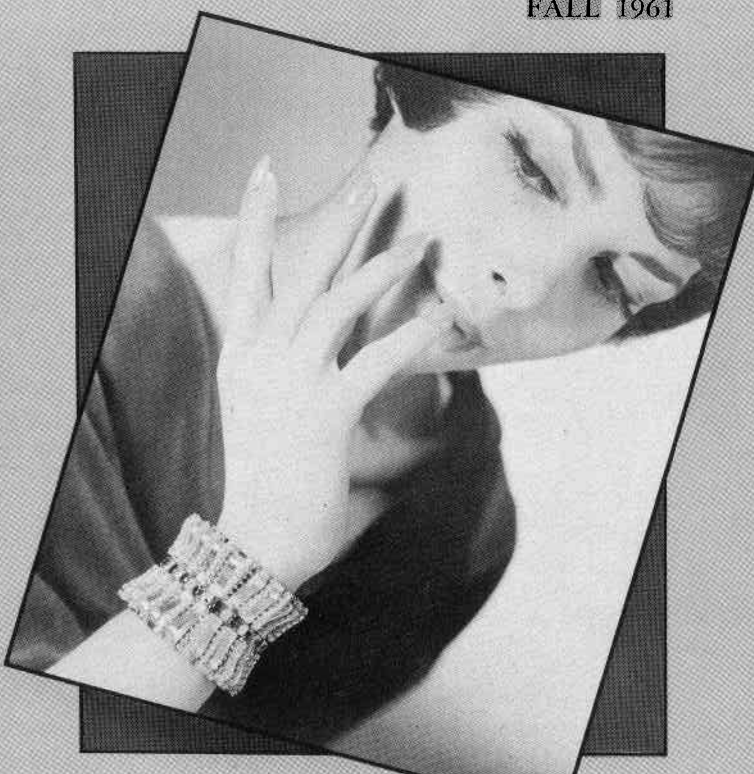
# Gems and Gemology

FALL 1961



See Inside Cover

Gems & Gemology

VOLUME X FALL 1961 NUMBER 7

## IN THIS ISSUE





### *On the Cover*

*This distinguished cuff-bracelet, consisting of alternating ribs of round diamonds and 18-karat yellow textured gold, seems to be tied in the mid-region by a ribbon of oval diamonds and deep-blue sapphires set in platinum. Designed by Black, Starr & Gorham, New York City, it was one of the fifteen that received awards in the Diamonds-International Awards, at the Waldorf-Astoria, New York City, October 3, 1961.*

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

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# The Gemstones of Brazil

*by*

Francisco Muller Bastos

Brazil is a privileged country in respect to gemstones; they are found in many of the twenty-two States and four Territories that comprise the country. In addition to colored stones and diamonds, gold also is found in large quantities. Let us study each state separately, beginning with Rio Grande do Sul, which is situated in the extreme southern part of the country.

### Rio Grande do Sul

This State is known as "the land of agates," since all shapes and colors occur abundantly. Geodes containing agate, rock crystal or amethyst make outstanding collectors' items, because of their beauty and great size. Another unusual agate contains water. However, very few of the agates found here are used for cutting.

This State also produces a variety of amethyst that, when heat treated, becomes "topazio do Rio Grande," a more familiar misnomer for which is "Rio Grande topaz." To the layman, and even to many dealers, this creates confusion, because they are led to believe that the stone is a variety of topaz.

### Parana

The State of Parana, bordering on Rio Grande do Sul, was famous several years ago for the diamonds found in the Tibagi River; however, in recent years, smaller quantities have been produced.

### Goiás and Mato Grosso

Many gemstones have been produced in the States of Goiás and Mato Grosso, the principal one being quartz. Several mines furnishing good-quality rock crystal are situated in this area, mainly in the district of Cristalina. Sapphires from the Coxim River in Mato Grosso, as well as emeralds from the Lages farm in Goiás, have been produced but in very small quantities. The production of diamonds is surpassed only by the State of Minas Gerais; many beautiful stones have been found.

## Espirito Santo

Following the States of Minas Gerais and Bahia (discussed below), in respect to the production of gemstones, is the State of Espirito Santo, from which comes some of the best citrine-quartz found in Brazil. (Espirito Santo is bordered on the north by Bahia and on the west by Minas Gerais. It has the typical geological formations of those States and produces similar gem minerals.) This famous citrine is mined at Baixo Guandú, a small place situated in the eastern part of the State. In its natural state the color is dark; the beautiful reddish-yellow color is the result of heat treatment. Citrine also is found in a pleasing yellow color, making it unnecessary to undergo treatment.

Another well-known mine in this section of Brazil that formerly produced high-quality aquamarine is called Itaguassú after the district in which it is situated. Hundreds of kilos of material were found here, but the deposit is now considered exhausted. Recently, however, some attractive andalusite was recovered in the area.

## Bahia

The State of Bahia has only recently been discovered as a source of gemstones other than amethyst. The best Brazilian emerald comes from the city of Conquista. Although this material is lighter in tone than that from the Muzo and Chivor Mines, in Colombia, it is very attractive; however, the production is somewhat limited. Garnet and citrine have been found in the district of Caetité, situated in the southwest part of the State. Recently, large deposits of beautiful blue sodalite, resembling lapis-lazuli in appearance, were discovered in Bahia. It is used for ashtrays, tumbling, etc., and for industrial purposes. Large deposits of amazonite also have been discovered, but the material is of industrial quality.

Nevertheless, the most important gemstone in Bahia is amethyst, the best of which comes from the famous "Brejinho das Ametistas." It has a beautiful velvetlike color, and some of the stones show flashes of red when cut. It is not unusual to see many high-quality stones weighing 30, 40, 50 and even 60 carats. Vast quantities of this fine material are shipped to Idar-Oberstein, Germany, for cutting. On the other hand, the mines of Cabelluda produce only small stones; one larger than ten carats is seldom seen. The color, although darker and of a different shade of purple, is very pleasing. If Rio Grande do Sul is known as "the land of agates," it can safely be said that Bahia is "the paradise of amethysts."

Another interesting gemstone that comes from Bahia is the green variety of quartz known as prase. It should not be confused with the so-called prase from a mine near Brejinho, which is heat-treated quartz. Quantities of the latter have been marketed in recent years. Some of it, when properly heat treated, approaches the beautiful green color of the best tourmaline.

## Rio Grande do Norte and Ceará

Gemstones have been mined in the northern section of Brazil, in the States of Rio Grande do Norte and Ceará. During World War II, the exploitation of scheelite in Rio Grande do Norte revealed occurrences of gem minerals in the pegmatite dikes of the State. As a result, some aquamarines of very good color were found. Large garnets also were mined and marketed. At the present time, quantities of amethyst in small sizes are produced.

### Minas Gerais

Finally, there is the State of Minas Gerais, meaning "General Mines." A well-known geologist who visited the State several years ago expressed his admiration for the quantity of gold and iron that he saw there by saying, "Minas Gerais is a heart of gold in a chest of iron." The author would like to add two words to this statement to make it read, "Minas Gerais is a heart of gold *and gems* in a chest of iron." It seems that only on the islands of Ceylon and Madagascar, and possibly in Burma, can such a wide variety of gem minerals be found. In this area both primary and secondary deposits are gem sources. Ninety percent of all gemstones are found in pegmatites, since the greatest concentration of pegmatite dikes in the world is located in Minas Gerais and the surrounding States.

Although Minas Gerais has been a heavy producer of gemstones for many years, the greatest demand for both industrial and ornamental minerals came during World War II. The search for rock crystal, sheet mica, industrial beryl, columbite, tantalite and cassiterite was responsible for an increased interest in gemstones, because often these important minerals were found in association with gemstones. Consequently, many gem-rich pegmatites were discovered, and quantities of various gemstones began to appear on the market. From this period to a short time after the War, there were about 250 lapidaries in Belo Horizonte, the capital of the State, and 150 or more in Teofilo Otoni, the two principal centers of the gem industry in the country. In Rio de Janeiro, there were a few lapidaries and several more scattered in the southwestern part of the State.

It is of interest that, in addition to all the stones produced and cut in Minas Gerais, great quantities of agate from the State of Rio Grande do Sul were sawed, dyed and cut, subsequently becoming the "black onyx" that was shipped to the United States to be used in signet rings. Eventually, after the War, the gemstone industry returned to normal.

Beryl constitutes the major portion of the gemstones produced in Minas Gerais; ninety-eight percent of the production comes from the northern and northwestern sections of the State. The five principal colors — green, yellow (heliodor), pink (morganite), blue (aquamarine) and colorless (goshenite) —are mined in great quantities. The colorless variety has little commercial value, other than as a curiosity. Green beryl occurs in various shades, but the color approaching that of emerald is rare. As stated previously, the best ones come from Conquista, in the State of Bahia.

Many of the beautiful blue aquamarines of Brazil are produced by heat treating the green variety of beryl; therefore, because of the temptation of obtaining the higher price that the good blue quality commands (sometimes two to three times higher), a significant percentage of the attractive green stones never reaches the market.

In its natural state, morganite, the pink variety of beryl, often has an undesirable yellowish tint. Because of this, approximately ninety-five percent of the total production is heat treated, to produce a more attractive and valuable color. Material from certain regions turns to an unusual rose color. A small percentage of the natural yellowish-colored stones are retained as curiosities. Although minute rutile needles are present in the majority of morganites from Minas Gerais, beautiful flawless stones are often found.

Beryl from this area occurs in shades varying from yellow to yellowish green. A deep-yellowish-red variety is called "berilo boca de fogo," or "fire-mouth beryl." However, it is not as common as the yellow or the yellowish green.

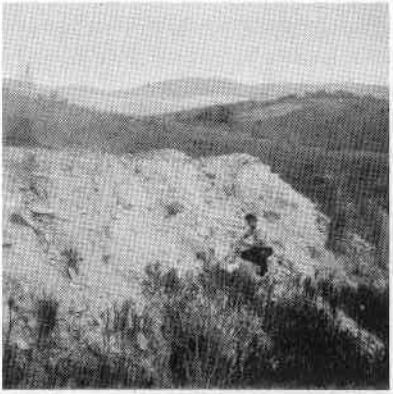
Minas Gerais is a heavy producer of aquamarine. Some of the world's most noted and beautiful specimens were discovered in the mines in the northern and northwestern part of the State. The famous Marta Rocha Aquamarine, found in 1954, was named in honor of Miss Marta Rocha, a Brazilian, who took second place in the International Beauty Contest in the United States. This outstanding stone, which was found on a farm near Teofilo Otoni by workers who were looking for industrial-type rock crystal, weighed about 74.8 pounds. At first, they thought it to be a large crystal of dark-colored quartz. About seventy percent of the stone was cutting quality; the largest area had the finest blue color ever noted. Since then, it has become a criterion for fine color in aquamarine. Although the Marta Rocha was outstanding and rare, the beautiful stones that formerly came from the Santa Maria Mine must not be overlooked. It is situated near the village of Santa Maria do Suassui, in the northwestern part of the State.

Today, the best aquamarines come from the city of Pedra Azul (blue stone), formerly known as Fortaleza. Almost all of them should be heat treated, as a means of changing their slight green hue to a more desirable blue. It is interesting to note that many stones, even those containing flaws, can be heated successfully without fracturing.

The Brejauba Mine, one of several in Minas Gerais that has been exploited very little, is situated near the village of San Jose de Brejauba. It produces one of the most beautiful green beryls of Brazil; however, very few of the stones retain their original color, since the majority are heat treated.

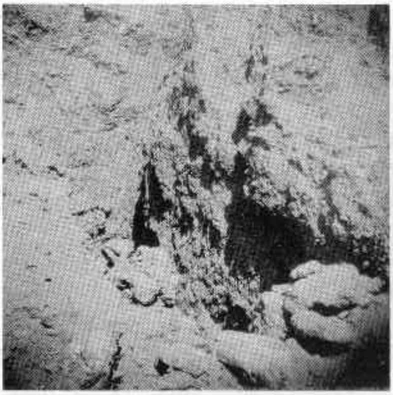
Another source for deep-blue aquamarine is the city of Ferros, situated in the center of the State; however, stones larger than twenty carats are seldom recovered. Good stones also have been found in the vicinity of Mantena, Sabinopolis, Ataleia and Teofilo Otoni.

Tourmaline occurs in almost every size and color in Minas Gerais. It is interesting to note that the mine often assumes the name of the place or town in or near which the stones are found. The largest producer, and the source of the finest stones, is the town of Barra de Salinas, in the northern section of the State. The two most desirable colors are green and pink. The color of some green tourmaline is made lighter by heat treatment. The same process is used to drive out the brown content in the pink stones, and thus produce a more attractive color. Rubellite, the red to purplish-red variety, is called "pigeon's blood" by the natives. Beautiful tourmaline is found in the vicinity of Malacacheta, Turmalina, Rubelita and Nova



View of a tourmaline-producing pegmatite, Barra de Salinas, Minas Gerais, Brazil.

Both pink and yellow topaz are produced from the Morro Mine at Hargreaves, Minas Gerais, Brazil. Author Bastos is removing gem-quality topaz from the red earth.



A typical hole, or pocket, in a pegmatite located at Novo Cruzeiro, Minas Gerais, Brazil. Aquamarine is found here, mixed with kaolin and a decomposed mica.

Holes in the pegmatite dike from which tourmaline was mined at Malacacheta, Minas Gerais, Brazil.

Cruzeiro, where it often occurs in the mica mines. All of these localities are situated in the northern to northwestern section of the State. In addition, the towns of Itapore, Rubim, Aimores, Conselheiro, Penana and Araguary are producers. All of these areas often furnish unusual and beautiful specimens for the collector.

From Campo Belo, in the southwest,

comes some of the best citrine of Minas Gerais; as usual, it should be heat treated, if the yellow color with flashes of red is desired. Medium-quality quartz is available in large lots from numerous areas and at reasonable prices. The smoky variety and the color called morion are cut in great quantities. Other localities that produce citrine are Diamantina, Conselheiro Mata, Bom Depacho and the famous Bakú Mine, which is situated at Sete Lagos, in the center of the State. The latter mine, however, has been more popular for the production of rock crystal than for citrine.

The best garnets are found at Resplendor and Barra do Cuité, both in the northwestern part of the State. Hessonite and demantoid are rare, but other varities occur in appreciable quantities. Garnets also are found at Itinga, Conselheiro Rena and Itaboaum.

The yellow and pink varieties of topaz are found in Minas Gerais but only in the region of Ouro Preto, one of the oldest cities of Brazil, and in the adjacent communities of Rodrigo Silva, Cachoeira do Campo and Hargreaves. Although most of the pink material derives its color from heat treatment, some occurs naturally in this color. The recovery of fine stones is rare, and it is unusual to find a flawless stone weighing more than ten carats. There is an abundance of flawed material, but it is not used for cutting. Blue topaz has been found at Marambaia, in the northwestern part of the State. Huge colorless crystals also have been discovered, but they are used only as collectors' specimens.

Euclase, one of the rarer stones, has been mined in the Ouro Preto area. It occurs in attractive light tones of blue, green and yellow, as well as colorless, sometimes in well-formed crystals as much as two inches in length.

Chrysoberyl, one of the most beautiful gemstones, is found near Teofilo Otoni. It is recovered also from the panels (holes) of the Jequitinhonha River, associated with andalusite, pyrope and hessonite. It occurs in several shades of green and yellowish green, the latter being the most appreciated. No occurrence of alexandrite has been noted. High-quality cat's-eyes also are found in the Teofilo Otoni area, and stones of fairly large size are seen frequently. Some are semitransparent with a sharp, white eye; others are translucent with either a white or a brown eye. Andalusite, besides occurring in the gravels of the Jequitinhonha River, is found also in crystal form in the vicinity of Teofilo Otoni.

A few peridotes and opals are mined at Teofilo Otoni. Some of the opals show a characteristic play of color and are quite attractive, whereas others are milky and have slight appeal.

Spodumene deposits are located near the city of Governador Valadares, in the Rio Doce Valley. Some of the yellowish-brown material turns purple when heat treated. In February, 1961, a strike was made and spodumene of all sizes and in various colors appeared on the market. It is interesting to note that only approximately five percent of the entire production is the green variety, hiddenite. Occassionally, it is found in association with yellow to yellowish-green crystals.

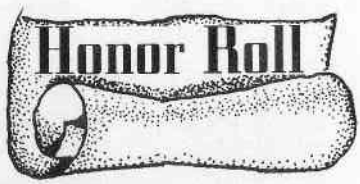
A few occurrences of corundum and spinel have been noted, but in small quantities and small sizes. The color of this material, mainly the ruby and the blue sapphire, was very good.

Aventurine and labradorite, from the feldspar group, is available in large quantities; however, the occurrence of moonstone is rare.

The industrial variety of zircon is found in the region of Pocos de Calda. The rare minerals brazilianite and kyanite also occur, but in limited qualities suitable for cutting. Again, fine specimens of all stones desirable for collections are available from time to time in the market.

The majority of diamonds produced in Brazil come from Minas Gerais. The city of Diamantina, situated in the central part of the State, can be considered the principal center of the diamond industry in South America. The diamonds from this area are not large, but the color is superior. Parcels of fine-color stones in the .10-, .20- and .30-carat size range are seen frequently. Also, from the town of Piui, in the eastern part of the State, at the headwaters of one of the most important Brazilian rivers, the Sao Francisco, good-quality diamonds have been found. One of the world's most famous diamonds, the 261.88-carat Estrella do Sul (Star of the South), was found near the small town of Bagagem in 1853; its weight after cutting was 128.50 carats. The well-known Presidente Vargas diamond, weighing 726.60 carats, was discovered at Coromandel in 1938. It was cut into 23 stones, eight of which were important emerald cuts weighing from 17 to 48.26 carats.

One should not be surprised to find almost any species or variety of gemstone in this country, since new sources are being discovered each year. Truly, Brazil is a privileged country in respect to gemstones.




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

**Curtis W. Lewis,** Hudson Belk Company, Raleigh, N. C.; **Wayne H. Hunter,** Way-Fil Jewelry & Gift Shop, Booneville, Miss.; **Julius C. Maier,** Julius Jewelers, Syracuse, N. Y.; **Richard L. Kraft,** Jorgenson Jewelry Company, Sheridan, Wyo.; **Robert J. Kenney,** Hosken Jewelry Store, Frostburg, Md.; **Phyllis Brantley,** Trein's Jewelry, Dixon, Ill.; **Don B. Dalzell,** Henry Birks & Sons, Ottawa, Ontario, Canada; **Jack Monchecourt,** J. R. Wood & Son, Inc., New York City; **Thomas L. Thompson,** Thompson Jewelry, Napoleon, Ohio; **La Verne Jobe,** Jobe Jewelers, Hillsboro, Texas; **James Ian McAskill,** Kingston, Ontario, Canada; **Harry Allen Sturdevant,** Chicago, Ill.; **Robert N. Hackett,** Pittsburgh, Penna.; **Alan David,** Philadelphia, Penna.; **Philip Henry Rynn,** Nahant, Massa.; and **Leo J. Weber,** San Antonio, Texas.

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

**Joseph A. Ghegan,** Irvington, N. J.; **Velma Mae Caldwell,** Traverse City, Mich.; and **Richard Caldwell,** Traverse City, Mich.

# Corundum in Tanganyika

*by*

Robert Webster, F. G. A.

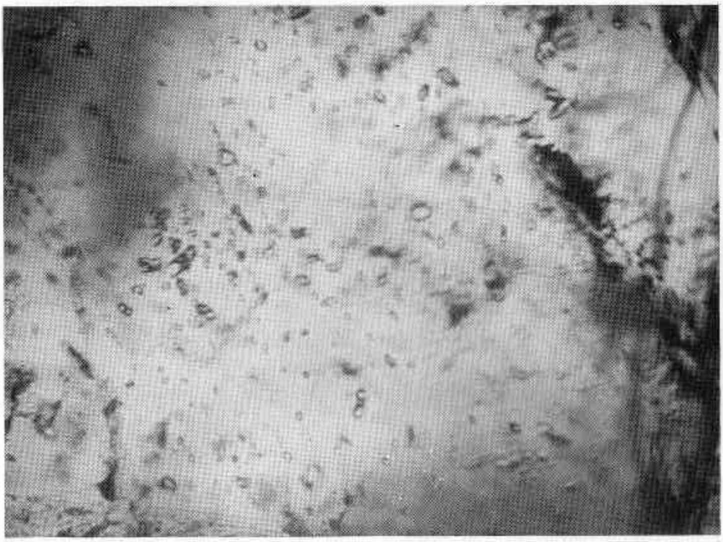
The existance of deposits of nongem corundum in the East Africa territory of Tanganyika has been known for a number of years. During World War II, owing to the acute shortage of hones for sharpening the knives of rubber collectors, a small factory in the Geological Survey of Tanganyika was set up to make abrasive hones from local corundum. Purplish-red crystals with a greenish micaceous envelope, called "egg corundum," from the schist at Matumbulu, near Dodona, and the greenish or greyish boulders on the outcrop of serpentine that had intruded aplitic veins, at Mleha Mountain, was the material used.

There is much opaque corundum to be found in the northern part of Tanganyika, but only two occurrences seem to be of gemological significance.

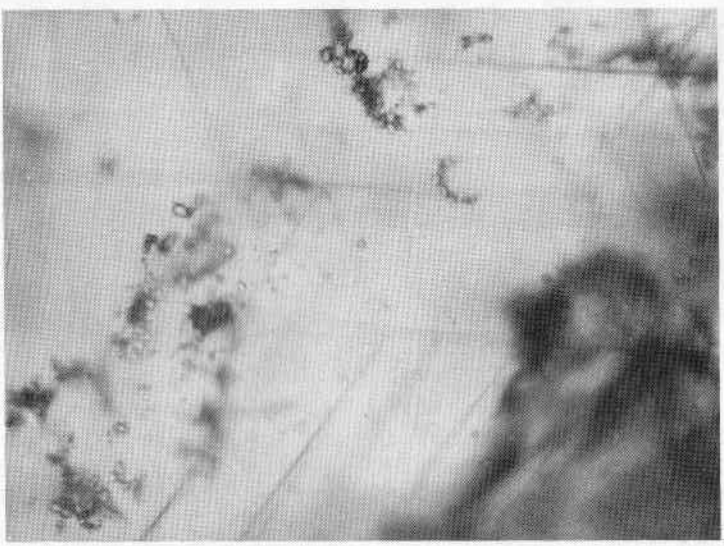
The first of these is the deposit of ruby crystals in a bright-green matrix of zoisite-amphibolite that occurs in the Matabatu Mountains, near Longido, a small town on the Great North Road that lies west of the volcanic peak of Kilimanjaro. Here the ruby crystals are hexagonal prisms with tabular habit. They are bright crimson and may measure three centimeters or more across. Usually, they are extensively cracked and granulated, due to the stresses resulting from the metamorphism of the local rocks. However, a few small fragments of the crystals were clean enough for faceting. The less-clear material is used for cabochons.

Although the ruby from this area is commercially unimportant as cut gemstones, the green rock containing the bright-red crystals has been used as an ornamental stone for making ashtrays and similar small articles. This very attractive material, which has been named "anyolite," after the Masai name for green, is cut and polished in Idar-Oberstein.

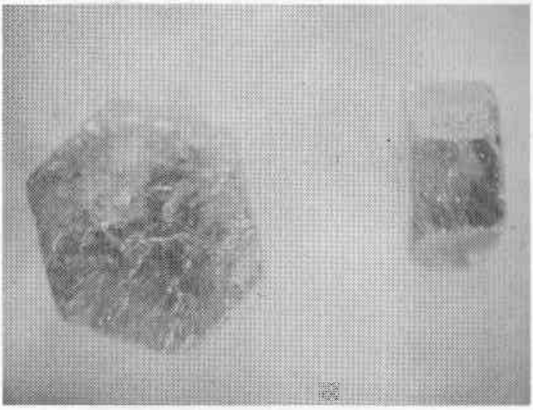
A year or so ago, crystals of transparent blue corundum were found in the Gerevi Hills, which lie to the north of the Umba River, in Tanga Province of northeastern Tanganyika. These hills



Small crystal inclusions in a sapphire from the Gerevi Hills.



Small crystals and long tubes in a Tanganyika sapphire.



Sapphire crystals from the Gerevi Hills, Tanganyika.

are some 150 miles southeast of Kilimanjaro, and are close to the Kenya border.

The sapphire crystals of this locality have the habit of short stumpy hexagonal prisms, or prisms with tabular habit, and all of the faces are heavily etched. The color may be said to be greenish blue, but down the length of the prism (the optic axis) it is a bright blue. All of the crystals examined were characterized by a patch of yellow color that penetrated the crystal parallel to the principal, or C, axis. This "tube" of yellow color does not show a zonal outline, and may not be at the exact center of the prism; in general, it seems to be associated with cracks in the crystal.

The specific gravity of four of these crystals examined gave the following values: 3.991 (3.985 grams); 3.991 (1.2625 grams); 3.989 (1.140 grams) and 4.987 (4.6558 grams). No polished specimens were available for the study of the indices of refraction. The writer did see some small stones that had been cut from these Gerevi Hills crystals, but no time was available to take measurements.

The crystals were strongly dichroic, a bright-blue color being visible along the direction of the optic axis and a bluish green in the direction across the prism, the effect being seen easily with the naked eye. The absorption spectrum, typical of that of blue sapphire, showed the 4500 Å line strongly, the 4600 Å line moderately strong, and the 4710 Å line rather weak. With a flask containing a saturated solution of copper sulphate placed before the strong light source, the fluorescent lines of chromium were weakly apparent.

Examination of the luminescence under long-wave ultraviolet light showed the crystals to fluoresce weakly reddish, as they did when placed between crossed filters; however, the yellow patch down the center of the crystals emitted a strong orange glow, similar to that shown by Ceylon yellow sapphires. There was no noticeable response to irradiation by short-wave ultraviolet light, and only a dim red glow was visible when the crystals were irradiated by X-rays. Examination of the internal inclusions showed many small irregular oval crystals, many of which were clustered in groups, and long needles, or canals, that were oriented to the faces of the hexagonal prism and to the faces of the rhombohedron. The cracks along which the yellow patch appears to have developed, and the yellow patch itself, precludes the cutting of stones of worthwhile size and, especially, of the correct orientation necessary for the best color.

Ruby is found either in the same locality, or nearby, some of which has been fashioned into stones of fairly good color. These ruby crystals tend to assume more of the rhombohedral form, rather than the prismatic habit of the sapphire crystals from this part of Tanganyika. The specific gravity of two of the crystals was 3.982 and 3.983, respectively. The dichroism was distinct but far less pronounced than that shown by the sapphire crystals, and the absorption spectrum (typical of ruby) was only moderately strong. Under long-wave ultraviolet light, the fluorescence was moderately intense, whereas under the Mineralite (short-wave ultraviolet) only a dull crimson glow was seen. A similar, but much weaker, fluorescence with no phosphorescence was seen when the crystals were irradiated with X-rays. The internal imperfections were similar to those in the Gerevi Hills blue sapphires, except that the small crystal inclusions were not in great evidence.

Apparently, a group of Greek prospectors have obtained mining rights in the Tanga area, and there is every likelihood that cut stones from this locality may enter the gemstone market.

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**New York City Diamond Class**

Members of the New York City Diamond Evaluation Class that met August 28th, through September 1st. Seated left to right: **Al Berger,** Woodmere, L. I., New York; **Harry Ward,** New York City; **Jean Claude Rivet,** Montreal, Quebec, Canada; **Helene Fortunoff,** Brooklyn, N. Y.; **George Crevier,** Montreal, Quebec, Canada; and **Martin Busch,** New York City. Standing left to right: **Harold Smith,** Toledo, Ore.; **William J. Heitz,** Trenton, N. J.; **Charles Syer, IV.,** Norfolk, Va.; **Noel J. Murphy,** Saint John, New Brunswick, Canada; **Lee R. Runsdorf,** New York City; and GIA instructors, **Mrs. Eunice Miles, Robert Crowningshield** and **Bert Krashes.**

# A Memorial Tribute to Lester B. Benson, Jr.

*by* Richard T. Liddicoat, Jr.

The unexpected and untimely death of Lester B. Benson, Jr., on Friday, August 11, 1961 robbed gemology of one of its leaders. Lester Benson's contributions to the gemological field in his short fourteen and one-half years association with it were exceptional. An extraordinarily gifted and exceptionally hard-working man, he combined scientific and artistic talents with unusual mechanical ability.

He was born to Lester B. Benson and Sabina Lukes Benson, December 16, 1921, in Mountain View, Colorado, a suburb of Denver. Lester went to a one-room school in Mountain View from

1927 to 1934 and to a slightly larger one in neighboring Washington Heights through the 10th grade. He was student-body president in the 10th grade. His junior and senior years were spent at Lakewood Senior High School from which he graduated in 1940.

Lester Benson was an outstanding athlete in high school. He was elected to the National High School Athletic Association because of exceptional performances in football, track and wrestling. He set a district record in a running event and a league record in the discus throw. He was also elected to the National Scholastic Association on the basis of his academic record.

Between high school graduation and his induction into the Army in December, 1942, he worked first as a machinist at Douglas Aircraft in Santa Monica, California, and later in a mine near Lake City, Colorado. Shortly after his induction, Benson was picked on the basis of intelligence tests as potential officer material. Candidates were sent to the University of San Francisco. He studied there for about a year and one-half until the end of the war in Europe cancelled out the program. He was married to Mercedes Rodgers, May 8, 1944, at San Luis Obispo, California a short time before being sent to the Philippines for the Leyte invasion as a member of a tank company. Shortly before the fight on Leyte was brought to a successful conclusion, he was wounded and evacuated to Hollandia on New Guinea. From Hollandia, he was returned to the United States. He was discharged from Fort Logan, Colorado, in the spring of 1945.

After his return to civilian status, Lester Benson decided to design and make jewelry, in spite of an almost total lack of specific preparation for that field. However, he enjoyed immediate success. His interest in jewelry was kindled by his wife's interest in gemstones and her study of the GIA courses, which he began to read. He became so interested that he decided to take advantage of his veteran benefits to study the courses himself. He inquired about on-the-job training, which was then possible under Public Law 346, the so-called G.I. Bill. A program was set up for him which terminated approximately eighteen months later when he became a regular member of the staff of the Gemological Institute. Despite his abbreviated college training, there was no question of his ability to perform ably the duties of an instructor. In June, 1947, while he was still a GIA student, he sat for his British Gemmological Association examination. He received a Fellowship with Distinction. His Graduate Gemologist diploma was awarded late in 1947.

Working with Lester Benson, then and later as well, was a source of continuing pleasure to his colleagues. Frequently he undertook problems which would seem to have required specialized training he hadn't had, but solutions usually resulted. In part, his wide range of skills could be explained by his background. In 1928, the Senior Lester Benson purchased twenty acres and set up a wholesale nursery. In the years of the Depression, Lester and his older brother, Fred, formed a life-long habit of working long hours. Lester learned early to fend for himself — he was remarkably self-sufficient. The greenhouse and other nursery work made it necessary for him to become an accomplished blacksmith, machinist, electrician, plumber, flower-arranger, gardener and truck mechanic. The habits acquired and the self-sufficiency developed in his work for his father formed patterns he followed the rest of his life.

In the gemological field, the first real evidence of his inventiveness was the development of the spot method for refractive index determinations on cabochons and tiny flat surfaces. In Britain this is known as the "distant vision method." Basil Anderson, famed Director of the London Laboratory, mentions that he and his colleagues often speak of "taking a Lester Benson" on a stone. Benson's article describing this technique was published in *Gems & Gemology* in the Summer, 1948, issue.

In late 1948, Lester Benson became a Gemological Institute instructor, assisting in resident classes in Los Angeles that year and guiding his own classes from 1949 on. In his early years at the Institute, he devoted much of his free time to assembling colored-stone prices. His purpose was to be able to teach appraising effectively in resident classes. Later he worked with colleagues to devise colored-stone price charts that could be explained clearly in writing for correspondence training.

In 1951, Benson spent several months in New York as Acting Director of the Gem Trade Laboratory, during the illness of Robert Crowningshield. While he was there, the X-ray unit in operation since the inception of the Gem Trade Laboratory burned out, so Benson designed and assisted in the construction of a new and more practical pearl-testing X-radiographic unit. This new equipment was described in an article he wrote for the Winter, 1951-52, issue of *Gems & Gemology.* In 1952, Benson assisted Dr. Edward Gubelin in the preparation of his book, **"Inclusions as a Means of Gemstone Identification,"** by editing and revising the text for publication in English.

For many years, Benson emphasized the importance to the retail jeweler of the offering of an open appraisal service. He lived to see a much greater acceptance of this idea than had seemed possible initially, when most retailers were very strongly opposed to the idea of appraising except for customers. His article, **Making Appraisals,** in the Summer, 1955, issue of *Gems & Gemology,* was taken from lectures delivered for American Gem Society Conclaves in 1954 and 1955. From 1952 until his death, Lester Benson was a regular speaker at Conclaves. His lectures on identification methods, pitfalls for the novice, colored-stone pricing, the importance of an open appraisal service to the retail jeweler, prejudging salability on the basis of design characteristics, new developments in testing and ideas for improving store layout and illumination will be long remembered.

In 1955, Benson studied jewelry designing under Christian A. Jakobb. For many years, after retirement from full time designing, Mr. Jakobb taught classes at Mechanics Institute. Later, in 1955 and 1956, Benson rewrote a correspondence course in designing prepared originally by Mr. Jakobb. In 1961, Lester Benson presented several short resident classes in jewelry designing. At the time of his death, his ideas in this field were becoming increasingly influential among jewelers.

In 1960, Benson developed a clever method for detecting color-improving treatment in turquois and did some pioneering work in the gemological field on spectrophotometry. In order to adapt a spectrophotometer for gem studies, it was necessary for him to design and build equipment that would make it possible to use for gem study an instrument that was designed primarily for the study of liquids. Standard instruments could be used for materials prepared in thin parallel-sided polished slabs, but not faceted gemstones. Lester Benson made an ingenious device that permitted cut stones to be analyzed readily by a standard-spectrophotometer. Some of the transmission curves that he prepared disclosed information that was particularly enlightening in the fields of diamond coloration and fluorescence. He was anxious to continue his research in spectrophotometry but lack of availability of funds which could be devoted to the purchase of an exceedingly expensive recording spectrophotometer frustrated him in this purpose.

His article, **Planning and Using Your Diamond Room,** which appeared in the Winter, 1960-61, issue of *Gems & Gemology,* was typical of his practical approach to solving store layout and display problems to maximize the effectiveness of retailing selling space. Since the Winter, 1958-59, issue of *Gems & Gemology,* his column, **Highlights at the GTL in Los Angeles,** had been a popular feature of the magazine.

In 1960, Benson assisted several colleagues at the Institute in the preparation of **"The Diamond Dictionary"** by contributing many of the drawings, writing a number of definitions and editing some of the others.

Over the years he designed much of the present-day equipment used by gemologists in this country. His designs (worked out in cooperation with Kenneth M. Moore) include the present Gemolite base, the Institute's spectroscope unit, the new Duplex refractometer and the GIA Jeweler's Camera. It was an idea of Benson's that led to the unique system of baffles that gives the Diamondlux its effectiveness as a source of illumination for diamonds.

Lester B. Benson, Jr. made many important contributions to the advancement of gemology as a science, but probably he will be remembered best for the inspiration and wise counsel he gave to jeweler-students of the Gemological Institute all over the world. He was never too busy on the many tasks he had before him to advise a student on any subject that troubled him. The GIA has received hundreds of letters from students, graduates, and former associates expressing their feeling of loss.

Les Benson will not only be missed by the many who regarded him as a close friend, but by all those he guided.

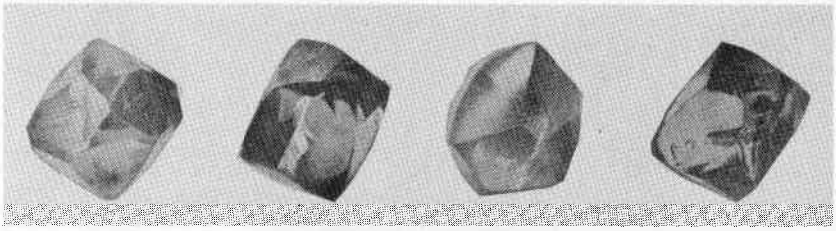
# Wisconsin Diamonds

*by*

Arthur A. Vierthaler, Ph.D.

Transportation by glacier is still accepted as the most logical explanation for the existence of diamonds in the Great Lakes region. The great ice sheets from the north last covered the area about 10,000 years ago, during the Pleistocene period. Intermittent advances had covered the entire northern portion of our continent, moving as far south as St. Louis. The northern portion of what is now the U. S. was invaded by ice sheets at least four times at intervals of many thousands of years. During the process of pushing forward they ground out thousands of lakes and deepened many river beds in the northern states. The conformation of the leading edge at the point of deepest penetration undoubtedly had a great influence on our present drainage pattern in the Great Lakes area. It is believed that diamonds picked up to the north were deposited along with other transported glacial debris. Terminal moraines were formed by the lower end of the glacier at the point of greatest advance. As the melting continued, the transported debris in the ice remained; this consisted of heterogeneous matter of ground-up soil, large and small pebbles and boulders of different kinds embedded in sand or clay. These deposits usually formed crescent- or horseshoe-shaped moraines, concave toward the glacier and forming conspicuous hills in valleys once occupied by these glaciers. The drift debris, or till, so laid, varies in thickness from 100 feet to 700 feet or more, depending on the area. Final disappearance of ice from south of the Canadian border probably occurred no more than 8,000 years ago.

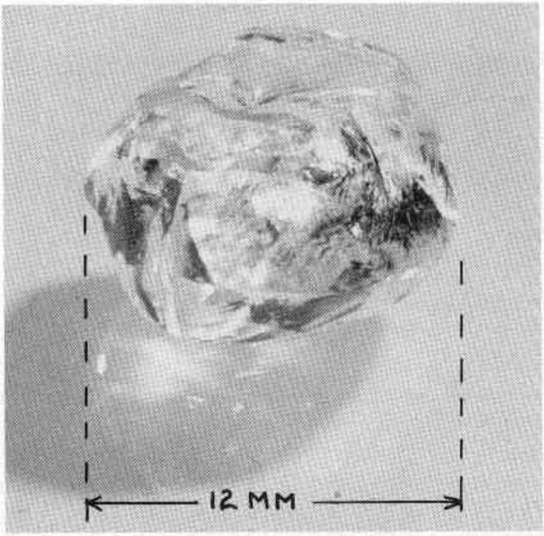
The discovery of diamonds in Wisconsin, as well as in Michigan and Ohio, is of considerable interest to geologists, since they are found in the terminal moraines of the great glacial sheets. In Wisconsin, diamonds have been found in the geographical provinces of the western uplands and the eastern ridges and lowlands. This last



**Four views of the 15.37-carat Eagle diamond. Present owner, American Museum of Natural History, New York City.**

district includes the "kettle moraine," which has produced most of the diamonds found in the Great Lakes region. Sizes of these stones vary from less than one carat to twenty-one carats, with a number of smaller stones, also varying in size.

The earliest report of a diamond found in Wisconsin was in 1876, from records in the files of the Circuit Court of Milwaukee County and the Supreme Court of the State of Wisconsin. These records are the results of the lawsuits caused by the discovery and sale of this diamond. The stone was found in Waukesha County during the drilling of a well by Charles Wood, who was a tenant on a farm owned by Tom Devereaux near Eagle River. It came to the surface from about the 65-foot level as a stratum of hard yellow material was penetrated. At that time, its identity was unknown. The court records relate that the following happened: After examining the stone, Wood brought it home and gave it to his wife, Clarissa, to add to her collection of shells and curios. For seven years it remained in their home; visitors frequently commented on its brightness and asked why it was not taken to a jeweler for identification. One day, in 1883, Mrs. Wood took it to a Milwaukee jeweler by the name of Colonel Boynton, who said the stone was probably a "topaz" and purchased it for one dollar. Boynton then sent it to a jewelry firm in Chicago for appraisal. Their report stated that the stone was a 15.37-carat diamond in the shape of a distorted dodecahedron, or a 12-sided crystal form. After the news became known it finally reached Mrs. Wood, who then filed a legal suit against Colonel Boynton in the Circuit Court of Milwaukee, demanding the return of the stone. The Court decided in favor of Boynton. Still persistent, she carried the suit to the Supreme Court of the State of Wisconsin and lost again. The decision handed down December 10, 1884, was in favor of the defendant, Colonel Boynton, on the grounds that he, no less than the plaintiff, Clarissa Wood, had been ignorant of the value of the gem at the time it was purchased. After offering the stone to the State for sale, it was finally purchased by Tiffany & Company, of New York, for $850.00. It was then bought by J. P. Morgan, who, in turn, gave it to the American Museum of Natural History in New York as a gift, where it may be viewed today. Shortly after the sale, Colonel Boynton formed the Dia-



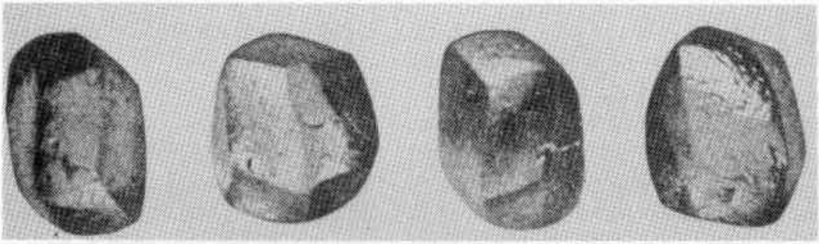

The Saukville diamond.
Weight 6.57 carats.

mond Producing Company of Wisconsin. He sold stock in his company and the town of Eagle actually "sprang alive" as a diamond center, after a few small crystals were found. After finding two diamond crystals of unmistakeable African origin, the realization that the area had been "salted" exposed the attempted fraud.

In 1880, several small diamond crystals were found on the banks of Plum Creek, in Pierce County. The largest of these weighed three-fourths of a carat. Claims have been made that other small crystals have been discovered in this vicinity since then, but efforts to find substantial proof have failed. Until more crystals show up, one can assume this to be rumor, rather than fact.

In 1896, a farmer near Saukville by the name of Conrad Schaefer claimed that he found a 6.57-carat diamond while hunting for arrowheads left by Sauk and Fox Indians. Since he had the stone in his possession for fifteen years before taking it to a chemist in Milwaukee for identification, the actual discovery date was 1881.

In 1888, the largest diamond of all was found near the village of Theresa, in Dodge County, in the Green Lake moraine. This stone, which was known as the Theresa Diamond, weighed 21½ carats. It was picked up by Louis Endlick, who lived in Kohlsville. Shortly after the discovery, the Endlick family moved away from Kohlsville, taking the diamond with them. Information concerning its ultimate disposition was a mystery for many years. In May, 1927, the Milwaukee Journal printed a feature article entitled, "Where is the Theresa Diamond?" When this story was read by Mr. Endlick's son, he went to Milwaukee to reveal what actually happened to the diamond. He explained to Edwin E. Olson, of Bloedel's Inc., a Milwaukee jewelry company, that after his father moved to Kewaskum he sent the stone to the New York

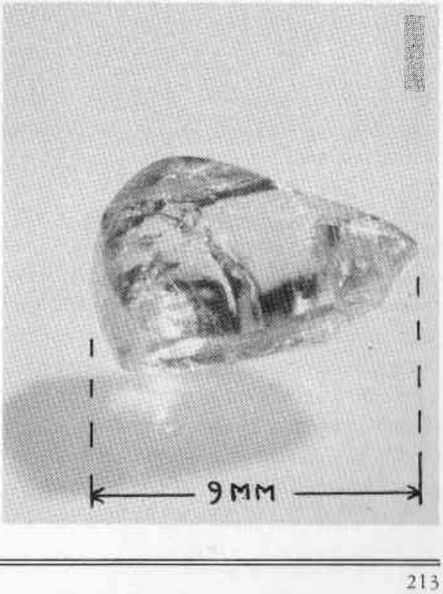


Four views of the 3.87-carat Oregon diamond. Present owner, American Museum of Natural History, New York City.

firm of John Wood & Company, where, in 1918, it was cut into ten stones at a cost of $400. The total weight was 9.27 carats, and the individual weights were as follows: 1.48 carats, 1.09 carats, .97 carat, .96 carat, .95 carat, .85 carat, .84 carat, .83 carat, and two stones weighing .65 carat each. Endlick's son pointed out that the crystal was almost spherical and was colorless on one side and almost a cream color on the other. These two portions were separated by a distinct cleavage plane, which is probably the reason for the great loss of weight during cutting.

In 1893, a 3.87-carat distorted octahedron was discovered by Stanley Devine on his father's farm, twelve miles south of Madison, near the town of Oregon. Stanley was only five years old and the shining pebble intrigued him. His father did not know what it was; after showing it around, however, word spread and finally a Chicago newspaper wrote an article describing the find. Tiffany & Company purchased the stone from the Devine family for $50. It is presently owned by the American Museum of Natural History.

The discovery of this diamond aroused the curiosity of Professor William Herbert Hobbs, of the University of Wisconsin. Thinking that this area south of Madison was an unlikely spot to find a diamond, he traveled there and inspected the site. He also went to other areas where diamonds were reported to have been found in terminal moraines. This started a seven-year study and a trail of facts and fancies.




The 2.11-carat Burlington diamond. Present owner, Bunde & Upmeyer, Milwaukee, Wisconsin.

He finally offered the theory that glaciers were responsible for diamonds being transported into the State. In a Smithsonian report, dated 1901, Professor Hobbs entitled a section, *History of Diamonds in Wisconsin.* It is important to state that his glacier theory is still accepted today, and is much more important than the monetary worth of the diamonds themselves.

In 1903, a diamond weighing 2.11 carats was found by G. Pufahl near Burlington. This stone has a bluish-green tinge and shows clear areas on its outer surface; internally it is very clear and free from flaws. It glows yellowish green under ultraviolet light. The present owner is Bunde & Upmeyer, a Milwaukee jewelry firm; this firm also owns the Saukville stone, which is very clear and white in color. Both diamonds are 12-sided crystals. There is a marked absence of frosty surface on these stones, which further strengthens the belief that they were suspended in the glacial ice. If they had been subjected to stream abrasion, the surface would be frosted. The stones have been promised to the University of Wisconsin by Mr. Fred Gilomen, the President of Bunde & Upmeyer. They will be presented formally in the near future. This will be an important addition to the University collection, not only as gems but from a scientific standpoint.

It is interesting to note that all diamonds of any consequence were found prior to 1904. George F. Hanson, State Geologist of Wisconsin, states that no diamonds have since been found or reported anywhere in the State, even after thirty-five years of investigation of gravels and drillings.

Recently, an increasing number of articles have been written about finding diamonds in Wisconsin. The latest, which was entitled, *Mine Your Back Yard for Riches,* appeared in the March, 1958, issue of *True Magazine.* Even though they are somewhat authentic, these articles often are filled with half-truths and misleading statements, giving the impression that anyone can find diamonds easily in Wisconsin. This is very discouraging, especially when one considers an experience I had a few years ago. While teaching a course in advanced gem identification at the University of Wisconsin, one of the students brought in a handful of very small diamond crystals he had received from a man who claimed he was mining them near the town of Eagle. The largest was $\frac{1}{32}$ of an inch in diameter; however, microscopic inspection proved all of them to be octahedral (8-sided) crystals, which is the usual crystal form of African diamonds (an octahedron resembles two pyramids base to base). All records of diamonds found in Wisconsin describe the crystal habit as dodecahedral (a 12-sided form). One of the stones clearly showed the slit of a diamond saw, and the other one had a very tiny polished facet on its outer surface! The conclusion drawn from this incident was that they were not of Wisconsin origin. It is quite possible that they were the crystals that had been salted long ago, mentioned before.

Other stones found in the Great Lakes district are the 11-carat Dowagiac Diamond (Michigan) and a 6-carat diamond that was discovered near Milford, Ohio. The latter has a very fine color, and is presently in the collection of the University of Cincinnati.

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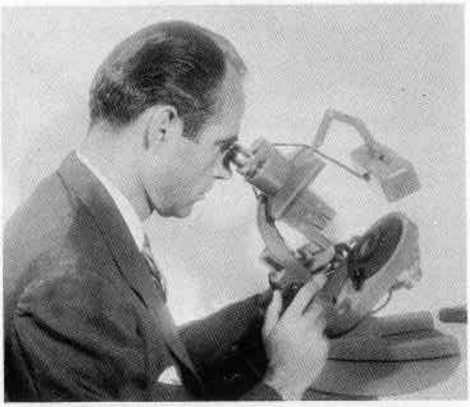
4. *Wisconsin Diamonds,* American Geologist, Vol. XIV, 1894.

5. *Diamond Fields of the Great Lakes,* Jn. Geology, Vol. VII, 1899.


**Los Angeles Diamond Class**

Members of the Los Angeles Diamond Evaluation Class that met August 21st, through August 25th. Back row left to right: **Jerrie L. Sparks,** Los Angeles; **Norma Prim,** Lynwood, California; **Richard T. Liddicoat, Jr.,** Executive Director; **Floyd L. Johns,** Los Angeles; GIA instructor **Joseph Murphy**; **Mrs. Elizabeth Grace,** Sepulveda, California; and **Jack Beyerlein,** Los Angeles. Middle row left to right: **Ivan Munson,** Culver City, California; **John R. Gray,** Culver City, California; **M. W. Leetzow,** Fontana, California; **Howard Henschel,** Los Angeles; **Seymour Bilowit,** Hermosa Beach, California; and **Edgar Neel,** Huntington Park, California. Front row left to right: GIA instructor **William A. Allen**; **Camille Pilet,** Geneva, Switzerland; **William Caplan,** Beverly Hills, California; **Ben Salewsky,** Centralia, Washington; **Norman J. Cutler,** Burbank, California; and **Harvey Blohm,** Alhambra, California.

# Developments and Highlights



## at the

## GEM TRADE LAB

## in New York

*by*

Robert Crowningshield

*Director of Eastern Headquarters*

### Mabe Pearls

Mabe (pronounced "mah'-be") is the Japanese name for the bivalve mollusk, *Pteria penguin* and *Pteria macropters,* in which cultured blister pearls were first successfully grown. *Figure 1* illustrates *Pteria penguin* with an attached cultured blister pearl. Today, however, a cultured blister pearl grown in any mollusk is called a mabe pearl. As an example, suppose that blister pearls had been successfully grown in New England, in the quahog clam (the local name for *Venus mercenaria,* the young of which are called cherrystone clams) and the blisters were given the name "quahog pearls." Later, supposing blisters were successfully grown in edible oysters and also in salt-water mussels, following the logic of the mabe designation, all such blisters would be called quahog pearls. Quahogs were chosen merely as an illustration, for, of course, edible clams and oysters do not form true pearls.

As seen in jewelry, mabe pearls appear to be approximately composed of one-half of a nacreous pearl, with a back of mother-of-pearl. This would appear to be true for all sizes; however, it is well to describe the processes used for the various sizes encountered. For growing mabe pearls of under 12 millimeters, a mother-of-pearl sphere, or a three-quarters sphere of up to 10 millimeters, is placed on the inside of the shell of not only *Pteria penguin* and *Pteria macropters,* but also the ordinary Japanese cultured-pearl oyster, *Pinctada martensii,* and the Australian yellowlipped shell, *Pinctada maxima,* although the latter is usually used for producing large mabe pearls. When the mollusk has covered the inserted bead with approximately 1 millimeter of nacre in the form of a blister, the shell is harvested and the blister is cut out. The bead is then removed from the blister and it may be used again. A mushroom-shaped mother-of-pearl backing (*Figure 2*) is cemented to the eggshell-thin blister with an adhesive similar to Canada balsam and the mabe is complete. Often, in order to deepen the color of the finished product and to mask the mother-of-pearl back, a thin, colored cellulose coating is used to line the thin blister before it is cemented to the back. This is illustrated in *Figure 3* as the dark "cap" just above the mushroom-shaped back.

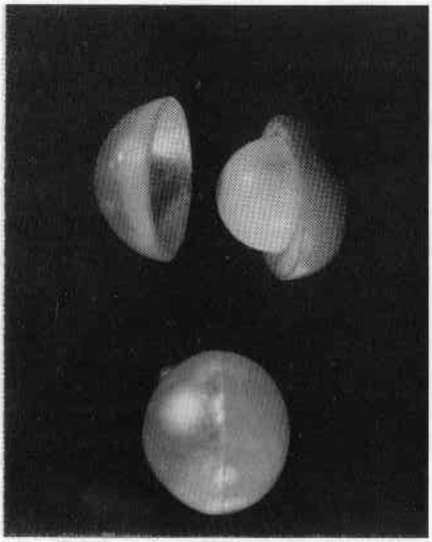


Figure 2

Since the thickness obtainable in mother-of-pearl is limited, being procured mainly from fresh-water shell from the Mississippi River and its tributaries, the irritant for growing blisters larger than 12 millimeters usually is in

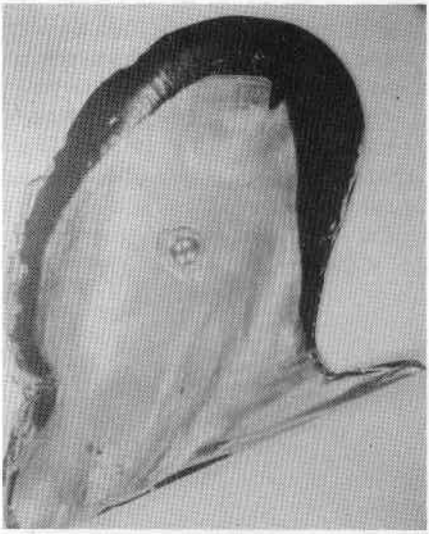


Figure 1

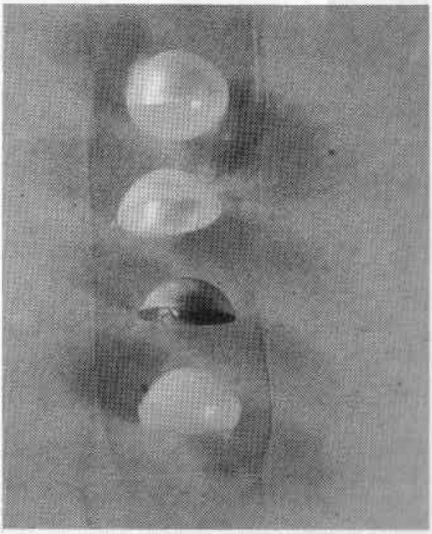


Figure 3

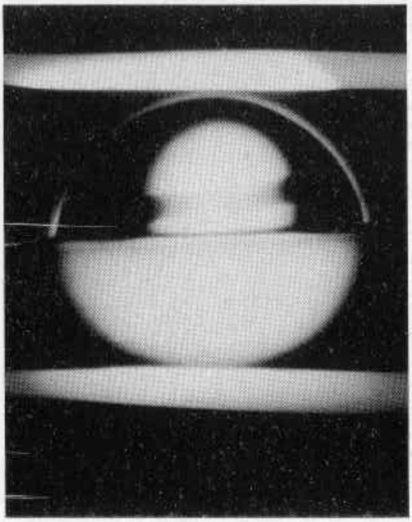


Figure 4

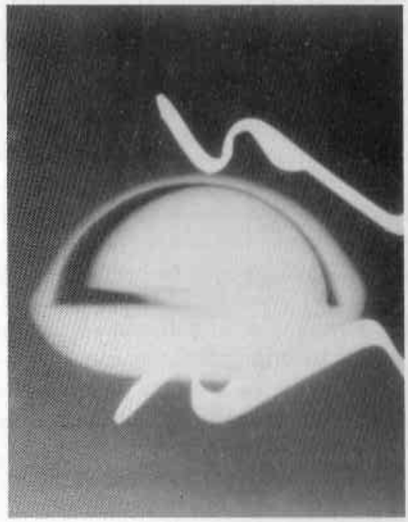
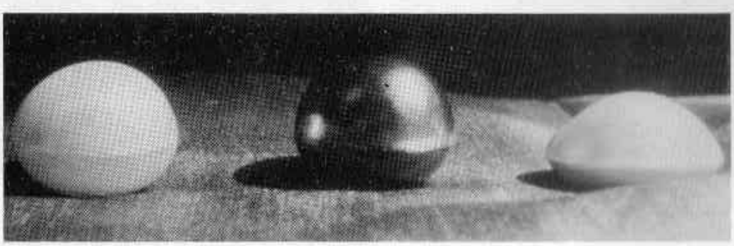


Figure 5

the form of a baked-clay pellet. Pellets up to a 20-millimeter diameter have been used in the huge Australian *Pinctada maxima* mollusks. When sufficient time for growth has elapsed, the blisters are cut out of the shells, the baked-clay pellets are discarded, and the mother-of-pearl backs are prepared. *Figure 4* is an X-radiograph of a 19-millimeter mabe pearl. The mother-of-pearl back is roughly a half sphere, about 9-millimeters thick. Within the blister is a drilled mother-of-pearl bead used as a "filler." It occupies approximately three-quarters of the space, the remaining void being filled with Canada balsam or a similar cement. In *Figure 5,* the "filler" is almost a semi-round of mother-of-pearl with the back being nearly the same. When using this type of "filler," only a small amount of cement is necessary.

Three very large Australian mabes (mah'-bees) are illustrated in *Figure 6.* The white one on the left is 20 millimeters at its largest diameter, and the one on the right has a diameter of 21.5

Figure 6



in a large void.



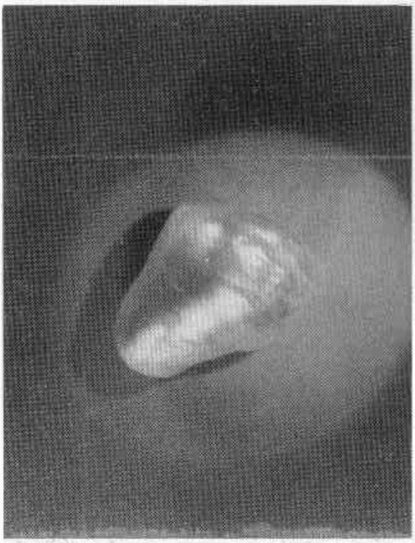


*Figure 7*

millimeters. The center one is a dyec
or treated, mabe pearl.

One may wonder why cultured-blis
ter pearls are being produced, inas
much as great success has been accom
plished in growing spherical culture
pearls. When one realizes that in Japa
the growers are limited to culture
pearls of approximately 10 millimeter
and a demand exists for larger pearl
and that this demand has not yet bee
satisfied with pearls from the large
pearl oysters of Australia and Burm
(to say nothing of their high cost)
then it is easy to appreciate the need fo
cultured blister, or mabe, pearls.

## Baroque Pearl That Rattled!

*Figure 7* illustrates an unusuall
large and lustrous cultured-pear
baroque that "rattled." The radiograp
of the same pearl (*Figure 8*) is sel
explanatory—the nucleus was containe

*Figure 8*

## Purple Clam Pearl

We have mentioned many times in this column the fact that although some very attractive concretions have been found in edible clams and oysters, they do not have an established market and, not being nacreous, they cannot be classed as true pearls. *Figure 9* is a photograph of an unusually fine, button-shaped clam pearl mounted in an elaborate diamond and natural-pearl ring. It was submitted to the Laboratory for identification of the "stone." The fact that clam pearls are formed concentrically just as true pearls are, is illustrated in *Figure 10*; however, the structure is not as fine. This is a radiograph of a large black clam pearl that was sold as an "oriental black pearl" by a dealer, who evidently did not understand that one of the requirements for a true pearl is a nacreous surface. The radiograph also illustrated another reason that clam pearls have no market

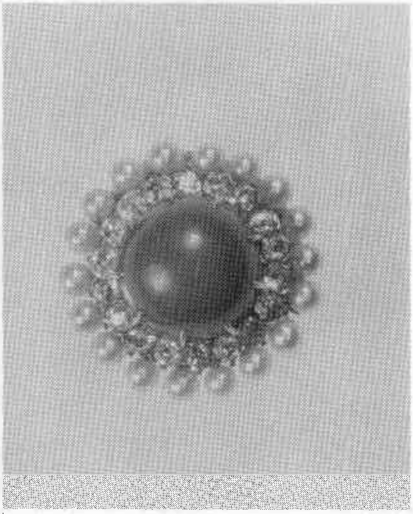


Figure 9

Figure 10

value; they are brittle and nearly always crack when drilled.

## Abalone Pearl

A most unusual pearl is illustrated in *Figure 11*. It is the largest and the finest rich blue-green to gray-blue Abalone pearl that we have seen. In addition, it depicts a drama of nature rarely encountered. The outline of a snail can be seen quite clearly at the center of the

Figure 11

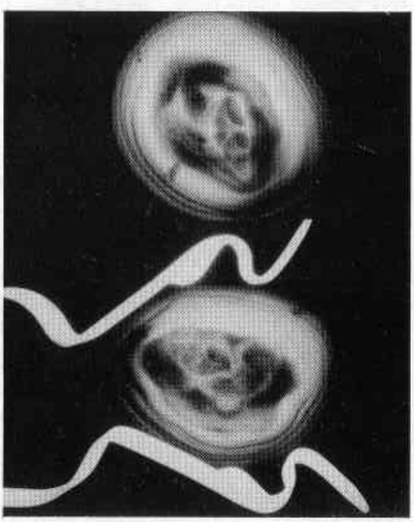


Figure 12

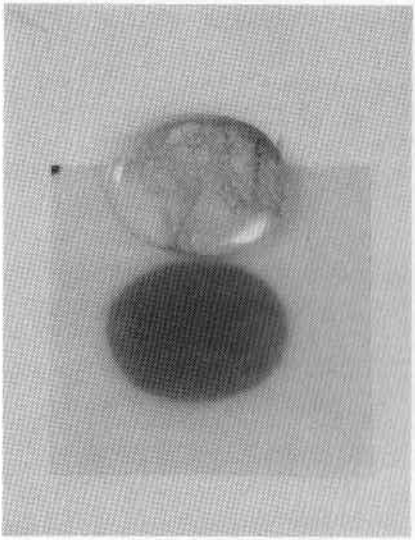


Figure 13

pearl and, on close examination, it appears to be the shell of a drill, a marine snail that is very destructive to oysters and other mollusks. The drill (*Urosalpinx cinerea*) can burrow through the shell of another mollusk and live on its body. In this case, after entering the body of the Abalone, the drill became the nucleus of a pearl. Abalone pearls may be detected, incidentally, by the fact that they fluoresce a dull-greenish color under long-wave ultraviolet light, unlike similarly colored black or blue pearls.

## Carnotite Cabochon

Recently, we examined a large, flat, bright orangy-yellow cabochon and determined that it was mainly carnotite and other radioactive breakdown products. We placed it on a covered film (*Figure 12*) for 24 hours and it "took its own picture," as illustrated in *Figure 13*. Examination with the spectroscope, using reflected light, gave us a rather distinctive spectrum (*Figure 14*).

## Nonfluorescent Pearl Cores

Recently, we examined a very old and badly worn necklace of cultured pearls. We were surprised to find that the cores in the majority of the smallest pearls were nonfluorescent under X-rays; normal cores made of fresh-water clam shell are fluorescent. By candling and observing the "hot spot" of the mother-of-pearl, we were able to see the core. It is natural to assume that in the early days of culture experiments, cores for the small pearls were made from available thin, salt-water shells.

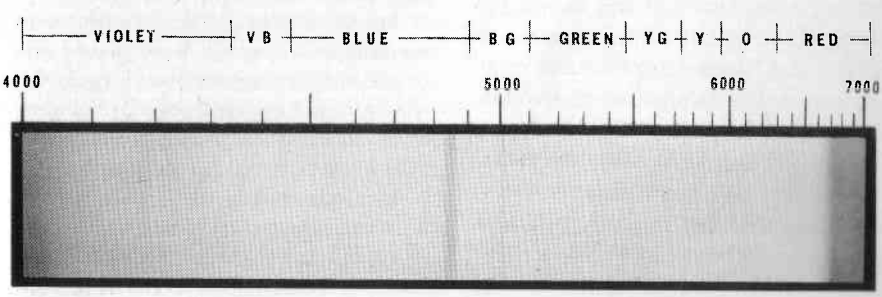



Figure 14

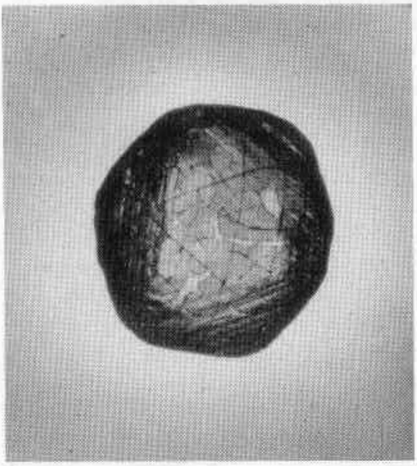


*Figure 15*

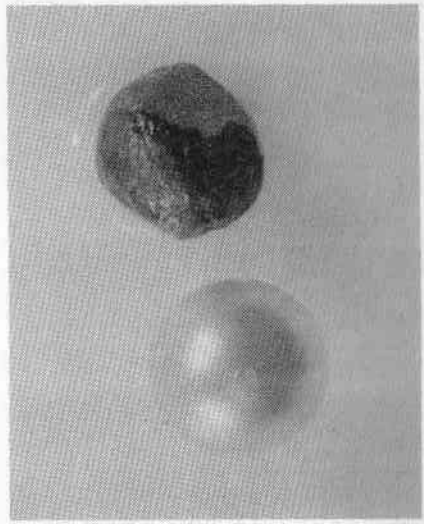


*Figure 16*

## Coatеd Diamonds

We mentioned coated rough diamonds in a recent issue of *Gems & Gemology,* and suggested that another term might be more fitting, since the word "coated" is often used to refer to the dubious practice of coating cut stones in order to disguise off color. However, no appropriate term has been offered to apply to the stones, such as the one illustrated in *Figure 15,* which has a yellow cracked- and crazed-surface coating, that masks the very fine interior color. Cutters say that the "coating" does not behave as a diamond should in that it is crumbly in texture. No theory has been advanced as to why stones from South America, Sierra Leone and the Ivory Coast, in particular, are coated. Perhaps, one day, a study will be made of the surface material of these stones to determine if it differs from diamond. One thing that we have discovered, no absorption spectrum seems attributable to the often dark-colored coating.

## Reaction of Pearls to Vinegar, Cologne, etc.

Recently, we had a request for a detailed explanation of what happens to a pearl when it is placed in vinegar. Although it is known that pearls are attacked by vinegar, we felt that in order to answer the request properly, simple experiments should be conducted. For 24 hours, similar cultured pearls, with one used as a control, were placed one each in cider vinegar, wine vinegar, distilled vinegar and in a popular cologne. After this 24-hour period, the pearls were examined. By far the most active damage occurred to the pearl placed in the wine vinegar (*Figure 16*). Nearly all calcium carbonate appeared to be dissolved and only the network of conchiolin remained. To the touch, it felt like an over-ripe blueberry. Under mag-

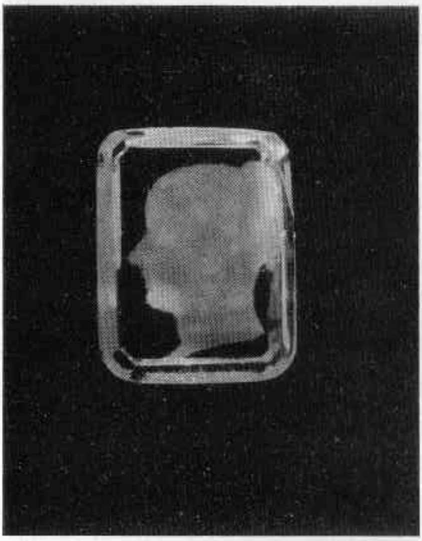


*Figure 17*

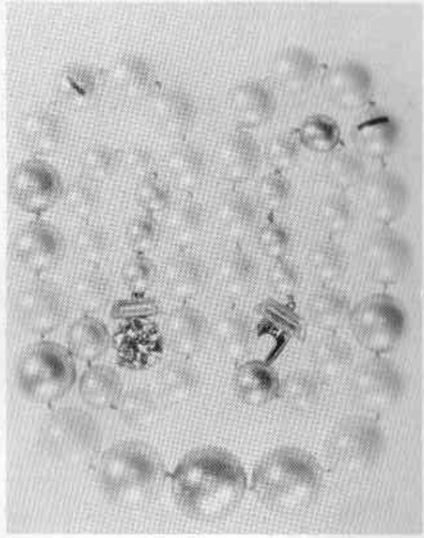


*Figure 18*

nification, distinct brown calcite scalenohedrons were noted here and there on the surface. More or less damage was suffered by the cultured pearl in the cider vinegar, but only slight damage to the one in the distilled vinegar, and none to the one in the cologne. A week later, all of the pearls in vinegar were destroyed, whereas the pearl in the cologne showed only mild discoloration.

We have had inquiries concerning the reaction of spray colognes and perfumes on pearls, but have been unable to conduct any experiments. We doubt that any simple experiment could either indict or exonerate spray perfumes. However, to be on the safe side, it is our recommendation that, when spray colognes, hair sprays, etc. are used, the pearls should be placed on the person as the last item of the dressing routine.

### Carved Diamond

*Figure 17* illustrates a carved diamond weighing approximately two carats that is in the possession of Max Fine & Sons, Inc., New York City. It is a portrait of Queen Frederika, of the Netherlands, and was engraved by an unknown artist, about 1815. It is one of the very few known engraved diamonds.

### Fresh-Water Pearl Necklace

*Figure 18* illustrates, in actual size, one of the most attractive and unusual pearl necklaces that we have seen. With the exception of the two pearls marked with bits of black tape to indicate they are cultured, they are fresh-water pearls and have the most delightful hues imaginable.

### Unusual Gem Materials

Unusual gem materials seen in the Laboratory in the past few months include natrolite, psilomelane and a nearly flawless spessartite of more than 100 carats.