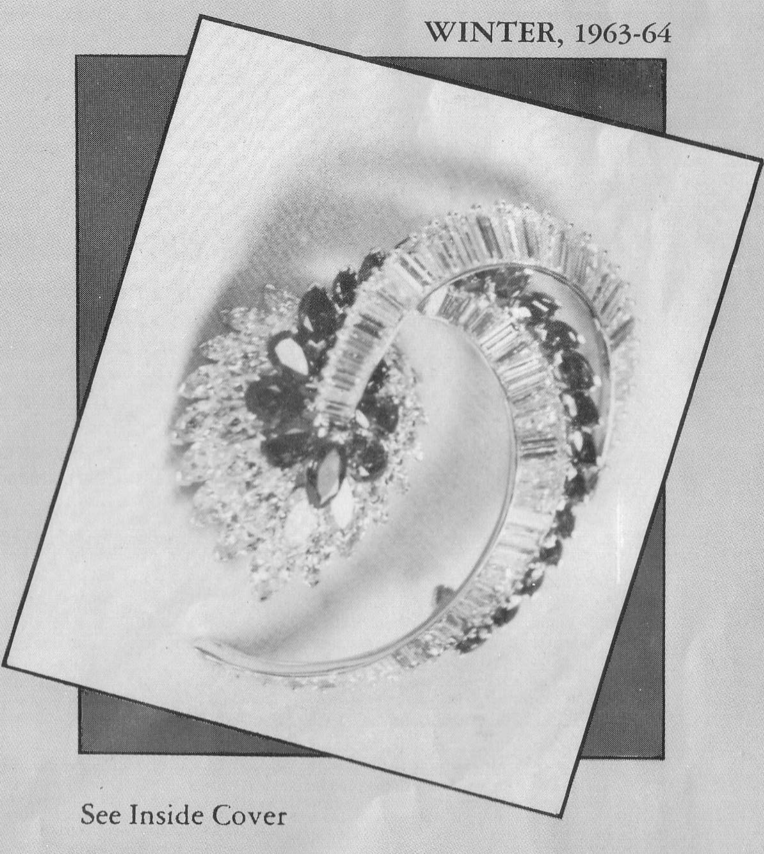
Gems and Gemology

WINTER, 1963-64



See Inside Cover

Gems & Gemology

VOLUME XI | WINTER, 1963-64 | NUMBER 4

IN THIS ISSUE

On the Cover

This shooting-star pin, designed by Linz Bros., Dallas, features tiered rows of marquise diamonds and rubies set on elevations in the celestial body. Trails of baguette-cut diamonds and rubies flare upward in contrast with the falling diamond star. Linz Bros. was one of the 24 jewelers receiving awards at the exhibition of prize jewelry in the Parke-Bernet Galleries, New York, October, 1963.

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

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

Developments and Highlights

at the GEM TRADE LAB in New York

by
Robert Crowningshield

Bleached and Dyed Cultured Pearls

We are occasionally puzzled by what appears to be a number of drill holes in the radiographs of especially fine cultured pearls. Once, we thought they represented inexpert drilling; however, considering the quality of the pearls, we were doubtful. The mystery was solved by an importer who informed us that these holes had been drilled from the initial-stringing hole to points beneath the nacre and outside the nucleus that need special attention in the bleaching process. *Figure 1A* illustrates a fine specimen that had three "false drill holes," by which bleaching could be carried out in the area between the nacre and the nucleus. Our informant showed us some gray-blue cultured pearls that had such a heavy concentration of conchiolin between the nucleus and nacre that no amount of bleaching would remove the color; these are offered for sale as they are. Of course, some of these blue cultured pearls have been dyed, frequently an unnatural depth of color.

Figure 1B is a photograph of a sawed natural-colored, blue cultured pearl, showing the effect on color of conchiolin around the nucleus. On the left, with the half bead removed but before the conchiolin has been scraped from the inside of the nacre, the pearl appears quite dark. On the right, after

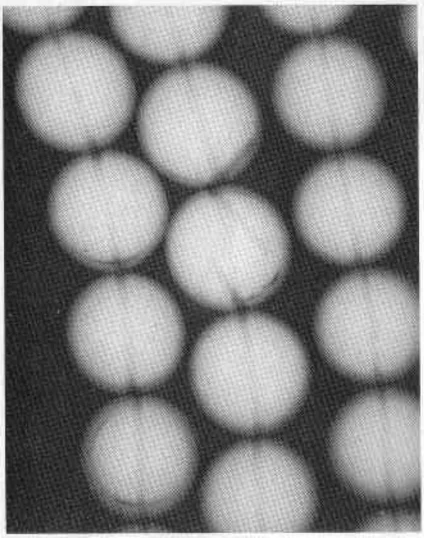


Figure 1A

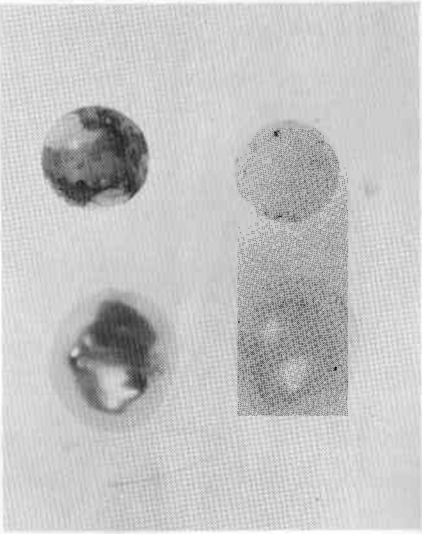


Figure 1B

the conchiolin has been scraped from the inside of the other half, it appears to be normally white. This illustration shows that blue dye introduced into the drill hole lodges around the nucleus and gives the pearl a blue color.

The appearance in the market of cultured pearls in which pink dye is so obviously present that a layman questions it was brought to our attention by a copy of a letter that had been sent to a Better Business Bureau by a lady who had purchased a fine strand. She proceeded to restring them herself when she detected the concentration of dye. Since the Japanese pearl mollusc, *Pinctada Martensii,* has a tendency to produce cultured pearls with a greenish to yellowish body color and the demand, especially in America, is for white and pink, bleaching and staining are as necessary as the various processes used in preparing mink skins for coats. It is perhaps unfortunate that the organizations responsible for the good public relations of the cultured-pearl industry do not release information that will allay the consumer's fears of being "taken" when purchasing normally-processed cultured pearls. One suggestion is to inform prospective purchasers that bleaching is not confined to the cultured product but is also a normal process in preparing Persian Gulf pearls for market. The bleaching is done principally in Bombay.

Faded Dyed Jadeite

On several occasions, clients have presented badly-faded dyed jadeite for examination. In one case, we were told that the color had faded within six

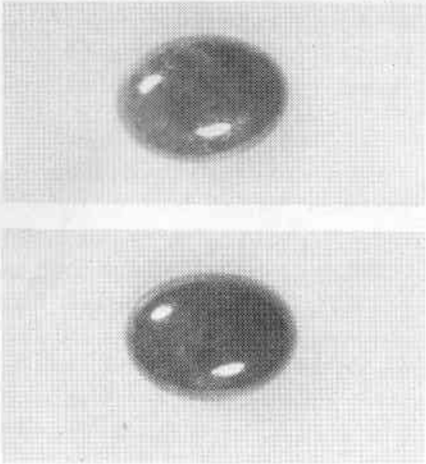


Figure 2

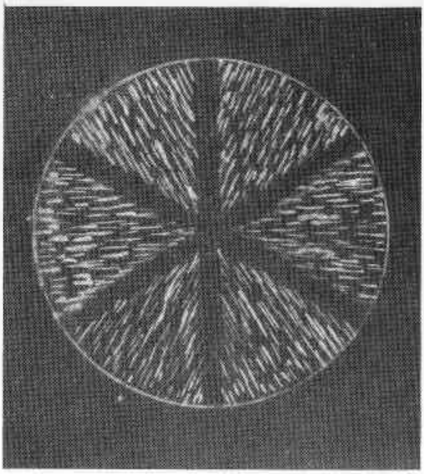


Figure 3

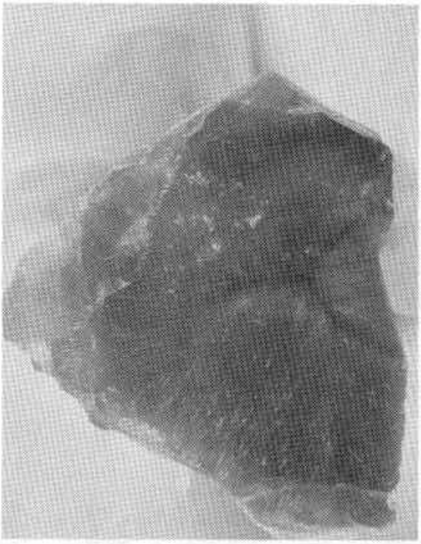


Figure 4

weeks of purchase. We wondered if perhaps the latest dyed jadeite might be less color fast, so we bought several pairs of identical color. We placed one pair in a light-proof wrapping, and the other was taped to a south window; this was on October 10, 1963. The stones were compared on February 8, 1964, and virtually no difference could be detected. Possibly, the one exposed to light was a shade more yellowish, but not strikingly so *(upper stone in Figure 2).*

Unusual Star Effect

Figure 3 is a drawing of a most unusual collector's item that we had the opportunity to photograph. The stone was violetish brown and had a star that was formed by areas in which rutile needles were absent. The needles apparently had crystallized in a rhombohedral direction, giving the six sections a bright, metallic sheen, each separate and distinct from its neighbor. The stone, which had almost a manufactured appearance, weighed in excess of one hundred carats. We were immediately reminded of a sawed-and-polished crystal of amethyst in our collection that has rutile needles arranged in three dis-

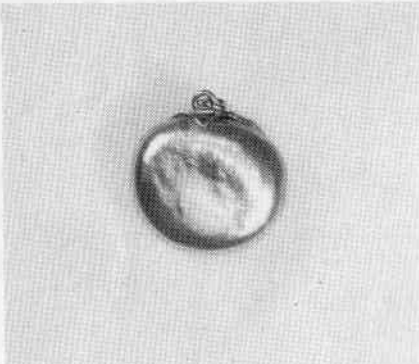


Figure 5

tinct and three indistinct zones, giving a weak three-rayed "star." Our specimen looks very much as if it might have been part of the same crystal from which the cabochon was cut *(Figure 4)*.

Treated Amazonite

An unusual blue color characterized a necklace of amazonite beads; in addition, they lacked the laminated appearance that one sees in most cabochon-cut amazonite. The reason was that the stones had been wax or paraffin treated, using materials with a similar refractive index to that of amazonite, thus hiding the incipient cleavages that cause the platy sheen of this stone.

Red-Abalone Pearl

One of the most striking jewels we have seen was a simple gold pendant containing a very large, flattened, button pearl *(Figure 5)* from the red abalone *(Haliotis Rufrescens)*. As the pearl was turned in the light, it became alternatingly metallic bronze in appearance, changing in turn to red, orange and green. Like the shells themselves, these pearls show a characteristic green fluorescence under long-wave ultraviolet.

Brilliant-Cut Variations

One of the many myths about diamonds is that all brilliant styles of cutting have fifty-eight facets (not counting girdle facets) ; therefore, one often sees the marquise and pear-shape brilliant illustrated as in *Figures 6A and 6B*. In reality, these "ideal" cuts are rarely encountered. More frequently both end pavilion facets are eliminated on the marquise, as in *Figure 6C*, and one or both end pavilion facets on the pear shape, as in *Figures 6D and 6E*. Recently, we have seen variations in crown faceting, principally in the marquise, producing a fifty-two facet cut *(Figure 6F)*.

Color Alteration in Turquois

Because most medium- to dark-colored turquois we encounter has been treated in some way, we tend to forget that these colors do exist naturally and that mistreatment of the untreated material may cause color alteration just as in the treated material. We were made aware of this when asked to compare the stones in a bracelet with those in a pair of earrings. Those in the bracelet were a most attractive, untreated medium blue, but those in the earrings, presumably the same as the ones in the bracelet, were a less attractive, slightly mottled greenish blue. Apparently, the stones worn on the ears suffered from the effects of cosmetics, whereas those in the bracelet were spared.

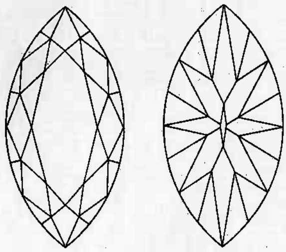


Figure 6A

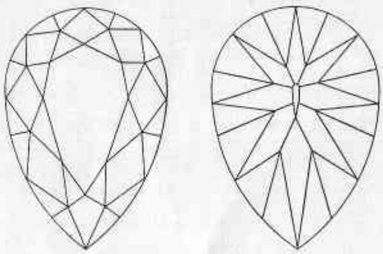


Figure 6B

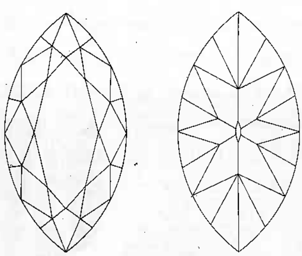


Figure 6C

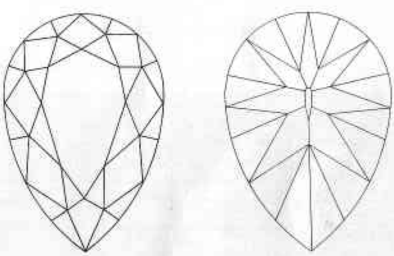


Figure 6D

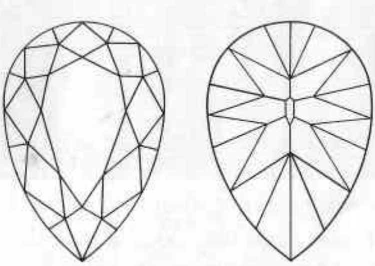


Figure 6E

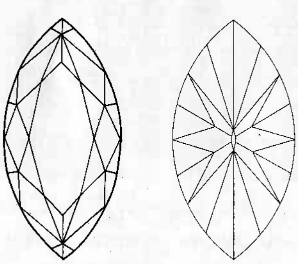


Figure 6F

Hardness of Synthetic Spinel Questioned

Although the definition of synthetic, as used in gemology, indicates that it has the same chemical, optical and physical properties as the natural stone it reproduces, we have seen frequent evidence that synthetic spinel is not as hard as its Mohs' number would indicate. *Figure 7* is a synthetic blue spinel in a fancy platinum-and-diamond ring; it appears so badly worn as to suggest glass. In reality, synthetic spinel not only does not reproduce exactly the structure of most natural spinels but it is under strain. Perhaps this accounts for its tendency to chip along facet junctions.

Rare Cat's-Eyes

Of the few unusual stones we have encountered since the last issue is an approximately forty-carat pink scapolite cat's-eye in a yellow-gold pendant. Also, we continue to see quite a number of dark-green chrome-diopside cat's-eyes, some of which are very attractive.

Naturals Prove Color Origin

Occasionally, we have seen 10- to 20-point greenish-blue diamonds that by their colored naturals, could be determined to be untreated. The largest diamond of this kind we have examined weighed nearly 1.50 carats and resembled a greenish aquamarine. It showed remnants of dark-green naturals, some dark-green inclusions close to the surface at the point (it was pear shaped), and a slight greenish "stain" from an original colored natural at the culet. These stones are associated with Brazilian rough, which frequently shows pronounced dark-green spots in the "skin."

Unusual Topaz

Figure 8 illustrates hairlike inclusions in brown topaz, reportedly from a new Mexican source. The color is unlike that of any precious topaz currently on the market; it resembles the color produced by exposing colorless material to fast neutrons in an atomic pile. We have examined at least six of these stones, and all but one has contained these inclusions.

Alexandrite Cat's-Eye

An unusual alexandrite cat's-eye was examined in the Laboratory twice. Since the hollow tubes were as prominent as in some tourmaline, we doubted that it could be chrysoberyl *(Figure 9A)*. In addition, at one end there appeared another chatoyant band that crossed the main band at ninety degrees, giving an unexpected four-rayed star effect *(Figure 9B)*.

A Synthetic Fluoride (?)

Figure 10 is an actual-size photograph of a transparent vivid-green "boule," with a metallic tip projecting at one end. We were not permitted to perform destructive tests, but the following determinations were made; a refractive index near 1.45, singly refractive, an S.G. of 2.31, light-blue fluorescence, and no absorption lines in the spectroscope. A suggestion was made that it was a synthetic fluoride, but we have no proof. Its rather low hardness (less than 5), indicate that it would be of little jewelry value.

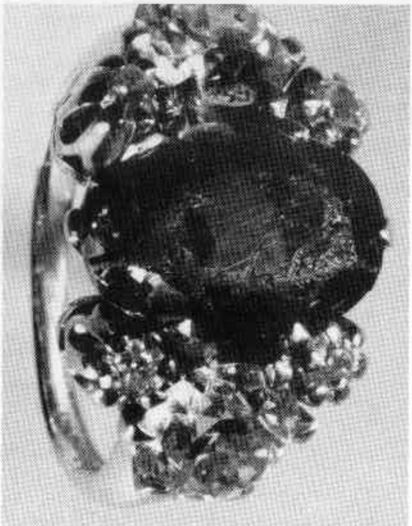


Figure 7

Figure 8

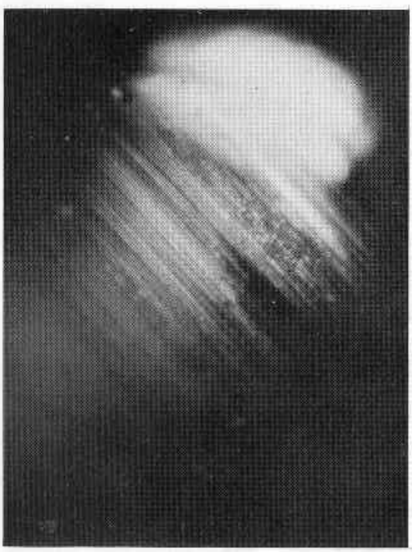


Figure 9A

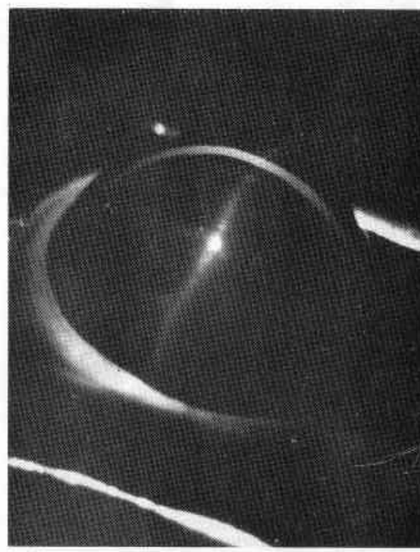


Figure 9B

Figure 10

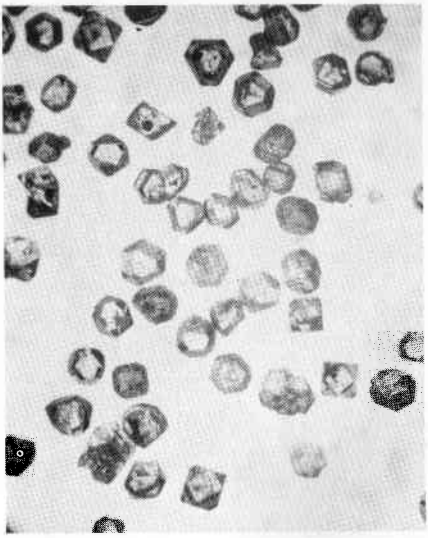


Figure 11

Acknowledgements

We are greatly indebted to **Mr. D. W. Hanson,** of General Electric's Marketing Research and Product-Planning Department, Detroit, for samples of the latest in manmade diamonds. Most interesting were the MBS 40/50 (Metal-Bonded Saw, 40/50 Mesh), in which distinct crystals are the rule. *Figure 11* is a group of crystals selected because they varied from an almost ideal octahedron through modifying stages to a cube with just the corners modified by the octahedron. In addition, contact twins and even some specimens that appeared to be macles were seen. The largest single crystal we were able to measure was .62 mm. in its longest dimension; contact twins measured a bit more. But considering that the average straight pin has a diameter of .64 mm., they were still quite small. Most were yellow and transparent.

We are indebted to **Mr. Martin Stone,** of F. & F. Felger Co., Newark, for setting some of our colored stones in attractive rings for use in Gem Identification classes. Similarly, we are indebted to **Mr. Ed Purcell,** of Baumgold Bros., Inc., for some fancy-cut diamonds for use in Diamond Appraisal classes.

From student **Joe Smith,** colored-stone dealer, New York City, we received a group of tourmalines that were used in heat-treating experiments.

From graduate **Howard Rubin,** New York City, we received several natural stones and substitutes to add to our supply of class study stones.

Here Lies Hidden

(Editor's note: Condensed from an article by Daphne Rooke in *Optima,* the quarterly review of the **Anglo American Corporation of South Africa, Ltd.**)

Nature often hides her precious minerals from the eyes of scientific prospectors, but sometimes she reveals them to searchers who have a more intimate knowledge of her secret laws. It was his keen observation of plants, insects and animals that led Allister Thornton Fincham to an important diamond deposit near Postmasburg, in Cape Province.

The men are dead who took part in the grand rushes to the diamond fields a century ago. Great companies now control the diamond mines, but the lure of seeking diamonds persists in men as strongly today as it did when fifty thousand came to Kimberley to try their luck. The equipment is much the same as that used by the old-time diggers, and the optimism and courage are as great. Diggers and prospectors still work from daybreak until dark, under the blazing sun and in bitter cold, without sick pay, vacations or pensions waiting at the end.

Along the Vaal River they can be found, these invaders into an era of settled jobs and suburban comforts, on farms near Kimberley and on the coast of South-West Africa. They are fossicking (prospecting) in the desert or, if they have to earn a living for their dependents, on a farm in their spare time. Nothing can turn them from the life they have chosen, neither poverty and disappointment nor riches and success. They represent all types: industrious men, gamblers, opportunists — but all have seen the glittering vision that has been revealed in Africa through the centuries.

Recently, a man named Allister Thornton Fincham discovered a diamond mine near Postmasburg, one hundred thirty miles west of Kimberley. The story of its discovery is essentially the story of Africa, where the old meets the new in a blending of ancient wisdom and modern science. It is a story of ant hills and "rubies" (garnets) and of the veld bushes and the secrets they hide.

Early in 1961, Fincham faced the major decision of his life. He had been prospecting the farm Brits for asbestos and a colleague had given him two big garnets that had been picked up out of the concentrates near a test pit dug many years before by another prospector. "You don't always find diamonds where you find 'rubies,' " Fincham said, "but you always find 'rubies' where you find diamonds."

He stood alone on the ridge, thinking out the problem. From where had the concentrates of garnets come? Did their presence indicate a pipe of kimberlite beneath the overburden of red soil? He looked about carefully, not only at the soil and the rocks but over the entire terrain, assimilating every detail in his surroundings—remembering, deducing and analyzing.

On a ridge about three miles distant was a small asbestos mine. On the plain were limestone works, and far to the north and northwest lay the manganese and iron-ore deposits of Postmasburg. He could see a windmill not more than a mile and a half away; at that spot, he and his father had worked a small diamond mine.

If there was a kimberlite pipe beneath the overburden on Brits, it was almost a certainty that there would be diamonds, too. In order to find out, he would have to abandon the asbestos project, which might prove a ruinous step. But if he were sure there was a kimberlite pipe, nothing would stop him trying for diamonds.

How could he be sure that the kimberlite was there? He had no formal education to depend on. All that he knew about minerals he had learned from his father and from his own wide experience. He had been in this district since 1929 and had a vast fund of knowledge, not only of the rocks but of the vegetation and insects to be found in the vicinity.

Scattered gray bushes, known as *vaalbosse,* spill from the ridges and on to the plain. In the vast sweep of the landscape, it seems that the vegetation does not vary and that there is nothing to break the uniformity, except the glare of the iron buildings of the asbestos mine and the tall smokestack of the lime works. But Fincham had already noted differences in the growth of the vegetation.

He had already prospected for asbestos along the line of a fault that he had traced from the existing asbestos mine to Brits, by taking into account the dispersal of the bushes growing in and near fissures and dikes. An aerial photograph had given him a comprehensive view of the entire prospect. Here on this ridge, with a perimeter of twenty morgen (a morgen is 2.116 acres), the *vaalbosse* grew more densely than elsewhere on the farm.

The motto of his family is *Arbore Latet Opaca (There lies hidden in a dense tree a branch golden, both in its leaves and pliant stem).* He did not look for an omen of this kind, yet he could not help recalling the words that day.

The denser vegetation and the presence of garnets within the same perimeter — these were the important factors he had to consider. He believed that the soil nourishing the bushes was made up of different components from the soil outside the perimeter. Since manganese and kimberlite are fertilizers, the denser growth argued the presence of mineral deposits.

He examined the structure of ant hills when prospecting, to discover what the termites were carrying up from below, and found an occasional garnet in the material. He had seen termites attack the roots of a garden shrub that had been specially watered during a drought, in an effort to save it. Termites are quick to find the slightest trace of moisture; they will go deep into the earth in search of it when the surface is dry.

If there were kimberlite beneath the topsoil, it would attract the insects, since the mica content of this diamond-bearing rock gives it the power to retain moisture. Only termites could have brought the concentrates of garnets to the surface, and they would burrow deep beneath the overburden *only* if there were sufficient moisture to attract them; therefore, mica must be present. Mica and garnets are two of the components of kimberlite. From these deductions, he felt reasonably certain that a pipe of kimberlite existed within the perimeter outlined by the denser growth of vegetation. He therefore decided to risk everything and apply for a permit to prospect for precious stones.

He was not without anxiety. It first would be necessary to form a new company (he had been operating under the name of Fincham Base Minerals). Boreholes would have to be sunk, and he knew that £2000 had been spent on an adjoining farm in a vain search for a plentiful supply of water. Discarding the asbestos project took some courage, since he had been occupied with it for more than two years. All over the property were small pits that had been dug with pick, shovel and crowbar. Heap upon heap of the satiny blue rock had been piled up; the asbestos mine had been proved, and a return awaited him as soon as work began on a large scale.

He thought of the regulations that he would have to comply with, and of the innumerable details of business that would henceforth occupy him. In the end, the area might not be proclaimed a mine, because of the insufficiency of diamonds. Additionally, there was the risk of running short of capital before the mine was proved. But nothing could deter him.

The new company that was ultimately formed was called Finsch Diamonds. A lease for prospecting was granted, and excavations by bulldozer and sixty pick-and-shovel laborers were begun. Fincham was right: there was a kimberlite pipe pushing up through the banded ironstones adjoining the asbestos reefs. This is an unusual formation, and it was only through his unique brand of experience and logic that he had discovered the mine.

Nearly a year later (in November, 1961), the first washing took place at Brits. The Mining Commission from Barkly West was invited to witness the event. Bucketful after bucketful of ore went through the rotary machine, but not a diamond was found. Finally, a small stone, weighing three-fourths of a carat, was discovered by Bobbie Campbell, Fincham's stepson. Excitement mounted rapidly among those assembled.

The Mining Commissioner then directed that nine prospecting pits be proved, at depths varying from fifteen to two hundred feet. Equipment was improved. A mechanized sieve and washing machine were substituted for the hand machines, and a mechanical shovel was used at the deeper levels. Six boreholes were sunk around the perimeter, but no water was found; it had to be carried from farms many miles distant. Finally, Fincham hired a geophysicist, who located an abundance of water outside the mine perimeter; it was at a depth of two hundred feet, far exceeding the 5000 gallons an hour that was required for the prospecting.

The pipe proved to be rich, and there was a yield from every pit. During November, 1961, thirty-three and one-half carats were registered. In May, 1963, when the last prospecting pit had been dug, 1634.45 carats were recorded. One of the most important finds was a stone that weighed forty-four and one-half carats.

The flow of diamonds from the mine is more than a vindication of Fincham's judgement: it is the culminating point of a lifetime of prospecting. His office in Postmasburg looks out on a dusty road, known as *Tuinstraat* (Garden Street). The town has the appearance of an American frontier community of the 1870's; but no cowboys ride in, discharging their six-shooters. It is, in fact, a sober and industrious place, made prosperous by manganese, iron ore, asbestos and limestone. The population is approximately 2000, more than half of which are natives.

His office was once a shop. The windows are high and hung with print curtains, to keep out the afternoon sun. Against the wall stands a display case containing rock and mineral specimens: pyrite, mica, talc, garnet, limestone, fluorspar and others. On the floor against the window are dozens of rock samples that have been brought to him for examination. Hanging on the wall is an aerial photograph of the diamond mine and a map of the layout of the pipe.

Since he has sold his mine to De Beers Consolidated Mines, Ltd., Fincham is now a millionaire, but he does not intend to retire. He is again prospecting for diamonds, and has an interest in a company that produces four thousand tons of gypsum a month. He also has an interest in a manganese mine.

In his office, plans are being made for a long journey to investigate minerals and for the development of hot springs. The scheme nearest to his heart is a

(Continued on page 126)

A New Source of Emeralds in Brazil

by

Thomas Draper

Within the last few months, the daily papers in Brazil announced the discovery of emeralds. The event was described in detail in the weekly journal *O Cruzeiro,* dated September 21, 1963 published in Rio de Janeiro.

This discovery, towards which the usual rush of *garimpeiros* has taken place, seems, from all accounts, to be somewhat bigger and more important than any hitherto reported in Brazil.

According to an elderly cattle herder, Abel by name, the occurrence of emeralds on the Fazenda São Thiago has been known for many years. There children, attracted by their beautiful color, have used them in their games.

The Fazenda São Thiago is near Salininha, Municipality of Pilão Arcado, State of Bahia. It is situated on the left bank of the São Francisco River, about half way between Xique-Xique and Remanso.

In 1950, Abel conceived the idea that the children's green pebbles might have a commercial value. He took them to Pilão Arcado, where he showed them to a chemist, who presumably did not attach any value to the stones. In September, 1962, the chemist returned with a friend and asked for more samples. Abel gave them about 250 grams, with which they returned to Pilão Arcado. A few days later, they reappeared with appropriate tools, built themselves a shack and began sinking test pits. They also subsidized children to collect more specimens.

The mysterious activities of the chemist and his friend aroused the curiosity of the residents of Pilão Arcado and eventually led to the discovery of their secret, which, after being made public, provoked a rush of *garimpeiros* from a wide area. By jeep, by cars of various vintages and quality, by trucks heavily laden with goods and humanity, and even by plodding out the weary miles on muleback they converged on the spot, accompanied by merchants who were anxious to reap a rapid harvest at exorbitant prices.

Pilão Arcado, however, is an exceptionally difficult place to live, even for the *garimpeiros,* who are accustomed to "roughing it." Here there is no grass with which they can construct their *corrutelas* and no shelter to relieve them from the intense heat and bitter cold. A hammock slung between two trees is the usual bed of a *garimpeiro,* but hammocks are no protection from the cold without protective cover above and below. A novel feature about this mine is the fact that a woman, as the nearest prefecto available, has taken charge and prohibited the sale of liquor and the carrying of arms. The chances are, however, that she will find it difficult, if not impossible, to enforce these regulations.

Pilão Arcado lies in the *caatinga* region. *Caatinga* is an Indian word for dry soil covered with cacti and other drought-resisting plants and a few stunted, twisted trees, all of which are so interlaced and thorny that horsemen are obliged to wear leather garments. The *caatingas* occur in the northeastern part of Brazil, south of the Amazon, including the western parts of the states of Bahia, Maranhão and Piaui. Periodic droughts over extended periods are responsible for this kind of vegetation, which becomes almost leafless and enables the heavy dew to reach the ground and promote the growth of sufficient pasture on which cattle can subsist.

Pilão Arcado, seat of the county, was once a thriving village that was noted for the quality of its *rapadura* (brown sugar). Its residents gained a living by gold mining and exporting salt. However, a private feud between two families, both endowed with appropriate names (Guerreiro, meaning *warrior;* and Militao, meaning *military man),* brought about virtual extermination of themselves and their followers.

Up to the present, only three pits are producing emeralds and inferior beryls. About 15 kilos of largely inferior crystals has yielded 100 grams of good emeralds (500 carats). The tangled nature of the vegetation will probably retard development.

Owners of the surface have exercised their rights of preference, by registering their claims with the government; this practically ensures disappointment to the majority of those who have rushed to the locality.

Previous contributions *(Gems & Gemology, 1949, 50 and 51)* described the extended search for emeralds and the discovery of a locality in 1612 that satisfied the quality requirements of Portuguese jewelers. The site was lost by the obstinacy of the discoverer, Marcos Azeredo Coutinho, who refused to disclose the locality until he received the promised reward of 4000 cruzados, but he died before the dispute was settled. The search, which lasted more than 150 years, included the epic venture by Fernão Dias Paes, a wealthy citizen of São Paulo, who, at the age of 66, spent his entire fortune in a vain attempt to discover the lost mine.

As the leader of an imposing expedition, including several famous leaders of previous expeditions, Fernão Dias spent seven years wandering about the southern part of Bahia and the northern part of Minas Gerais. Finally, discouraged by the fruitless search, his companions began to drop out, including two priests. His illegitimate son was hanged by his order for taking part in a conspiracy to abandon the expedition. After this seven-year period of searching, he eventually discovered some green stones and started home; he died before reaching Santa Luzia, near Belo Horizonte. On examination in Portugal, the stones were declared to be "impure emeralds, baked by the sun," but were probably green tourmaline.

In the western part of Minas Gerais there is a range of hills known as the *Serra das Esmeraldas* (Emerald Hills), in which there is also a river and a small town with the same name. By a fortunate coincidence, an emerald mine in that region, discovered many years ago, was recently described in the *Times of Brazil* by Mr. H. V. Walter, British Consul in Belo Horizonte. Mr. Walter visited the mine in 1940, accompanied by an American mining engineer, Thomas McClelland. The locality was only reached after a train journey from Belo Horizonte via Santa Barbara to Nova Era, followed by a 28-kilometer journey by car to Hematito and an eight-hour ride on horseback. Although advised by McClelland that the property could only be developed by the use of a bulldozer, it is being sporadically worked by "gophering," due to the owner's lack of the capital needed to construct a road and buy a tractor. A good motor road, however, is now being built by the government. In 1919, according to Mr. Walter, an emerald weighing 2200 carats was found during prospecting operations; because of its unusual size and color, it created quite a sensation. The stone was exported to Germany and was reputed to be the largest uncut emerald in the world.

In the same region, almost due north of Nova Era, near the town of Ferros, W. F. Anderson and Emmet Carney, about 1920, exploited an emerald mine at Brejauba with considerable profit until it was exhausted.

In 1922, fragments of an emerald crystal, presumably from the Brejauba Mine, that had been broken by misfortune during mining operations were offered for sale in Belo Horizonte. Caetano Ferraz, in his *Compendio dos Minerais do Brasil,* described them as being "fragments of beautiful emerald." The best emeralds hitherto found in Brazil come from Bom Jesus das Meiras, Bahia, but the locality has since become known as Brumado.

Near Victoria da Conquista, there is a deep, open pit that the writer had the opportunity to examine during a bus stop on the way to Brumado; he did not have the time to visit the Brumado occurrence, however.

Emerald mining near Conquista is being done the hard way. There is no mechanical equipment of any kind to haul the debris out of the pit; it is still

(Continued on page 124)

Developments and Highlights

at the

GEM TRADE LAB

in Los Angeles

by

Richard T. Liddicoat, Jr.

Transparent Labradorite

We have had some interesting identification and damage problems in the last few months. A light-yellow faceted stone was sent in as an example of the sanidine variety of orthoclase feldspar from a far-western locality. Tests showed that its properties were considerably too high for orthoclase. The 1.558 - 1.568 refractive indices, biaxial positive optical sign, specific gravity slightly over 2.7, and the presence of repeated twinning confirmed an identification of the labradorite species of plagioclase feldspar.

Synthetic Diamonds

When the common request is made to the Laboratory to distinguish between a natural stone and a synthetic, the owner always hopes for a finding of natural. Thus, we were surprised when we were asked recently whether some diamonds submitted to us were synthetic or natural, to realize that the client hoped for a verdict of synthetic. The organization submitting the stones had been approached by men claiming to have developed a commercially-viable process for diamond synthesis by a simple process apparently not requiring the high temperatures and pressures of publicized processes. They were trying to persuade financiers to organize a company to back them.

The material examined was considerably larger than any present synthetic diamonds on the market. The synthetics that we have examined have all been largely made up of tiny crystals. The appearance of this larger material to the unaided eye bore a striking resemblance to natural crushing bort. The grains were almost all in the form of cleaved fragments; a few of the fragments had very heavily-abraded edges, which in conjunction with other edges being fresh, suggested prior use as industrial diamonds.

The work of scientists at the General Electric Research Laboratories has shown rather conclusively the graphite-diamond stability relationship at various temperatures and pressures. It has been demonstrated conclusively that very high temperatures and pressures are necessary to reach the conditions under which diamond, rather than graphite, is the form in which carbon crystallizes. The presence of a catalyst, such as the nickel used in the early General Electric process reduced the temperature and pressure requirements, but they were still extreme. Under conditions of high temperature and pressure, the nickel melted and apparently lowered the activation energy of the reaction of graphite to diamond. However, even with a catalyst, the temperatures and pressures required are beyond the facilities of any but those laboratories with highly-specialized equipment. Although explosive techniques make high temperatures and pressures possible for microseconds, only very tiny crystals would seem possible by such methods.

F. P. Bundy, a G.E. scientist, recently

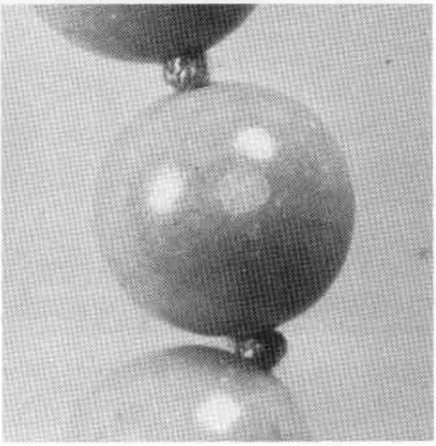


Figure 1

announced the production of diamonds directly without the use of a catalyst by the use of even higher pressures and temperatures. To accomplish this remarkable feat required static pressures up to 200 kbar (about 3,000,000 lbs/-inch^2) and transient temperatures up to about 5000°K (about 9000°F).

The pressure-temperature phase diagrams made possible by his work and that of others show to our satisfaction that diamonds are not going to be synthesized in a gemologist's home laboratory.

We were satisfied that the diamonds we examined were natural.

Blue-Dyed, Plastic-Treated Marble Beads

Figure 1 shows a few beads from a light-blue strand that was sold as turquois. An American tourist had paid $300 for the strand in Europe. The beads had an unusual appearance, caused by shiny reflections coming from

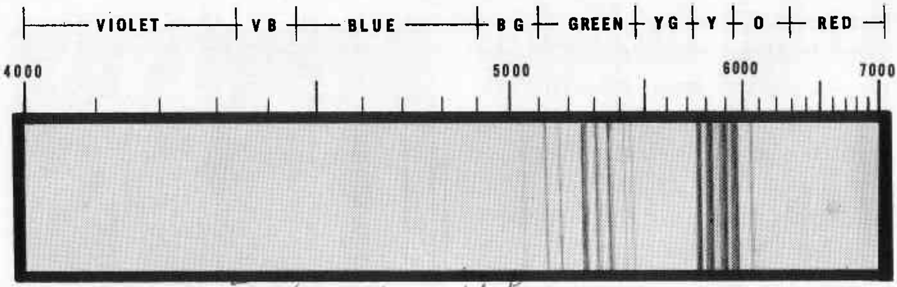


Figure 2

the granular-appearing background; examination under magnification showed that each had been plastic coated. In the photograph, the coating is indicated by the orange-peel effect on the highlights of the center bead. When a bit of this was scraped away and a drop of hydrochloric acid placed on the stone, it effervesced violently. The beads were cut from white marble and coated with a blue-dyed plastic coating.

Synthetic Scheelite

We were pleased to receive an interesting and useful gift from student Tom Mariner, the Linde Synthetic Star representative on the West Coast. He gave us two pieces of calcium tungstate, crystalized by the Verneuil process by Linde Air Products Co. Natural calcium tungstate is the mineral scheelite, so this is synthetic scheelite. One of the pieces was a full boule in the normal yellow color and the other a small section of a pale-violet boule that had been doped with the rare-earth element *neodymium.* The purpose was to produce a laser crystal that would yield a coherent light in a green wavelength. Of particular interest from the gemologist's viewpoint, was the fact that the neodymium imparted a spectacular absorption pattern, perhaps the most striking spectrum that has ever been our pleasure to see. A copy of the spectrum in black and white gives an idea of the sharpness and strength of the lines. The diagram is in no way exaggerated *(Figure 2).*

Early Star Sapphire

We received an early example of synthetic star sapphire, sent in because it looked so unlike the present product that the jeweler was curious. We photographed it because its transparency made the curved color banding much more apparent than in most synthetic stars. It shows up well in *Figure 3.*

46-Carat Natural Emerald Bead

Occasionally, we are given the impression that a gem sent to the Laboratory has been bought by one with little conception of its value from a seller with even less. One of the most interesting examples we have seen in some time was a pair of beads from what apparently was a very old necklace. One of the beads was of the quality we would expect in an old necklace of irregular, drilled emerald beads; the other, however, was a lovely, deep emerald green. *Figure 4* is a photograph

Figure 3

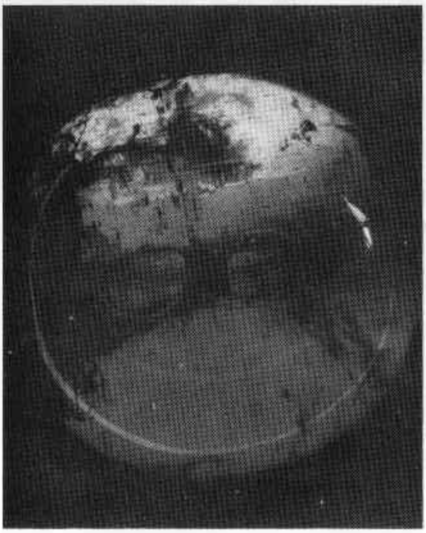


Figure 4

of the stone over a light background, showing that it was paler on one side but that there was a large clear area on the other. Since it weighed almost forty-six carats, the clear area would have yielded a ten- or twelve-carat emerald of magnificent color that would have been flawless to the unaided eye. The two pieces came in with very low insured value from an establishment of a "swap-shop" type. It is our opinion that the large stone has a potential value well into five figures at wholesale in today's emerald market. The nature of the source and the insured incoming value, plus the fact that they were sent for identification, suggested that the importance of the better stone had not been appreciated.

Recutting a Damaged Diamond

Frequently we are asked to examine insurance-protected diamonds that have been damaged. The insurance company or an adjustor asks us to determine whether the damage has been caused by the extention of an existing cleavage or by blows or other abuse during the course of wear. We examined a chipped, round brilliant recently that had been cut many years ago; it had a very flat, thin crown and a thin, flat pavilion. Because it had such a very sharp angle between crown and pavilion facets at the girdle, the diamond was particularly accident prone; even the slightest blow near the girdle was likely to cause cleavage. It was surprising that it had lasted a number of years before very serious damage occurred. It was obvious that recutting to a more normal depth would not only improve the appearance of the stone materially, by increasing its brilliancy, but would also reduce materially the chances for further damage.

Second-Floor-Lab Problem

Usually, our identifications are those involving stones weighing only a few carats. Recently, our problem in the second-floor Laboratory was whether the client would be able to get the stone being brought in for identification up the stairs. It was a huge, old bust of Buddha, the authenticity of which had been questioned by a potential buyer. Examination under magnification and by other means showed that it was made of slightly calcareous sandstone and not of the concrete that a competitor had alleged in calling it worthless.

Perfectionist Collectors

On occasion, we encounter perfectionist collectors who want diamonds of the finest grade and who are willing to search for years to find them. They sometimes demand stones that are absolutely devoid of internal flaws of any description, without the faintest surface blemish, cut to ideal proportions, and of the very finest color. Such a collector called at our Laboratory about ten years ago with a stone of this kind to get confirmation that it was the best obtainable, as claimed. When he was assured that it met all of the requirements he had in mind, he purchased it. He had it reexamined frequently by a jeweler in his city and not too long ago resorted to an amazing form of insurance: he purchased an expensive binocular microscope, so that he could examine the stone week by week and be certain that no surface damage had been incurred in the meantime!

Deplorable Cutting of Quality Material

From time to time, we have referred to the often deplorable state of the lapidary art, insofar as bringing out the potential beauty of rough material is concerned. Too often, colored stones are virtually ruined by cutting them with a total disregard for proper proportions. This was reexemplified last week when a peridot with a lovely body color was sent to the Laboratory for identification. The potential of the stone was almost entirely lost by failure to cut it with enough depth to make it brilliant. *Figure 5* shows the peridot placed over printing, to illustrate its complete transparency in the center. For increased brilliancy and depth of color it demanded sufficient depth, so that light entering from the crown could be reflected from opposite pavilion facets and returned to the eye of the observer. The depth was approximately 20% too shallow in relation to the girdle diameter to provide the beauty that its inherent color would have made possible.

Estimating Diamond Weight Before and After Recutting

Figure 6 shows a diamond that has been chipped from girdle to culet. Although the kind of lighting used to take the photograph does not show the table reflection clearly, it is possible under dark-field illumination to determine accurately by eye the stone's original depth, permitting the gemologist to calculate within a very narrow tolerance its weight before the damage occurred. This diamond was submitted by an in-

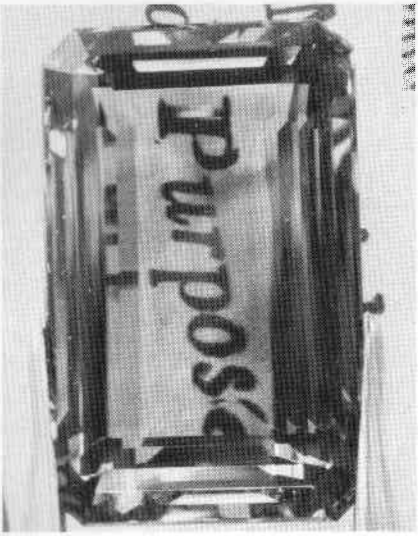


Figure 5

Figure 6

surance adjuster who requested that its weight be estimated both before damage and after recutting and that the percentage value loss caused by the damage be estimated.

Since the culet was gone, it was not possible to measure the original depth to work out what the stone would have weighed before being broken. However, by determining pavilion depth by the size and nature of the table reflection and other easily estimated or measured characteristics (see *Gems & Gemology, Fall and Winter, 1962),* it was possible to estimate the total depth as a percentage of girdle diameter with the assurance that it was within one-half percent of the correct figure. The other characteristics used are table size, approximate bezel angle and girdle thickness.

The stone had a table diameter of 67%, which would have meant an 11.3 crown thickness had the bezel angle been about 34°; but because the crown angles were flat, a depth of 10% was estimated, plus a girdle thickness of 1½% and a 44% pavilion. Totalling these depth factors, it was determined that the original depth had been approximately 4.3 mm. Its present depth is 3.85. Using 3.85 as a new depth and assuming that the stone will be recut to give it an ideal pavilion angle and a full crown, the new stone would weigh slightly over a carat, as compared to slightly over a carat and one-half prior to the damage. Since the stone had a flat crown originally and it lost as much at the culet as it did at the girdle, the depth would become the determining factor for the recutter, if a pleasing brilliant was the objective. This would mean reducing the girdle diameter and a significant weight loss. Simple repair would save much more weight but produce a flat crown and pavilion; the result would have little beauty. Use of the table-reflection method to determine original dimensions is very helpful in a situation of this kind.

Coated Glass Intaglios

A pair of old intaglios tested at the Lab reacted to a hot point as if they were composed of an organic material, such as a lacquer or plastic. Observing them individually under magnification as a red-hot metal point was brought into close proximity to the surface suggested that the organic substance was confined to a thin near-surface layer. The thin layer covered cast glass. Hemispherical depressions where gas bubbles were trapped at the glass-mold interface may be seen in *Figure 7*. Apparently, the intaglios had been coated both to mask the vitreous luster and to make them seem ancient.

Unusual Absorption Spectrum in Brown Diamond

We examined a brown diamond that gave us the impression of being naturally colored on the basis of its hue and general appearance. A check with the spectroscope found the interesting and unusual spectrum illustrated in *Figure 8*. Two very faint fluorescent bands were visible from about 5370 to 5390 Å and from 5760 to about 5770 Å. We had never encountered such a spectrum in a brown diamond in the past.

We Appreciate

A gift from student **Charles Williams,** of Florida, of moonstones, amber and glass.

Figure 7

From Graduate Gemologist **William Ilfeld,** Santa Fe, New Mexico, we received an unusual red tiger's-eye ring. When the whole ring was put in the plating solution, the tiger's-eye took the plating in a broad band across the center of the stone. *(See Figure 9)*. Bill also gave us several cabs of a new copper-based turquois substitute.

A nice selection of rough black and purple star sapphires, rough star rubies, and rough blue sapphires for faceting were received from GIA student **Lyle R. Bigelow,** Tampa, Florida.

A very nice specimen of rose quartz crystals on mica has been added to the GIA gemstone display through the courtesy of **Martin Ehrmann,** Beverly

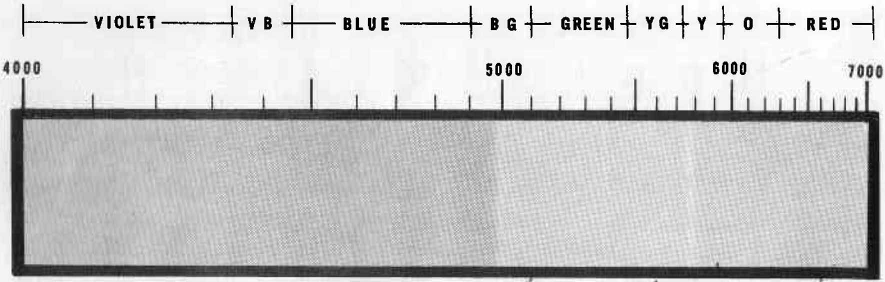


Figure 8 brown diamond

Hills, Calif., gemstone dealer. He also donated several cut chrysoberyls and a selection of sapphire and spinel rough for our collection.

Eugene O. Prue, Lancaster, Calif., a lapidary and a GIA student, donated a selection of rough and cut opals. These will be used to good advantage in our colored-stone practice sets.

From **Cos Altobelli,** GIA student, North Hollywood, Calif., we received a strand of large aventurine beads.

We are grateful to **Bernard Mecke,** Sea Cliff, L.I., N.Y., for rough specimens of diopside and hypersthene he recently presented to the GIA.

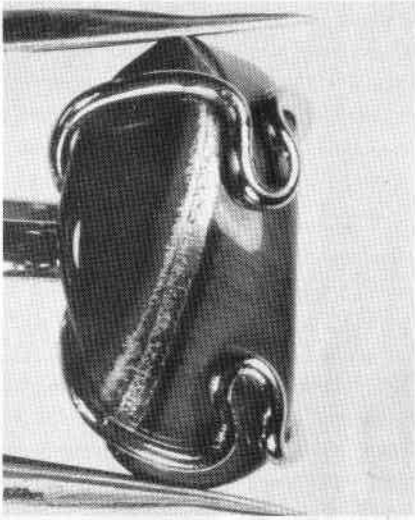
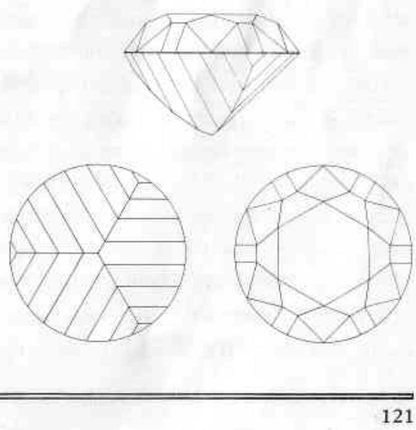


Figure 9

* * *

Our apologies to Bill Rowbury, the originator of the Triumph design. *Figure 6* was inadvertently omitted from the Fall, 1963, issue of Gems & Gemology. We are printing it herewith, to ease our conscience.



(Figure 6, which was omitted from the Fall, 1963, issue)

Book Reviews

MEXICAN JEWELRY, by Mary L. Davis and Greta Pack. Published by the University of Texas Press, Austin, 1963. 262 pages, illustrated. Price: $6.50.

Author of *Jewelry & Enameling*, long a standard textbook in the hobby field, Greta Pack has collaborated with artist Mary L. Davis to write a carefully researched and thoroughly enjoyable account of the history, tradition, symbolism and styles of the jewelry of Mexico.

The authors, writing in lucid, easy-reading prose, introduce the reader to a brief history of Mexican jewelry, including chapters on the accomplishments of the pre-Conquest Indians, colonial New Spain and independent Mexico. Other chapters discuss religious jewelry, which is such an integral part of Latin American culture; the characteristic, specialized adornments of the *charro* (horseman); and the diversity and tradition of regional jewelry. A more comprehensive chapter deals with creative developments in contemporary jewelry, with sections that describe the inspired work of some of the more highly respected craftsmen of Mexico. In conclusion, there is a brief consideration of basic jewelry-making techniques and the metals and stones used. A generous use of selected photographs and drawings show examples of the styles discussed.

In the extensive bibliography, a few books have been categorized incorrectly, but perhaps inadvertently, under jewelry making; e.g., Kraus & Slawson's *Gems & Gem Materials* and Sinkankas' *Gemstones of North America.*

Mexican Jewelry should have a strong appeal for those whose interests lie in this direction.

GREEK & ROMAN JEWELRY, by R. A. Higgins. Published by Methuen & Co., Ltd., London, England. 236 pages, illustrated. $9.80.

This book is a comprehensive survey of ancient jewelry over a period of almost three thousand years, from about 2500 BC (the Early Bronze Age) to about 400 AD (the Late Roman Period). It is intended by the author to serve as an introduction to the subject and as a reference source for collectors, dealers, archeologists and museums.

The book is divided into three parts. The first five chapters are devoted to a discussion of the techniques and materials used by the artisans of this early age to make their jewelry. Historical development is also given prominence throughout this portion of the text. Following this is an eleven-chapter section that gives a detailed, chronological description of the jewelry articles associated with each period. The author points out that the division of the subject matter into periods is primarily a matter of convenience — that seldom does the jewelry of a particular historical epoch cease abruptly, to be succeeded by a different kind. As a result, the story of ancient personal ornaments is almost always one of gradual development, rather than of a series of sharply-defined revolutions.

The third and final section of the book consists of a lengthy bibliography, combined with a list of sites where archeological discoveries have been made. There are sixty-eight plates, four of which are in color, and a number of line drawings.

The author is Assistant Keeper of Greek & Roman Antiquities at the British Museum, in which is housed one of the world's largest collections of antique jewelry, and has particpated in exploration and excavation work at various places.

DESIGNING & MAKING HANDWROUGHT JEWELRY, by Joseph F. Shoenfelt. Published by McGraw-Hill Book Co., Inc., New York, 1963. 168 pages, illustrated (paperback). Price: $1.95.

Although *Designing & Making Handwrought Jewelry* contains much the same information as can be found in any standard work for the hobbyist on this subject, it presents a number of unique features. For example, generalizations are not made until the specifics have been discussed and illustrated. Processes and techniques progress from the simplest ones, such as making attractive pieces by bending and forming silver wire, to the more complicated. Even the more advanced craftsmen may find something new in these sections. The techniques are also arranged in the order in which they are used.

Cross references provide easy access to information or techniques as they are needed. The photographs and drawings are presented from the vantage point of the worker, rather than from the often misleading viewpoint of the observer on the other side of the worktable. (Although the photographs are numerous and well chosen, it is regrettable that the photographic and/or reproduction quality is often less than desirable.)

In addition to helpful information on sources of supply and recommendations for tools and materials, the appendix contains a section in chart form that is devoted to solving the problems often encountered by jewelry craftsmen. In the author's words, "Too many good designs are spoiled and too many students

Book Reviews

are frustrated by simple problems that can be corrected with a little knowledge of this kind. Perhaps more important, a great deal of time can be salvaged to produce more and better jewelry." A short bibliography completes the book.

Mr. Shoenfelt is a teacher at the State University of New York.

WONDERS OF GEMS, by Richard M. Pearl. Published by Dodd, Mead & Co., New York, 1963. 64 pages, illustrated. Price: $3.

Every parent who has a budding gemologist in the family will be pleased to learn that a gem book for the young reader is now available. Written by Richard M. Pearl, well known for his writings in the fields of gemology and mineralogy, it is one in the popular series of *Wonder Books.*

The book tells the story of gems in a simple, understandable style that is designed to arouse and maintain the child's interest in this fascinating subject. Enhanced by excellent black-and-white photographs, the book discusses the nature and lore of gemstones, where gem minerals are found, the history and beauty of birthstones, and the exciting tales associated with famous gems and jewels. Other chapters relate the interesting stories of fluorescent stones, organic gems, the eye stones, and the vast world of the quartz gems.

Richard Pearl's educational and professional background, plus his wide experience in working with youngsters in many phases of the gem and mineral hobbies, makes *Wonders of Gems* a scientifically accurate and worthwhile book for the beginning gem collector.

(Continued from page 113)

being done by spading it from bench to bench upwards.

Mention is made of emeralds near Arrasui, Minas Gerais, and at Lages and Itaborai, Goiaz, but apparently these are of minor importance.

It is very unlikely that the Pilão Arcado area coincides with that discovered by Marcos Azeredo Coutinho, nor is it likely that Fernão Dias would have rediscovered it, because of the scarcity of water and the difficulty of penetrating the *caatinga.* From personal experience, the writer can testify to the frustrating effect of this kind of vegetation.

Fernão's epic journey was not, however, made in vain. He was responsible for the establishment of many towns in the interior of Minas Gerais and the opening of new paths to them. His camps, where he had the forethought to leave a few persons to plant corn, mandioca, sweet potatoes and cereals for his return, took root and spread into villages that furthered exploration of the region and eventually led to the discovery of gold and later: diamonds.

Even in death, Fernão Dias was unlucky. His coffin was lost in the Rio das Velhas while being taken to São Paulo for final burial. Day after day, a devoted son dived and sought, until it was recovered and taken to São Paulo; here, it was deposited in the vault of the São Bento Church, which had been built at his expense. His memory was honored by giving his name to the new highway between São Paulo and Belo Horizonte; it also appears in different places on the map of Brazil.

Fernão did not, as a priest pointed out in a moving sermon, discover emeralds; he did a great deal more: in effect, he discovered Brazil.

Louisville, Ky., Diamond Class

Members of the Louisville, Ky., Diamond Appraisal Class which met February 10th, through February 14th. Seated left to right: **Edward J. Meier**, Ft. Thomas, Ky.; **William B. Harman, Jr.**, Dayton, Ohio; **William E. Merkley**, Louisville; **Lee I. Huntington**, Greensburg, Ind.; **Hershel J. Monroe**, Princeton, Ind.; **T. S. Merkel**, J. C. Penney, Louisville; **Robert D. Hagel**, Washington, Ind.; **Charles R. Carlton**, Washington, Ind.; and **Morris Tucker, Jr.**, Campbellsville, Ky. Standing left to right: GIA instructor, **Bert Krashes**; **R. W. Campbell**, Campbell's Watch Clinic, Buffalo, Ky.; **Joe Bunn**, Olney, Ill.; **Dave Church**, Malcolm Ross Jewelers, Columbus, Ind.; **Ronald E. James**, Malcolm Ross Jewelers, Columbus, Ind.; and **Arthur Reutter**, Tiemeier's Jewelry, Seymour, Ind.

(Continued from page 110)

thorough prospecting of northern Cape Province and beyond. He hopes to form a development company, and has already appointed a geologist. His main purpose is to discover bauxite for the aluminum industry, and soda ash, for he feels that these commodities are essential to the growth and economic solidity of South Africa.

Printing and Purchasing Manager Retires

Clare Verdera, who retired on February 28th, also performed a number of duties for the Institute. The printing, purchasing and shipping functions were under her able direction.

Miss Verdera joined the GIA staff in 1946 on a regular basis, having assisted on a part-time basis prior to that time. Previous to her work with the Institute, Clare had been an actress, having played a number of roles on the Broadway stage. She continued to play radio parts, including a number of roles on the Lux Theater of the Air for several years after joining our staff. Miss Verdera has a buoyant personality and her unfailingly cheerful outlook made her a pleasant person to be around. Present and former staff members will remember her with great affection.

She embarks in a short time on an around-the-world trip, which is planned to take approximately a year. On February 28th, a farewell luncheon was held at the Bel Air Country Club in her honor. She was given an engraved watch and luggage for her trip.

GIA Executive Secretary Retires

Dorothy Jasper Smith, GIA Registrar, as well as Executive Secretary, retired December 31, 1963, after 31 years with the Institute. Mrs. Smith, known to thousands of jewelers throughout the world, joined the staff in 1931, and had served the Institute for a longer period than any other person.

Dorothy and her husband, Orville, are building a fifteen-unit motel at Desert Hot Springs, California, a fast-growing winter resort not far from Palm Springs. With the attraction of a natural hot-spring pool, in addition to the regular pool, year-around occupancy will be assured.

Dorothy has always been a prodigious worker. She wore three or four "hats," ably and efficiently, handling the duties of bookkeeper and registrar and the varied tasks required of Executive Secretary. She was a key person even in the very early days of the Institute. Her departure constitutes a real loss to the organization.

In her thirty-one years with the Institute she left once to get married, later returning to the staff, and then again on two occasions to give birth to Dorothy L. and William "Bud" Jasper. Shortly after World War II she lost her husband, William Jasper, Sr. A few years later she married Orville Smith.

At a farewell luncheon in her honor she was given a lovely watch and a number of remembrances.

Clare and Dorothy are sorely missed.