naturally colored green and brown stones.

Fallacy of Visual Examinations

With emeralds being found in new localities in recent years, some have appearances that confuse dealers long acquainted with the usual sources. Occasionally, mistakes are made when the identifications are based solely on visual examination. A case in point is the damaging appraisal of a handsome emerald in which the appraiser thought that he detected gas bubbles and subsequently informed his client that the stone was glass. The so-called gas bubbles were found to be a plane of black crystals

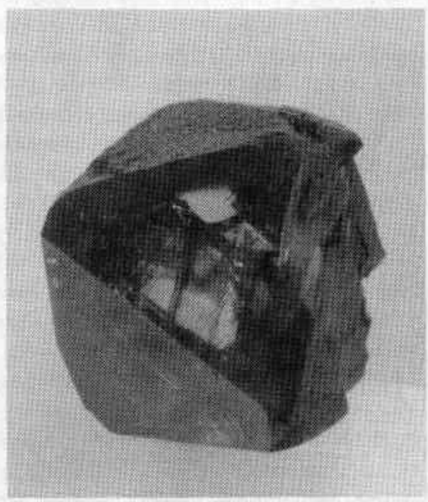


Figure 9

that appeared like doughnut-shaped gas bubbles when viewed under a loupe because of a light ring, or "halo," around

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Book Review

A history of the Crown Jewels of Europe, by Lord Twining. Format: 9 x 12 inches, 707 pages: 230 plates, containing more than 800 illustrations. Publisher: B. T. Batsford, Ltd., 4 Fitzhardinge St., London W 1, England. 1960. Price: 16 guineas (approximately $47).

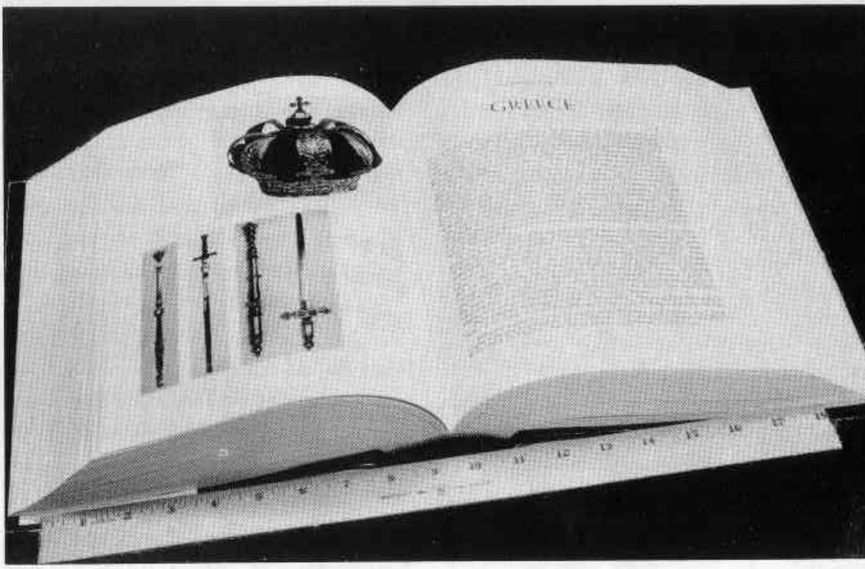
This is one of the most ambitious literary undertakings ever attempted in this field. It has been described as monumental, encyclopedic and comprehensive; but these adjectives seem almost inadequate, since it encompasses 707 9- by 12-inch pages, about 800 individual photographs, and information on more than 600 crowns, 187 scepters, 98 orbs and 116 ceremonial swords! It covers a period of seventeen centuries, and each of the twenty-seven chapters deals with a different country in Europe. The author, Lord Twining, studied a vast amount of literature in nearly twenty languages and visited most of the countries concerned, in order to examine the jewels of which he has written.

Conceived nearly thirty years ago, Lord Twining originally intended the book to be in two parts. He planned the first of these to be a study of the origin, development and meaning of royal ornaments, with additional chapters on Orders of Chivalry, precious materials and symbolism. The second was to be a country-by-country description of all the European crown jewels. It soon became obvious, however, that the information required to write Part II had to be available before Part I could be undertaken; hence, the present volume. Therefore, it is to be expected that Part I will be forthcoming sometime in the future.

Regalia and other crown ornaments have played an important part in the history of Europe, and the author describes in fascinating detail their adventure-filled histories: how they have been hidden, buried, stolen, pawned, sold and broken up for political reasons, and how murders and other violent crimes have been committed in attempts to gain possession of them.

The book describes fully the personal jeweled ornaments in the great treasures of Europe's royal houses, which can be included under the term *crown jewels.* Among these are some of the most celebrated and fabulous diamonds, pearls and other gems known to history; their stories are important not only historically but also in more purely human terms. The book, in fact, covers a wider range of regal insignia than has ever been assembled in one volume, and discusses numerous items whose existence has formerly been known to only a few.

In addition, many absorbing and little-known facts are brought to light. One of these is that the English coronation ceremony and regalia has a longer and more continuous history than that of any country in Europe. It is only in England, apart from the Papacy, that the coronation service survives. Strictly



speaking, the kings and queens of England are the only persons in that country who are entitled to wear the royal crown.

Little is known of the regalia and rights of the English pagan kings, but as late as 1956-1957 some bronze diadems and crowns, probably dating from the second and fourth centuries A.D., were found in Hockwold-cum-Witton, on the southern boundary of Norfolk.

When the very earliest kings were crowned and anointed, little thought was given to the need for a permanent set of coronation ornaments. But, as nationhood was established, the Church gradually gained the right to crown a king and claimed custody of the regalia, to make sure that there were no candidates of whom the Church did not approve. The abbots and monks of Westminster claimed that they possessed the crown and other relics of St. Edward that were to be used at the coronation of English kings. Similar claims were made in other countries, and it is thought that the clergy at Monza, who asserted that they were custodians of the Lombard Crown, may have faked a crown to strengthen their claim!

Neither has the author neglected the lighter side of his subject. He relates one humorous incident, for example, pertaining to the coronation of George III and Charlotte. This ceremony was something of a fiasco, because the Sword of State was completely forgotten and the Sword of Justice was found to be missing at the crucial moment—because the person who had been delegated to carry it had slipped into a nearby grog shop to fortify himself against the strain of the forthcoming ordeal!

This brief description should be sufficient to indicate that *A History of the*

Crown Jewels of Europe is truly an extraordinary book — one that approaches a vast subject in an erudite and workmanlike manner. Even so, the text is well written and engrossing. Moreover, Lord Twining must be praised for his efforts in acquiring and assembling the multitude of photographs, many of which are new. It will perhaps seem regrettable to some, however, that at least a few color plates could not have been included.

Unlike so many otherwise excellent books that are used frequently as reference works, it is indeed pleasing to report that the author has seen fit to include a comprehensive 39-page index. Researchers and other serious readers will welcome the bold-face listings of the more important references, the italicized captions, and the symbols indicating the number of references on the same page. A selected bibliography is given at the end of each chapter, and a list of general works is included in the back of the book.

This is an exceptional book — one that should occupy a place of honor and respect in the library of every earnest student of gems and jewelry. It, as well as the proposed companion volume, will undoubtedly become a prized collector's item.

Gemological Digests

Jagersfontein Mine

Prolonged negotiations between De Beers Consolidated Mines, Ltd., and the Union of South Africa Government will extend the production period of the Jagersfontein Diamond Mine for approximately ten years longer. Last year, there were strong rumors that the Jagersfontein Mine would be closing down. However, in anticipation of a successful conclusion to the negotiations, De Beers has already carried out preliminary work at the mine to "drop down" from the present level of 1,870 feet to 2,500 feet. Production from this new level will start in 1964.

New Method of Cutting Diamonds

A new method of sawing diamonds has been developed by Industrial Distributors, Ltd., Johannesburg, South Africa. The stone to be sawn is immersed in paraffin and a spring-loaded metal blade is placed on it. The blade is coupled to an electrical supply at several thousand volts and the diamond beneath the blade is eroded away. A one-tenth-inch diamond was cut in two in just over two hours, a job that might take a day or more the old way.

Russia

The Soviet news agency, Tass, reports that a new and large diamond-bearing area, incomparably richer than the Soviet Union's world-famous "peace pipe," has been discovered in Yakutskaya, in the valley of the River Sokhsolookh. This new deposit, which bears the name "Aihal" (glory), is situated in an area that is extremely difficult to reach; however, a convoy of trucks carrying equipment and supplies for geologists has been sent into the area from the Yakutskaya diamond-mining center at Mirny.

Antarctica

According to Tass, a Soviet geological survey has revealed that large deposits of gold, diamonds, iron, mica and other minerals may be found on Queen Maud Land, Antarctica.

Indonesia

It has been reported that the Indonesian Government is conducting exploration deep within Borneo, with a view to developing the interior of the island, eventually helping the Republic to become self-sufficient. In 1960, there was a rush to a new diamond field at Kahaju Hulu, in central Borneo. Approximately 30,000 people came up from the coast when four diamonds that later were sold for £10,000 were found in a river bed. Several fair-sized diamonds have been found, and just recently a 12-carat stone valued at about £8,000 was found.

Portable Diamond Detector

It has been reported that a portable device for detecting diamonds has been developed in the Soviet Union. The operation of the system depends on the use of radio-isotopes, which eliminates the need for cumbersome X-ray equipment. According to the original report from "Tass," the tests carried out with the new equipment are said to have shown that it was exceptionally efficient in operation and that no failures in detection of even very small industrial diamonds had so far been encountered.

EUROPEAN LABORATORIES

Continued from page 141

refractometer design. They also experimented with synthetic spinel, sphalerite (blende) and diamond prisms for refractometers.

Starting in 1932 with the most rudimentary equipment, Anderson pioneered in the work on the spectroscope for gemtesting. Working with Payne, he proved the value of the instrument in gem identification. It has become increasingly useful with each passing year. The Chelsea filter was also perfected at that time. Not long ago, Anderson was assisted by Payne in the preparation of a 39-part article in *The Gemmologist* summarizing their findings over the years in spectroscopy. The "immersion-contact" photography and "immersion-contrast" techniques for refractive-index determinations are useful recent additions to Anderson's published works. These are but a few of the many contributions of these men.

During the war, when Payne was in the service, Anderson operated the Laboratory and spent three nights a week in the London fire service. Even so, he found time to write the first edition of his outstanding book, *Gem Testing for Jewellers* (now entitled *Gem Testing*). He also pioneered in work on diamond fluorescence and absorption, a field recently receiving increasing attention.

All of the men on the staff have written many articles of value to gemologists. In addition, Webster wrote *Practical Gemmology* in 1941 and *Gemmologist's Compendium* in 1937-38, both exceedingly useful works. He has also completed a third very comprehensive book that will soon be published. Webster has contributed well over 100 articles to the journals in this field.

The Laboratory has the original diamond-prism refractometer made by Rayner, as well as several standard Rayners and spinel-prism Rayners. It also has an Abbe-Pulfrich refractometer for use when readings to more than two places are necessary. Other instruments include a table spectrometer; a quartz spectrograph; an electric furnace; a variety of spectroscopes; a number of binocular microscopes, endoscopes and ultraviolet-light sources; and a variety of minor equipment. The Laboratory has tested over 1,500,000 pearls and 100,000 stones in the 36 years of its existence.

In summary, the European Laboratories leave one with the conviction that the people who have made them famous combine remarkable competence with genuine sincerity and a warmth of personality. It was a privilege to visit their fine facilities.

L. A. LAB NOTES

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each crystal. We have noted similar inclusions in stones from the Gachala Mine, in Colombia.

Unusual Stones

Among the rare stones that we have seen in the laboratory since the last issue of *Gems & Gemology* are chondrodite; a flawless green diopside; a small stone with the properties of stibiotantalite but resembling a fine sphene; a fine square-cut blue kyanite; a pair of enstatite cat's-eyes; faceted transparent rhodochrosite, sillimanite, euclase, pollucite, cassiterite, willemite, and pink scapolite.

Acknowledgements

We are very happy to acknowledge gifts of synthetic star sapphires and rubies from **Mr. Pete Brown,** Linde Air Products Company, and from **Mr. Werner Von Clemm,** of The Gemma Company. These stones were very much needed to increase the effectiveness of our new one-week gemstone-substitute-detection class. We wish to acknowledge with thanks the gift of pink and blue diamonds from **Mr. Martin Harman,** of the Wander Company, New York City. From **Miss Gertrude Gold,** former Baumgold Brothers public-relations director, we received a handsome specimen of rough chrysocolla and other copper-alteration minerals from the area of King Solomon's Mines, in Israel. Miss Gold personally collected the specimens during a recent trip to Israel.

NEW EMERALD FIND

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government has not yet determined who should be granted the right to work the property; the army, however, has surrounded the area, to keep order and prevent robbery. The discovery was made by local residents.

It will be interesting to see how extensive the new find is in relation to past discoveries. The Vego de San Juan Mine, better known by the name of the nearest village, Gachala, has been the subject of litigation for two years and has been closed for that reason. Since the Chivor and Muzo Mines are apparently producing nothing of note, Borur could not have been discovered at a more propitious time.

Los Angeles Substitute Detection Class

Members of the Los Angeles Substitute Detection Class that met February 27th, through March 3rd. From left to right: **Harry J. Fink,** Tujunga, California; **Robert W. Milton,** Laredo, Texas; **Joseph F. Hannon,** Corona, California; **George Whitely,** San Francisco, California; **Billy J. Cooksey,** Pecos, Texas; **Harold H. Masada,** Fresno, California; **Walter Wright,** Los Angeles; **Jerrie L. Sparks,** Los Angeles; **Allan M. Moffit,** Salt Lake City, Utah; **Norman Teufel,** Buffalo, N.Y.; **Olle Torndahl,** Stockholm, Sweden; **Franklin A. White,** Los Angeles; **Mrs. Elizabeth Grace,** Sepulveda, California; **Mrs. Sallie Morton,** San Jose, California; **David Widess,** Los Angeles; **Dr. Ellwood T. Reese,** Twin Falls, Idaho; **M. Arthur Azevedo,** San Francisco, California; **M. G. Morton,** San Jose, California; **Mrs. Sylvia Fradkin,** Los Angeles; and **Forrest W. Dickey,** Bakersfield. On the spiral stairway left to right: GIA instructors **William A. Allen; Gale M. Johnson; Richard T. Liddicoat, Jr.,** Executive Director; and **Lester B. Benson, Jr.,** Director of Research and Laboratories.

Chicago Jewelry Design Class

Members of the Chicago Jewelry Design Class that met March 21st, through March 25th. Standing left to right: **Joe Foster,** Athens, Ga., **James M. Rudder,** Atlanta, Ga.; GIA instructors **Robert Crowningshield,** and **Lester B. Benson, Jr.; Art Liebermann, Jr.,** Joliet, Illinois; **Alva Collins,** Shelbyville, Indiana; **Harold Tivol,** Kansas City, Missouri. Seated left to right: **Elaine Cooper,** Philadelphia, Penna.; **Dorothy G. Riedel,** New York City; **Kathryn M. Everhart,** Fairfax, Virginia; **Lester W. Moon,** Tallahassee, Florida; and **Ray D. Pixler,** Kalamazoo, Michigan.