Gems & Gemology

GIA

FALL, 1971

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IN THIS ISSUE

THE STORY OF WHITE CLIFFS OPAL FIELD

(Ed. note: The following is an article reprinted from the March, 1971 issue of the Commonwealth Jeweller and Watchmaker magazine, written from notes obtained by Jack S. Taylor, F.G.A.A., who first visited White Cliffs in 1960 and again in 1969. Mr. Taylor has also supplied additional photographs to accompany this article, for which we are grateful.)

The first opal to be discovered in Australia was found at Listowel Downs near Springsure in Queensland in 1872. Twenty years later at White Cliffs, New South Wales, Australia's magnificent black opal was found. The story of the first chance finding is an explicit example of the "luck" element as predominate in the lives of almost every Australian.

A party of kangaroo hunters, Messrs. Hollie, Turner, Richardson and Closeton were operating in the White Cliffs area in 1892. Hollie, who had left the party to track down a wounded kangaroo over some low, stony hills, picked up a pretty stone which took his fancy. It puzzled him, so he took it back to camp to show his mates.

They were intrigued and Turner ventured his opinion that it might be opal. On their returning to Wilcannia, they took the stone to Mr. Winnenback, a jeweller there, who confirmed Turner's statement. He advised the hunters to collect as much of the stone as they could because it may prove to be more profitable than Kangaroo hunting. An application was promptly lodged with the Mines Department for a mining lease.

This application at first threw the Mines Department into a quandary, as there was no provision in the Mining Act for such a mineral as opal. After much deliberation, it was decided to classify opal under the Gold Mining Act; it was thought that the stone appeared in reefs like gold. Subsequently, the four prospectors were granted a Reward Claim of 80 acres. The area was named "Block 1" and it was decided that all subsequent leases issued would be not more than 40 acres. A minor rush to the area ensued and about 30 blocks were registered under these conditions, most of which were eventually abandoned.

A Wilcannia Syndicate took up six blocks and they arranged for Mr. E.F. Murphy to go to White Cliffs and look after their interests. As this Australian Opal was a new gemstone and not of course, readily saleable on the market, it caused some concern. Also, the strict labour conditions placed on the mining leases made it difficult for the miners to sell.

Two Gem Buyers, Messrs. Woolaston and Tweedy, hearing of the White Cliffs opal find, decided to visit the field. They soon saw that to do any good with the opal it had to be popularized and marketed properly. They convinced the original four prospectors and the syndicate then went to London with samples and floated the Amalgamation into a Company, called the White Cliffs Opal Mining Company. Mr. E.F. Murphy became the local manager.

The next move was to increase production and they decided to start an open cut on "Block 1." Other blocks were divided into 45 foot lots and people were invited to work these as tributors under certain conditions.

The Company would find and maintain in working order pegs, windlass, tools and supply blasting powder. The tributors had to subscribe 50% of the value of the opal found in their lots after being clipped, classed, valued and sold through the Company Office. Tributors were not allowed to be present while their opal was being prepared, and all the information they received was when a representative of the Company handed out cheques.

The tributors considered their opal was worth much more and that the returns for their labour should have been greater. They joined forces and protested to the Company in true Australian style and some time later it was agreed that the tributors be permitted to be present while the opal was prepared and classed.

These unsatisfactory conditions caused jewellers to send their own buyers into the field to deal direct with the tributors who were thus enabled to bargain and sell their best opals through these buyers while disposing of their lower grade opal through the Company.

Even with the many concessions allowed, the Company failed to obtain the returns expected. Tributors having been given time to organize their mines, into payable working conditions, demanded increased payments returning them up to 75 or 80 per cent. The Company refused with the result that more opal was sold through independent buyers.

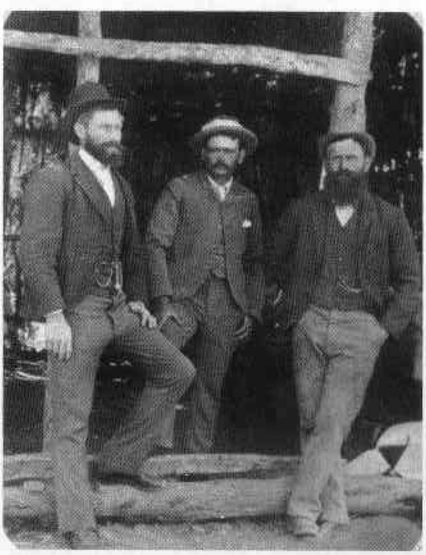
Eventually, the Government was to learn how the opal mining was conducted. A miner did not need much experience and the machinery was not expensive. It was decided that 40 acre blocks were too large and the size of the blocks were reduced to four acres. Even this arrangement did not last as it was found that a more workable size block of 100' x 100' was sufficient for a miner to operate. A special Opal Act to make the leases the same as for alluvial gold was brought down.

Opal mining being such an individual occupation, the Company continued to head for failure. Better quality opal was being discovered in outlying areas and larger quantities of less valuable opal was deposited with the Company. After trying a block rental system, it decided to abandon the project. Some miners returned and took up leases in their own right from the Government and although there are now only a few miners operating they are able to make quite a good living.

White Cliffs is a remarkable field as it seems capable of producing, from various parts of the area, all the different types of opal usually found on other opal fields; from white to black, to boulder type, as well as opalized shells, etc. Recently, with the aid of modern bulldozers and hole drillers, large tracts of land have been open cut and valuable packets of opal found. There is still, however, plenty of workable land at White Cliffs with an assured yield of opal for anyone who cares to try their luck.

HISTORICAL SURVEY

The township of White Cliffs was originally surveyed about the year 1894, but prior to this two enterprising gentlemen, Mr. W. Johnson and his brother, Dick, built a Public House and named it "The White Cliffs Hotel."



From left to right: Dick Johnson, Jack Patterson and Bill Johnson. Taken at White Cliffs in 1895 when the White Cliffs hotel and general store were built.

Mr. Jack Patterson built a General Store which had sufficient supplies for the town's needs at the time.

The township was on the Tartella side of the creek, while the hotel was built on the Momba side.

White Cliffs hotel and mail coach loaded with supplies.

The survey which had made ¼ acre opal leases close to the hotel was abandoned. The Government cut them into one acre blocks and put them up for sale at from £5 to £75 each according to their position and these sold very quickly.

The rapid increase in the population necessitated the Government building a Police Station, Court House, Post Office and School. Previously, the Post Office was conducted by a Mr. R. Croft in a small hut opposite the Hotel. The mail arrived from Wilcannia twice a week at approximately 6 P.M.

The journey from Wilcannia took 9 hours and the population of 150 all turned out to welcome the coach. Troops were stationed at the combined Police Station and Court House situated about ¼ mile from the Hotel.

White Cliffs post office with mail coach.

In all mining towns, it usually occurs that a few people try to take charge of the town, and White Cliffs was no exception. Attempts to dominate were resented by the miners who did not wait for police action, but attacked them with sticks and stones and drove them out of town very smartly.

When the State School was erected, Mr. E.P. O'Reilly was installed as teacher to about twelve pupils. This number soon grew to 150 pupils and necessitated a new school house and an assistant teacher. As the population increased the Roman Catholic, Church of England and Methodist denominations built churches.

Two newspapers, the "Western Life" and the "Opal Miner" were published by Mr. Shane and Mr. Frank Hartley. They survived a number of years.

White Cliffs grew rapidly. The Roman Catholic Church built a Convent and a boarding school for boys, a great benefit for families from Sheep Station properties and others. The school remained open for a long time, but eventually, owing to the difficulty of bringing supplies in from Wilcannia, it was transferred to that town. The Church of England still have a place of worship under the supervision of the Clergy of Wilcannia. The Methodist Church was abandoned when it was blown down in a hurricane which struck the town one afternoon.

Business developed. Messrs. W. Dell and H. Stevens opened a butcher shop and a bakery was run by

Mr. & Mrs. Dave Byers.

Mackenzie Brothers. A number of cool drink and confectionery shops were opened. Mr. Dave Byers, a hawker in the district, opened a general store in competition with another hawker, Mr. J.J. Barrett. Mr. Byers later amalgamated with Mr. W. Miller from Wilcannia and together they enlarged the store which soon became the principal general store. Mr. Johnson retiring from the Hotel, sold out to Dave Byers. The General

Store was taken over by Mr. R. Knox of Wilcannia who changed its name to "Knox & Miller." They increased the staff to eight persons. On Mr. Knox's retirement, Mr. Miller sold the business to Mr. W. Major who carried it on until the field started to decline. He then sold to Lum Low a Chinese baker.

Businesses changed hands rapidly and a fire in the main street closed several down. At one time there were a number of butcher shops in the town but keen competition and the toll levied by the surrounding stations, resulted in mutton being sold for 2d. per pound. One by one they closed down. The only business that seemed able to withstand competition were the Hotels. There were four in the town until a fire burnt down two of them. The town then became a shamble town as the burnt-out buildings were left and not replaced.

The two surviving hotels started to treat the townspeople in a rather off-handed manner. People were only allowed in the Hotel if they wanted a drink or were boarders.

The arrival of a new type of prospector on the field and who did not appreciate the treatment received at the hotels, formed "The White Cliffs Workingman's Club." They gained the support of the townspeople which enabled them to purchase the large stone Theatrical Hall which had been built by the Morris brothers. A few alterations provided a bar, concert hall, reading room, bathroom, gymnastics equipment and games. The library contained more than 1,000 books and magazines as well as newspapers from all over the world. News and reading was provided for the several difficult nationalities in the community.

The miners of White Cliffs soon surprised visitors to the field with their knowledge of happenings in other parts of the world and the intelligent deductions they obtained from this wonderful Information Bureau. Even members of Parliament, visiting White Cliffs, were careful not to make any rash statements risking being corrected by them.

Membership of the Club, at one time 600, was conducted under strict rules and welcomed by police as it provided much needed amenities and a great meeting place for the miners to discuss all aspects of the opal field.

The progress Association had another Concert Hall and together with the Club many social functions were held.

The first medical practitioner at White Cliffs was Dr. Archer from Wilcannia. He was followed by Dr. Rosenfeldt, a graduate of Melbourne University who was guaranteed an annual salary of £300 by local citizens. Later, he also was replaced by Dr. Gayes of Collins Street, Melbourne, who was to become the most popular Doctor on the field. As well as being a Doctor of Medicine, he was also well educated in Geology and Zoology. He ultimately became the "information bureau" for miners wanting technical information.

The nearest hospital was at Wilcannia 60 miles away. To build a local hospital a public collection yielded £600. Governmental permission was obtained and an 18-24 bed hospital was established. It was staffed with Matron, one Sister, two probationers, two wardsmen, a cook and a laundress. Dr. Ercole was appointed Medical Officer with rights to practice privately. He was also Medical Officer for the Druids and Oddfellows Lodges.

The hospital functioned satisfactorily until World War I when a shortage of doctors caused it to close. The Bush Nursing Service has serviced White Cliffs for the last 50 years.

Sport was always a popular pastime. White Cliffs has two football clubs and two cricket clubs. The first public schoolmaster was Mr. O'Reilly, father of the famous cricketer, Bill O'Reilly. The town also has a rifle club.

WOOLASTON, Tweedy, Goldstein, and Klein were the first important opal buyers on the field but many others came and departed.

The method usually adopted by the buyers was to employ runners to go around the mines and find out who was winning opal. Some of these runners employed other runners to cover larger areas. They would look at the parcel of opal available and then bargain about the price. If it was a small lot they may possibly

White Cliffs Racing Club.

A gem buyer selecting opals on the field.

purchase on the spot. Larger parcels would be referred back to their principals. They always reported back on all parcels available, such as quality, weight, and the price they had offered. If the miner brought the parcel direct to the Buyer he would be offered the same amount. A miner, however, seldom would get more than had been offered by the runner. Some miners would refuse to show their parcels to the runners, wishing only to deal direct with the principal buyer.

Runners were also able to arrange sales for tributors who did not want to sell their good opal to the Company. The runners always worked on a commission basis.

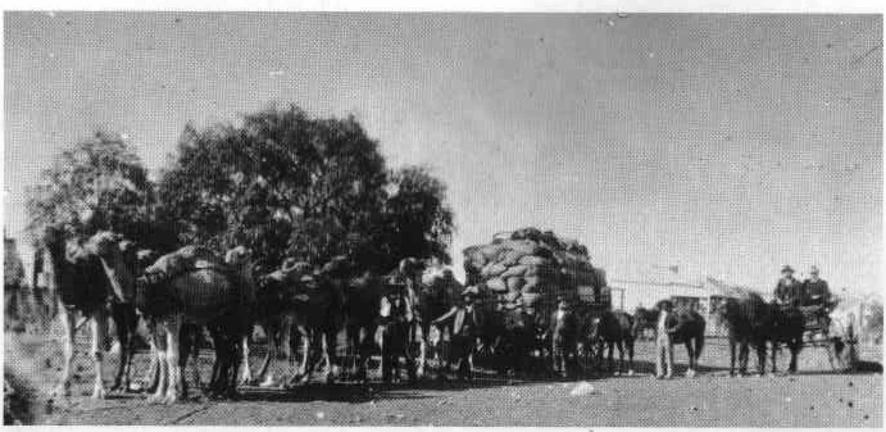
The earliest communication lines with White Cliffs were via Wilcannia. The mail coach was run twice a week by Morrison Brothers. Later, a direct service was commenced from Broken Hill via Tartella and Gnalta. White Cliffs was 16 miles off the Mount Crow Road. Eventually, a telegraph line was laid from Wilcannia. The general supplies for White Cliffs were brought also from Wilcannia by horse, bullock or camel trains.

The Opal shipments were sent by Mail Coach with Police escort once each week. Records show that only two occasions was the Coach robbed of its consignment; once on the Wilcannia – Broken Hill road and once, 6 miles from White Cliffs on the Tartella road. On this occasion, the Royal Bag containing the registered mail was recovered and the culprit received seven years gaol.

The earlier robbery occurred on a sandy stretch of road through some scrub near Dollows Tank on the Wilcannia – Broken Hill road. The opal was in a bag strapped to a rack on the Coach where it should not have been. The thief cut the rack straps and let the bag drop to the soft sand. The driver and policeman, not noticing the difference in the swinging of the coach, carried on. The thief picked up the bag and made off with it into the scrub. None of this opal was ever recovered officially but it is known that it went back to White Cliffs and resold mixed with other opal. Some of the buyers thought they recognized some of the stolen opal but it was difficult to swear as to its exact identity to satisfy a court that it was the stolen opal. Two men were arrested, tried and acquitted and when the Insurance Company paid up, the matter was forgotten.

Over the years there have been many cases of men taking their mates down over opal, not any of these incidents have ever been taken to court.

Fresh drinking water became a serious problem when the population suddenly grew from 200 to 3,000 persons. The miners dug a large tank, still known as No. 1 Tank, and good rains feeding the tank supplied the town for five years. Other smaller tanks and waterholes were dug but the water was polluted, a typhoid epidemic broke out and many died. A petition for a larger tank met Governmental approval and was built 18 feet above the township. A pipeline was laid to a central point



Camel train bringing supplies to White Cliffs from Broken Hill Road with police escort.

where everyone could use it.

The contractor who built the tank gained a special bonus of £700 worth of opal which he found while digging the tank.

The country around White Cliffs is composed of groups of low hills 50 to 200 feet high with flat tops which, when they had a larger area than usual or gradually sloped off to the plains were called tablelands. The surface is composed of small pebbles mixed with sand and decayed vegetation such as leaves from the scrub, which was plentiful in the early days. The whole country was opal bearing from the original surface down in some parts to about 40 feet.

In the first days of the field most of the opal was won from the surface down to about 12 feet. The miners used to sink paddocks usually 10 feet by 8 feet or smaller, throwing out the dirt with a small hand shovel. There was not much equipment on the field until someone built a windlass of logs and two forked sticks, using a crooked limb for a handle. With the aid of a rope and buckets made of hide they were able to sink a shaft down to 25 feet and win good saleable opal. This idea put new heart into the miners and it was not long before good well-made windlasses appeared all over the blocks. These better windlasses enabled the miners to go down to the 40 feet level.

The first few feet is composed of sand and lime, generally laying in flakes with small seams of dust between each layer. Occasionally, a patch of good opal was found in the dust seams. The next few feet is much harder to dig as it has small rock composed of smaller stones mixed through it and no dirt seams. Then came a conglomerate about the size of wheat grains or slightly larger set in cement as hard as flint which had to be drilled or blasted out. This was from 6 to 18 inches deep and layed in flakes, thick on one side and thin on the other and sometimes overlapping. Good opal was frequently found in these layers usually about 15 feet from the surface. After this the sinking was easy enough through soft rock which crumbled up into small blocks when exposed for some time to the air. Through this rock ran several ironstone seams of decayed matter which on numerous occasions carried a pocket of opal.

Some help from the fair sex working a windlass.

These seams are called levels and they vary in different parts of the field. Sometimes, a miner was unlucky enough to sink a shaft onto a deposit of limestone, locally called cement, and had to cut straight to the bottom often by driving several feet until he could clear of it and strike the settled country again. There were always good prospects of picking up a pocket of opal close to the limestone.

This sinking applied to the hills and tablelands on the deeper slopes. On the flats the sinking was much easier, with the prospects of winning opal at the shallow levels. Some of the flats carried a lot of decayed copi (gypsum) and in the early days a miner would leave his claim if he struck the copi, but when one or two struck good opal amongst it, it altered the theory of the knowing ones, and the shallows were then well prospected, usually with good results.

Many of the miners sinking either on the rising ground or the flats went deep as the bands (a layer of sandstone 6 to 15 inches thick) and if they sank that far without finding opal they usually abandoned the shaft. Many of these shafts were later worked again and by driving sometimes only a few inches good opal was obtained. The depths of the band varied from 12 feet on the flats to some 54 feet on "Thurlays Hill." The earth below the band was much softer than above and instead of being clean white or red it was a dirty grey or mustard colour and so fine that it could be scraped out with a shovel. It was not safe to work in this area without timbering and as prospects were not too promising it was thought not worthwhile.

The ordinary claims were all very dry and required no timbering when driving. The opal generally occurred in seams and a pocket might contain anything from ½ ounce to hundreds of ounces which the miners usually divided into four classes: firsts, seconds, and thirds besides candle box stuff and potch. All these different grades could come from one seam in the space of a couple of square feet.

Fossils are more or less plentiful all over the field; shells, both fresh water and marine have been found. Also, a peculiar fossil shaped like a cigar the miners call a pipe, and which varies in length from one to over four inches have been found.

There is another fossil locally called a pineapple which is supposed to be the cone of a species of extinct fir tree. Petrified wood is also very common varying in thickness from two inches to twelve inches in diameter. Some of these pieces of wood make beautiful specimens as all the ring marks are opalized, while other portions have turned into either a dark brown or snow white. Occasionally, the remains of small amphibious reptiles have been discovered, also, the joints of the backbone of some kind of fish varying in width from ½ inch to 3 inches.

The opal is thought to have been originally a liquid which ran into certain seams in the rock and into cavities formed through the decaying shells. After solidifying it has apparently been subjected to severe pressure which sometimes fractures the seams in all directions, still leaving the opal in its original position. In places some pieces are first class opal and the next piece will be all potch. There are flat seams and verticles and the colour in the flat seams run parallel to the surface while in the verticles it still does the same, with the result the different colours are across the stone according to the slant on the seams.

GEMVILLE

About 1891-1892, an exodus took place from White Cliffs to a spot some 14 miles distance on the Mount Brown Road where a couple of miners had discovered some very good opal. About 300 miners left the Cliffs to try their fortune there and met with varying success. The field only lasted for about ten years but became so important that it took on the name of Gemville. The Government put down a tank for the miners there and established a police station, school, and post office.

It was several years without a hotel as the miners objected to having one. Finally, vested interests and influence won out and a license was granted to Mr. R. Patterson. The Hotel only lasted about five years and was never a success. The landlord went out poorer than he went in, having to forfeit his license.

Most of the stores in White Cliffs opened branches in Gemville and they sent to White Cliffs for supplies. Some of the miners dated the downfall of Gemville to the opening. It probably has a lot to do with it as it caused a lot of time to be lost and made the men discontented. It is reported that there is still plenty of opal there but with the difficulty of obtaining rations, a very important item, and the price of opal falling at about this time, made it unprofitable to work on this field.

Developments and Highlights at GIA's Lab in New York

by

ROBERT CROWNINGSHIELD

Visible Graining in Diamond

One of the knottiest problems encountered while grading fine diamonds is how to handle the matter of visible graining. Some years ago a ruling was adopted by the American Gem Society, followed since by the grading in the Institute's Laboratories, by which diamonds that have no flaws whatever but do show phantom grain lines without color and that do not reach the surface may be considered flawless.

In recent years, we have been encountering more and more stones – always top color – in which the graining is not phantom but misty. In some cases, it is visible as dark lines or bands to the unaided eye; in others, the bands may run in more than one direction. Certainly, they are more readily visible and affect light immeasureably more than a tiny pinpoint, which disqualifies a stone from the flawless category.

Figure 1 illustrates graining in a 15-carat marquise that we agreed could not be considered flawless. It was graded VVS_1, but it was noted that no other flaws or imperfections

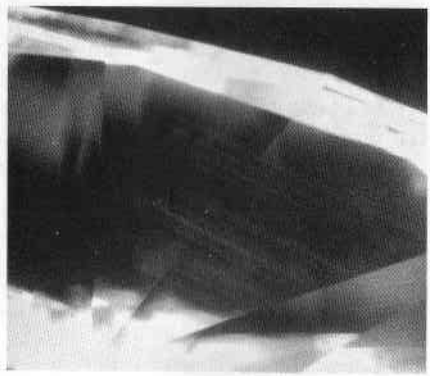


Figure 1

were visible. While investigating the X-ray fluorescence of natural versus General Electric's cut synthetic diamonds, we noted that this grained stone fluoresced an intense yellowish green and phosphoresced for a very long time afterward.

Since testing that stone we have had occasion to grade five more top-colored, grained diamonds, all of which behaved the same way. Two stones with acceptable phantom graining fluoresced blue without phosphorescing. Obviously, something in the grained stone is responsible for a most unusual reaction to X-rays. It is possible that with an X-ray test a cutter considering the purchase of what must be exceedingly expensive rough could protect himself from the disappointment of cutting a crystal only to find that it cannot be considered flawless. In the rough stone, these misty grain lines are invisible. Just how a cutter considering the purchase of this kind of rough could submit stones to a laboratory before purchase is a problem.

Burned Surfaces on Rough Diamonds

Figure 2 illustrates another problem with rough diamonds, only this one is fraudulently done in order to disguise a yellowish color. It shows a diamond crystal that has been burned, or oxidized, so that the surface takes on a white cast. The stone was submitted to the Laboratory after a cutter had polished several stones from a lot, only to find the color much poorer than he counted on and therefore worth much less than he paid. The entire parcel had been treated.

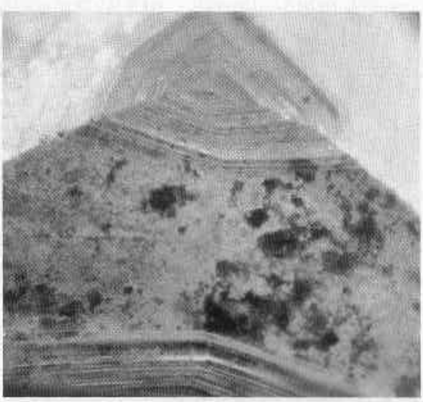


Figure 2

A 20th Century Cut Brilliant

We admired a lovely 20th-century cut brilliant recently and were struck with the beautiful symmetry, even to the appearance around the culet of the point where the table would be in an ordinary round brilliant *(Figure 3)*. We find these rare cuts to be most attractive and always are sorry to learn that one is to be recut as an ordinary spread brilliant, as this one was destined to be.

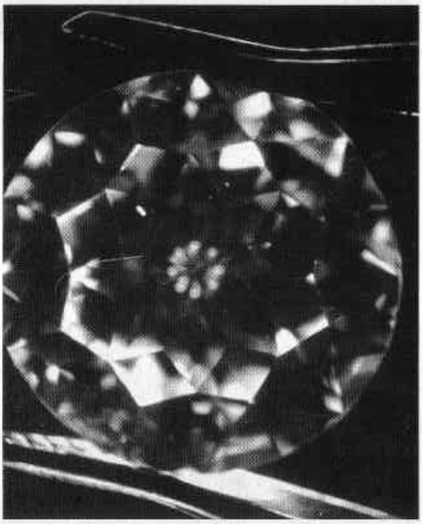


Figure 3

Tomaknot?

We are happy to photograph for Lazare Kaplan and Sons a brilliant-cut

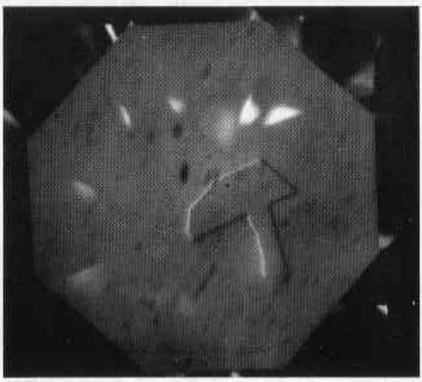


Figure 4

diamond in which a tomahawk-shaped knot appears in the table *(Figure 4)*. Not visible in the picture is the fact that the knot itself is not polished – only ground.

Synthetic Spinel and Strontium Titanate Doublets

Manufacturing a doublet of strontium titanate and a harder material for the crown is not new; it originated in an attempt years ago to market a doublet of synthetic rutile and synthetic white sapphire. The need for a more durable top on both of these materials is obvious. Strontium titanate is especially fragile.

We made some tests on a few doublets two years ago to determine the wearing, or resistance, of the cement to normal trade-shop work such as steam cleaning, ultrasonic, sizing a ring shank, etc. The samples we tested held up quite well and indicated a potentially satisfactory product. However, the strontium and synthetic spinel were joined at the girdle plane, resulting in knife edges for both materials. Consequently, many of the stones we have seen since have shown damaged girdle areas

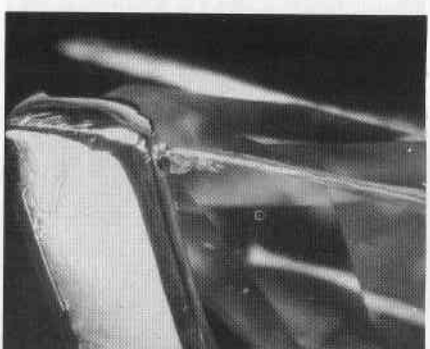


Figure 5

(Figure 5). Several have also shown damage at the point that the strontium titanate rests on the prong bearing.

Several doublets have been submitted to the Laboratory illustrating the fact that cements can vary and that not all the doublets will stand up like the ones we tested.

Figure 6 illustrates a new ring in which an arborescent pattern is developing in the cement plane. This, obviously, is the result of faulty control of the cement, since the ring had never been worn.

Figure 6

The stone in *Figure 7* had been worn in an engagement ring for a considerable length of time. The cement has begun to separate and flake away from the joining plane. The stone appears milky, since the cement has turned yellowish white, causing the stone to appear light yellow in

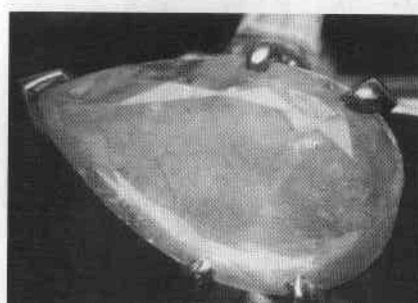


Figure 7

color. The strontium titanate shows considerable damage at the exposed head of the stone, but amazingly little wear elsewhere *(Figure 7A)*.

Figure 7A

Recently, we had the opportunity to examine a new idea in doublets developed by the firm of Naftile Fils, Geneva and Nafco Gems, Ltd., New York. After long research into the quality control of the cement process, they have been able to cut stones that appear very diamondlike by joining the synthetic spinel and strontium titanate well below the girdle plane. This allows the girdle to be relatively thin instead of the enormously thickened strontium titanate some manufacturers have produced, to avoid the knife-edge problem as seen in *Figure 7B*.

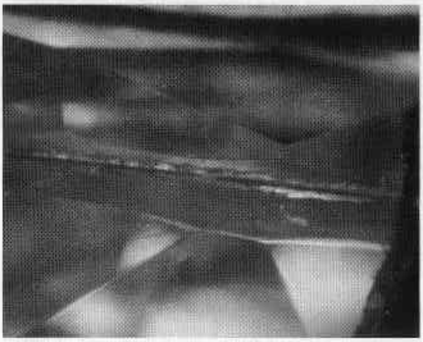


Figure 7B

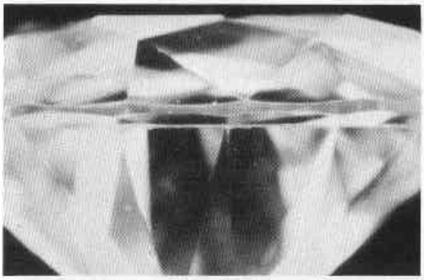


Figure 8

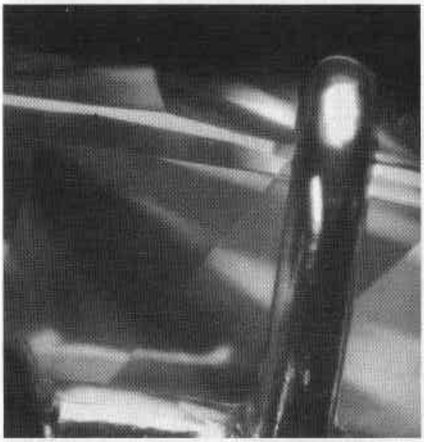


Figure 9

The Nafco doublet in *Figure 8* shows that the girdle is in the synthetic spinel. It is faceted and the spinel comes well below the girdle.

Figure 9 shows that the synthetic spinel will rest on the prong seat, avoiding the damage we mention above. We noted that in the pear shape and marquises the pavilion faceting is not quite diamondlike, since the pavilion facets are open at the girdle *(Figure 10)*. They still are more nearly like a diamond than many solid

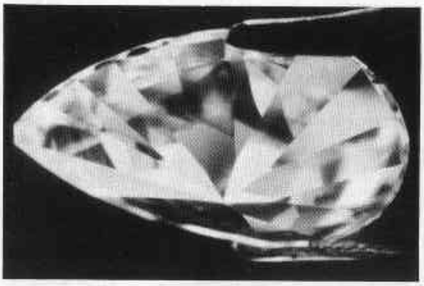


Figure 10

strontium titanate and other doublets in which there are no pavilions at all.

NAFCO has experimented with colored synthetic-spinel crowns and has shown us some attractive stones – particularly a pink one that resembled a fine pink diamond.

With the bulk of these doublets using synthetic spinel, it would be logical to assume that the amount of dispersion from the strontium titanate would be considerably less than in a solid strontium-titanate stone. This is not the case, and the experienced jeweler can still tell by the extravagant fire that he is not looking at a diamond.

Figure 11 illustrates the pavilion cutting of one of their round brilliants. Note that the pavilions come to a point at the girdle and that the girdle is faceted. We were amazed that we did not see more evidence of the

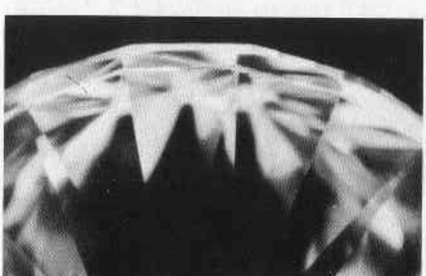


Figure 11

difficulty of polishing at one time two materials of such difference in hardness. In this photo one can see evidence of some undercutting at the joining plane in the center of the picture.

An even more promising doublet shown to us later by this firm has a colorless synthetic sapphire crown over strontium titanate base (*Figure 11A*). We were truly amazed to see that the two materials had been joined before

Figure 11A

polishing yet no evidence of under-cutting can be seen in *Figure 11B.* With its faceted medium thick girdle and crisp facet junctions (*Figure 11C*) it is a masterpiece of the lapidary art. If the cement layer is as durable as

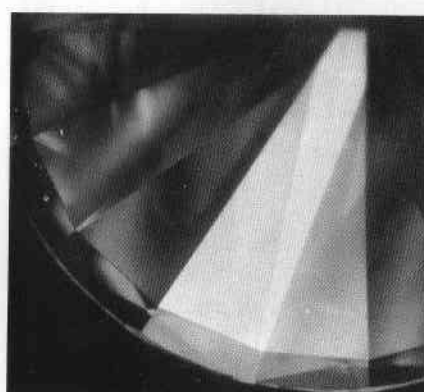


Figure 11B

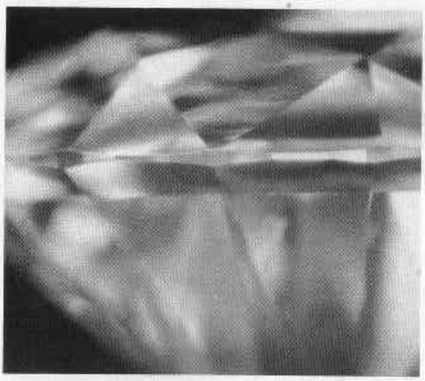


Figure 11C

current testing indicates it is, these well-made doublets should offer a welcome addition to the widening spectrum of diamond imitations.

Wire Loop in Synthetic Emerald

Testing small emeralds in bracelet or brooch settings sometimes offers difficulty, especially when testing for ultraviolet fluorescence. We have noted on one other occasion an unusual clue that a stone being tested is synthetic. This is shown in *Figure 12,* in the form of a platinum-wire loop.

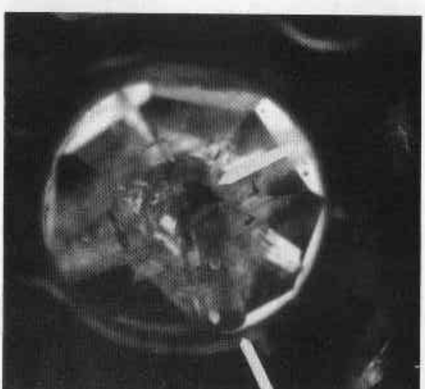


Figure 12

Dyed Blue Sapphires

In the Spring, 1971 issue we mentioned testing some "rubies" that owed their color to an intense red dye that penetrated fractures and repeated twinning zones. We recently examined a large parcel of cut stones of various shapes and colors that were dyed blue. The "raw material" was nearly colorless to whitish repeatedly twinned corundum worth next to nothing. *Figure 13* shows the laminated structure of one of these stones.

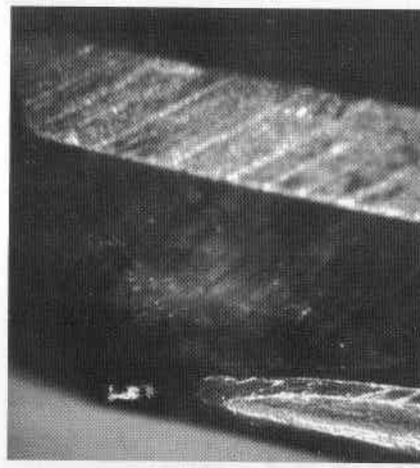


Figure 13

Is It A Diamond?

Figure 14

Figure 14 shows a 6.81-carat emerald-cut diamond with a badly abraded culet. The stone was being offered for sale, but several dealers could not believe it to be a diamond because of the wear. It was not hard to discover that the late wearer of the stone also wore a diamond wedding band, which caused the abrading. Incidentally, with slight loss of weight the stone became flawless and was D in color.

Dyed Chalcedony Carving

A very jadelike carving submitted recently proved to be a dyed chalcedony. One clue, of course, was the waxy luster of the broken surface of the bird's wing tip *(Figure 15)*. The absorption spectrum of the dye was different from any we have recorded *(Figure 16)*, in that the stone transmitted well beyond 7000 Å.

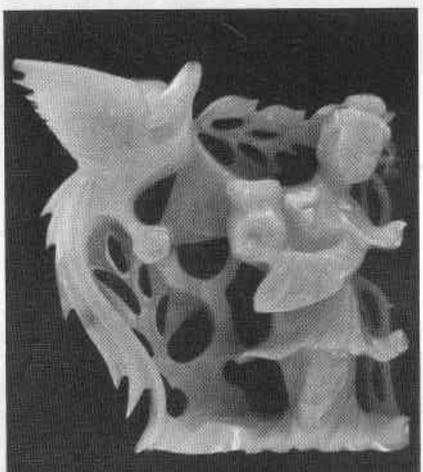


Figure 15

Red Synthetic Spinel

Over the years we have had occasion to mention synthetic red spinels, mainly as curiosities. We received a large octahedron attached to a platinum plate some years ago and deduced that it was probably made experimentally by Mr. Carroll Chatham. We received some time later a few very small faceted stones represented to be about the best that could be secured from Verneuil-grown boules. Dr. Gubelin reported seeing larger Verneuil-grown stones, but we have never considered red synthetic spinel to be potentially commercial. In April, Bert Krashes was given a 3.33-carat oval synthetic red spinel by one of his Gem Identification Class students, Mr. John J. Power of Rosemere, Quebec. Under magnification, this stone had a most unusual appearance. It resembled swirls seen in some glass *(Figure 17)*. We do not know the method of manufacture of this material, and are informed that there will not be a constant supply. Later, we received from Chuck Fryer in Los Angeles some small preforms that came from Walter E. Johansen, faceting-rough

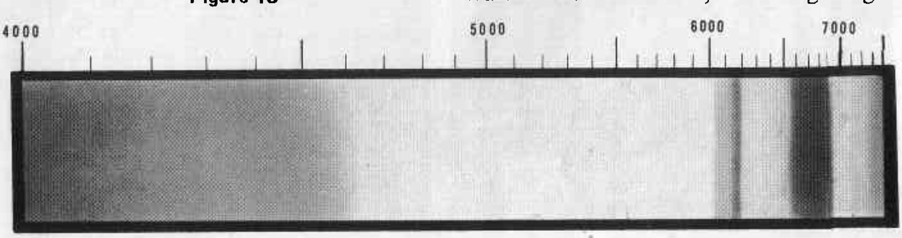


Figure 16

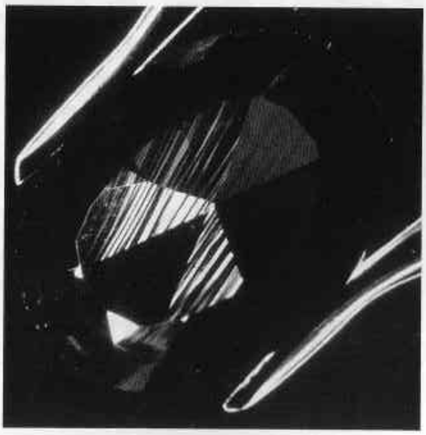


Figure 17

dealer of Morgan Hill, California. These also show the peculiar "Venetian-blind" structure.

Black-Dyed Oölitic Opal

When black treated opal first came on the market about 10 years ago, we learned to recognize it by the presence of the black (carbonized sugar ?) along cracks. At about the same time, a few

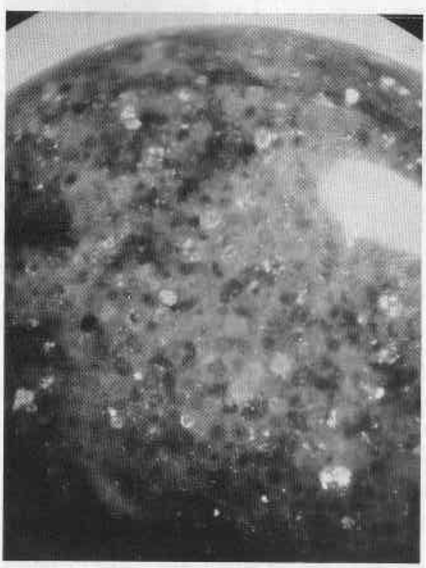


Figure 18

dyed-appearing stones that proved to be natural oölitic opal appeared on the market. The egg-shaped inclusions are a dark greenish-brown color surrounded by light-colored common opal sprinkled with tiny patches of play of color *(Figure 18)*. Some of the stones have enough beauty as they are, so they are not dyed. Others will take the black color, which penetrates around the oölites enhancing the black appearance of the stone *(Figure 19)*. It occasionally takes careful examination

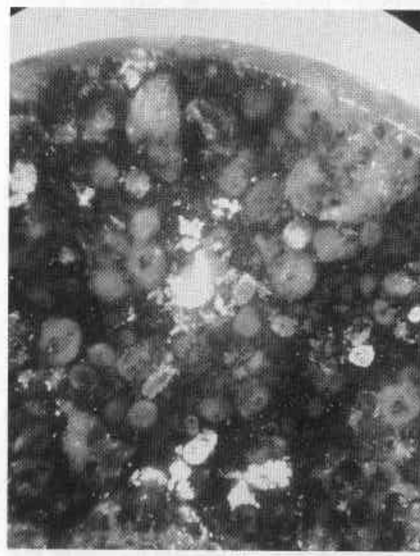


Figure 19

of the stone to spot dyed areas, such as cracks in clear opal areas that were penetrated by the dye. *Figure 20* illustrates a stone that appeared to be an untreated oölitic opal with low magnification. Actually, it is black treated, only in this stone the black color penetrates the oölites themselves and the play of color is in the surrounding areas.

Figure 20

Assembled Crystal Groups

The popularity of jewelry made with amethyst, rose quartz and other natural clusters of crystals has prompted one firm, Collins Associates of Philadelphia, to imitate clusters by assembling fragments of natural and

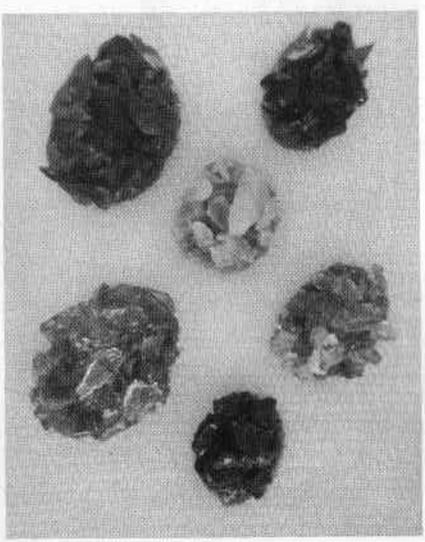


Figure 21

synthetic material in a wide array of colors and standard sizes. We are grateful to Mr. Stanley Gross for a selection of 8 colors shown in *Figure 21.* The development is another credit for the new adhesives being made.

Biaxial Yttrium Aluminate

We were very glad that our Los Angeles Laboratory recorded in the Spring, 1971 issue the properties for a new synthetic material. The stone we were asked to test was a bright, nearly ruby-red color with properties nearly identical to those listed. In *Figure 22* we show a most unusual interior texture unlike anything we have seen in nature, which put us on guard that it was probably synthetic.

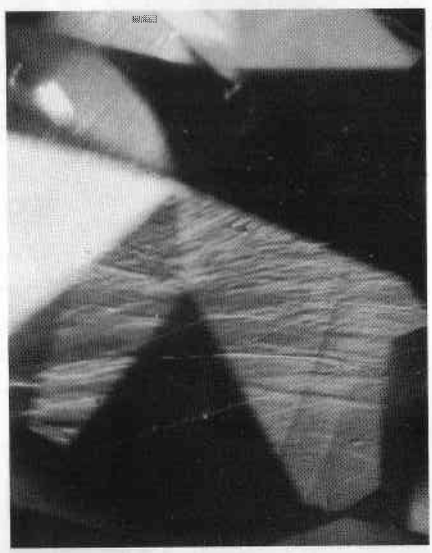


Figure 22

Rare Green Stones in Jewelry

Recently, we tested a transparent lively green idocrase in a gold-and-diamond brooch. We do not recall ever seeing quite this color before. Another fancy "ballerina" platinum marquise-and-tapered-baguette cluster ring was set with a nearly flawless green sphene, or titanite (as Jerry Call mentioned, that is the preferred name in Brazil). The stone was nearly identical to one Jerry gave to our collection recently. One wonders how well this stone will wear.

Acknowledgements

We are indeed grateful for gifts received in recent months and express our appreciation to the following:

To **Jerry Call**, now living in Governador Validares, Brazil, for a wide assortment of cut stones and minerals including opals, amblygonite, spessartite, rose quartz, etc. A lavender topaz is the first we have seen and came from a lot that he brought. He indicated that there will probably be no more.

To **Eunice Miles**, New York Staff gemologist and her recent host in Brazil, student **Julio Sauer**, for specimens of tourmaline, amethyst, emerald and other minerals from various mines they visited recently. Also, we received an alexandrite crystal given to her by Alvaro I. Morais, Teofilo Otoni. Eunice's gift of a ruby-red tourmaline is the best color we have yet received.

To students **Janison and Haertel**, of the firm of the same name in New York, we received a needed and valuable gift of green-dyed jadeite.

To graduate **Howard Rubin**, New York, we received some nicely cut cushion-antique garnet-and-glass doublets.

To student **Bill Mazza**, New York, for some black coral from a locality in the Caribbean that was new to us.

To **Edgar F. Borgatta, Ph. D.**, student, Gempro Distributors, Rupert, Vermont, for gifts of peridot, hessonite, thulite and black nephrite. This most generous gift is deeply appreciated.

To **Dr. Reinheimer**, turquois specialist in New York, for a handsome benitoite crystal.

To graduate emeritus **Bill Collison**, Philadelphia stone dealer, for two beautifully cut garnets – one a Kashmir almandite and the other a red-brown spessartite.

To **Dr. Herman Bank** of Gebruder Bank, Idar-Oberstein, and his traveling representative **Peter Kiecksee**, for an urgently needed and greatly appreciated selection of cut blue zoisites. With this stone becoming ever more popular, though scarce, we were becoming pressed for stones for student study.

To graduate **Arnold Baron**, Billings, Montana, for several Russian emerald crystals.

To **Barnett Robinson**, New York, for a most generous selection of mineral specimens and cutting rough. We are happy to have gold in matrix, natural wire silver and many other items that will add interest and value to our collection.

Developments and Highlights at GIA's Lab in Los Angeles

by

RICHARD T. LIDDICOAT, JR.

An Unusual Gift

Recently Edward R. Swoboda, one of the owners and the operator of the Stewart and Tourmaline Queen Mines in the Pala area of San Diego County, Southern California, visited Idar-Oberstein in West Germany. While there, he called on the Friedrich August Becker Company to visit a mutual friend, Gerhard Becker. While Mr. Becker was showing him a number of different items that had been received in the last several months, Mr. Swoboda was particularly interested in what appeared to be a massive grossularite garnet which was pink at one end and green at the other. He thought it was a piece in which the Gemological Institute would be interested because of studies made on this material in our laboratories previously *(refer to the article entitled "Hydrogrossular – A Hydrogarnet from the Transvaal" in our Summer and Fall, 1966 issues: Volume XII – Number 2, Part I, pages 49 to 57 and Number 3, Part II, pages 74 to 76 by H. Lawrence McKague, while on the GIA staff.)*

Mr. Becker donated the piece to the Institute and Edward R. Swoboda had it polished into a long slender cabachon. The studies made by Charles W. Fryer, the Institute's Laboratory Supervisor, follow this commentary.

The stone measures 19.83 x 10.01 x 3.68 mm. and is shown in *Figure 1.*

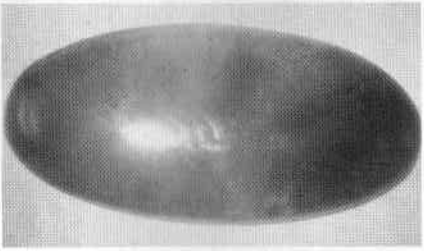


Figure 1

Although not in color, the photograph shows the distinct difference between the dark green end of the stone and the lighter pink end on the left. The colors are very much reminiscent of the ones seen in a fine bicolor tourmaline from Mesa Grande, California. Because of the striking difference in color from end to end, it was decided to test each end of the stone to determine if there was any perceptible difference in the properties.

The back of the cabochon was not perfectly flat but it was flat enough to get a reasonably accurate refractive index. Each end had the same refractive index of 1.71. The pink end had a very strong yellowish fluorescence to X-ray. While the green end fluoresced, the strength of the fluorescence was noticeably less than the pink end.

The spectroscope revealed a strong 4650 line indicative of idocrase in the absorption pattern of the green end. The pink end showed no trace of the 4650 line or any other distinctive absorption line or band, for that matter.

The specific gravity of the stone was 3.391. Obviously it was impossible to measure the specific gravity of each end independently, without sawing the stone in half. However, when a stone is allowed to sink slowly in a liquid having a specific gravity slightly lower than the stone, if one end is heavier than the other, it will consistently arrive at the bottom of the container before the lighter end. Since neither end seemed heavier than the other on this stone, it can be assumed that the specific gravity is fairly constant from end to end.

Up to this point, the data gathered seemed to indicate that the

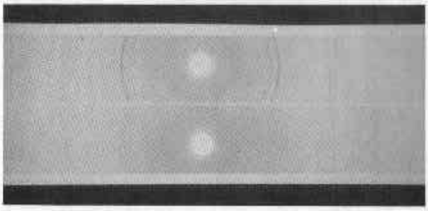


Figure 2

pink end was grossularite and the green end idocrase. In order to prove or disprove this theory, it was decided to run X-ray diffraction patterns on each end of the cabochon. *Figure 2* shows a comparison between the diffraction patterns of the two ends. It can be seen that the patterns are quite different and none of the lines from one pattern was found on the other pattern. *Figure 3* shows that the pattern of the material taken from

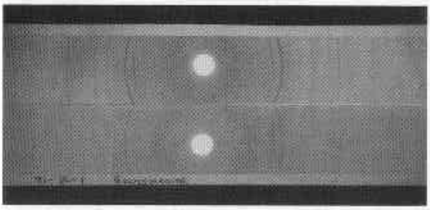


Figure 3

the pink end matches exactly the standard pattern of grossularite. *Figure 4* compares the pattern of the green end with a standard idocrase pattern and shows how well they match. Neither diffraction pattern showed any of the lines found in the other pattern, indicating that the ends of the cabochon were relatively pure material.

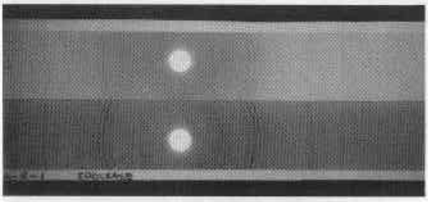


Figure 4

In conclusion, it can be said that this stone represents a unique example of an intimate mixture of grossularite garnet and idocrase.

Although such a mixture is not uncommon, it usually exists as a stone having properties somewhere between the properties of the pure minerals, depending on how much of each is present in the solid solution. Never before have we encountered a piece of material which showed such clear-cut differences from end to end.

Star Beryl

It is not often that we encounter star material that is not corundum or diopside. We received a brown stone recently for identification that showed a rather tentative six-rayed star. When this material was viewed from the side in transmitted light we could see various layers, some of which had a bluish cast, reminiscent of aquamarine. Through the center of the stone was a very clear uniaxial interference figure. It was identified readily as beryl and the star as is shown in *Figure 5* was fairly well defined. The layering, with some having a bluish cast suggesting aquamarine, is typical of the star

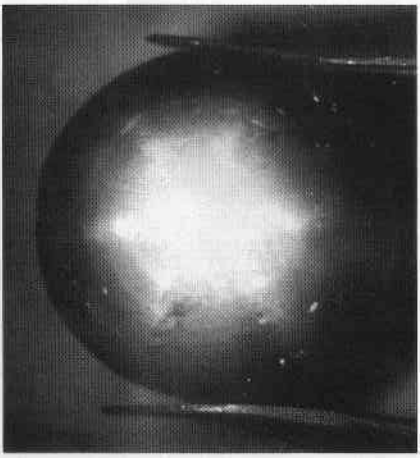


Figure 5

beryl that we have encountered in the past.

Unusual Discs

From one of our full-time Resident students, we received for identification a necklace made up of irregular discs which, under magnification, showed a structure such as that seen in *Figures 6 and 7.* The properties, refractive index 1.54 and a burnt-hair odor to the hot point, suggested vegetable ivory.

Figure 6

This type of material is really out of our province in identification, but the structure is typical of what we expect from one of the plant compounds that are occasionally used for jewelry purposes. In attempting to identify something of this nature, we feel somewhat out of our element, but we can have a reasonable idea of the nature of the material, based on its structure and characteristics under medium-to-high magnification, and its reaction to the

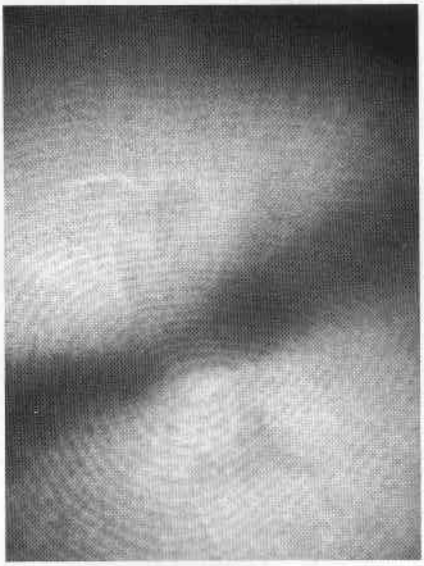


Figure 7

hot point, plus refractive index. We would like to know more about such material.

Emerald . . . Synthetic vs. Natural

A very attractive emerald was received for identification. It was suspected of being synthetic because of the rather unusual inclusions in it. It did not fluoresce, but refractive indices were in the 1.575-1.580 range, and it was thought at first to be possibly one of the latest of the Gilson line. However, additional studies disclosed a number of characteristics that we considered only possible in a natural stone. In addition, there was no 4270 line that we expect in a synthetic in which iron oxide has been used to dampen the fluorescence. Some of the inclusions seen in the stone are shown in *Figure 8*.

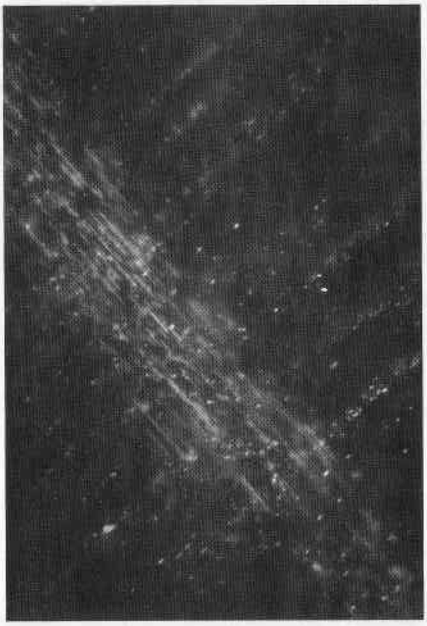


Figure 8

A Carved Opal

Marvin Wilson, a Graduate Gemologist from Los Angeles, who is

Figure 9

a very talented stone carver, used Mexican opal as the medium from which to carve the head shown in *Figure 9.* It contains a good play of color showing red to green flashes, the former being the more predominant. The weight of this carving is 288.25 carats.

Bubbling YAG

Most of the YAG that reaches the market is almost free of bubbles. However, occasionally one is encountered that shows many. This one, shown under 60X in *Figure 10,* evidently escaped the quality control people at the plant where it was made.

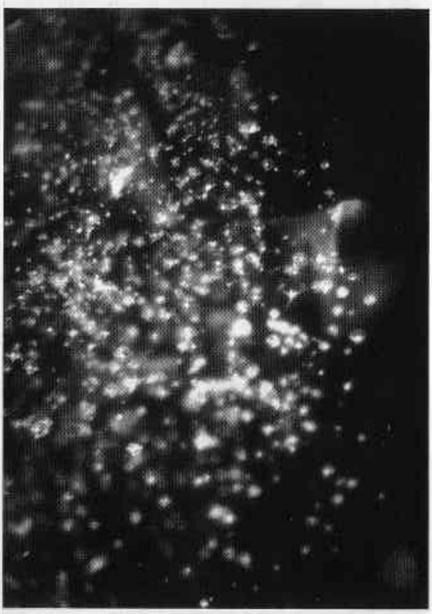


Figure 10

The plethora of plants being set up to cut YAG makes one wonder at the capacity of the consumer market to handle so much material.

Crystal Aggregates

The popularity of crystal aggregates in avant garde jewelry has led to the assembly of crystal clusters cemented together. Such a cluster, identified recently *(shown in Figure 11),* included a combination of natural green beryl and emerald

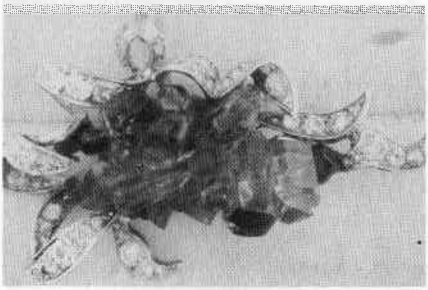


Figure 11

Figure 12

crystals, together with quite a few that were polished to resemble crystals. A closer view in *Figure 12,* shows the bubbles in the glue holding the aggregate together.

Yet Another Synthetic Emerald

It is sometimes interesting how word travels. We learned from a member of the Gemmological Association of All Japan in Tokyo, that Hans Reymer, a Graduate Gemologist in Vancouver, had encountered some synthetic emeralds made by a Canadian chemist. Upon writing to Mr. Reymer, we learned that this was indeed true, and were given the opportunity to examine the product.

The properties of this new synthetic emerald, which has not as yet reached the market, are similar to those of Chatham and the early Gilson product. The only faceted stone weighed .37 carats. The refractive indices are approximately 1.560-1.563, and the specific gravity is 2.66.

Of particular interest about these synthetic emeralds, is that their inclusions are not really suggestive of a synthetic material. The properties suggest flux-fusion growth, but with one or two exceptions – the internal features do not lead one to that conclusion. There are many negative crystals elongated parallel to the C-axis *(see Figure 13)*, and there are

Figure 13

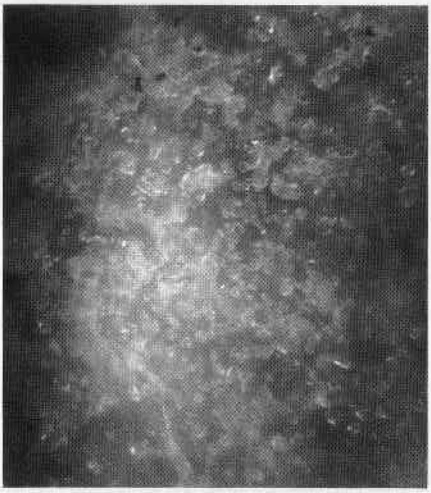


Figure 14

Figure 15

many inclusions which appear to be crystals but do not have a habit suggesting the usual phenakite *(Figure 14)*. There are some fractures which give the typical roughly hexagonal

Figure 16

outline expected in flux-fusion synthetic emeralds *(Figure 15)*. One flat crystal plate did show wisplike patterns not evident in the cut stone *(Figure 16)*. Otherwise, this material could very easily pass for natural emerald, if the properties were not so low, and if it did not fluoresce so strongly.

Graining in Diamonds

Off and on for the last year or two, we have been discussing the effect of internal graining on the clarity grade of a diamond. A brilliant-cut 3+ carat diamond, sent to the Institute for a quality analysis, showed a very interesting square pattern of graining with all four sides very clearly defined. This was so readily visible under 10X, and a suggestion of it even detectable by the unaided eye, that there would have been no choice but to grade the stone other than flawless. The slightly distorted central square and other grain lines are clearly visible in *Figure 17*.

Interesting Emerald

One of the unknown materials received recently for identification turned out to be a natural emerald, and interestingly enough the very

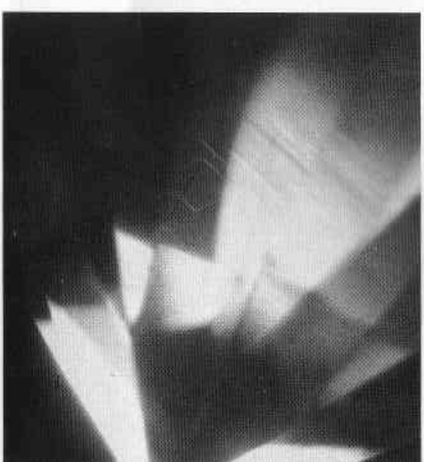


Figure 17

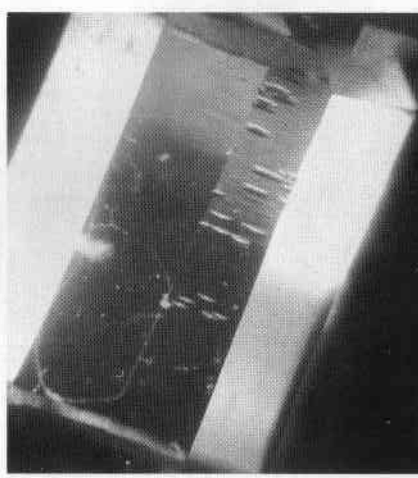


Figure 18

large culet on the emerald was unpolished. There were quite a number of growth features on the original surface in addition to many elongated ridges at right angles to the length of the culet. Both are shown well in *Figure 18.*

Acknowledgements

We wish to express our sincere thanks for the following gifts:

To **Edward R. Swoboda**, Los Angeles, California, for several rough eosphorite and pink topaz crystals, as well as many different colors of orthoclase moonstone cabochons.

To **Richard W. Michaels, C.G.**, Michaels' Jewelers, Waterbury, Connecticut, for over one hundred assorted natural and synthetic stones to be used in our gem identification sets.

To **Ben Gordon, G.G.**, Gordon Jewelry Corporation, Houston, Texas, for assorted stones and pearls for student study sets.

To **Werner "Sol" Salomon**, GIA Graduate, for a double strand of imitation amber beads.

To **Ben Baxter, C.G.**, Baxter's Jewelers, New Bern, North Carolina, for a splendid example of a calcareous concretion from a cherrystone clam.

To **Ralph Shapiro**, Los Angeles, California, for the repair of a damaged emerald-cut diamond with a remarkably small weight loss.

To **Lee Sparrow**, San Francisco, California, for a fire agate cabochon and an opal concretion for use in our display case.

To **Frank Golden**, Graduate Gemologist, now with the Army and Navy Exchange in Dallas, Texas, for a doum palm nut, better known as vegetable ivory – an item previously not included in our collection.

To **S.M. Fisher**, Los Angeles, California, for the use of a fine black opal at the last Conclave in Montreal, Canada, and a donation of a dyed lavender jade and assorted pearls.

To **Jim Dolleslager**, Graduate Gemologist, for a deeply colored oval-cut amethyst and an emerald-cut peridot. These two stones have found a place in our display cases.

To **Brian Lingham** of Australia, for several specimens of rough opal.

To **Stein & Ellbogen Company**, Chicago, Illinois, for an assortment of natural stones for student study use.

To **Joseph O. Gill**, Fox's Gem Shop, Seattle, Washington, for a rough carnelian specimen for use in our display case.

To student **Nancy Brown**, Kashan Laboratories, Dallas, Texas, for ten Kashan synthetic rubies to be used in our Gem Identification classes, and a lovely 36 carat Kashan synthetic ruby crystal group that has been placed in our display case.

To **Earl Dresden**, GIA Residence student, for an opal triplet, a fire opal in matrix and a fire agate. These fine specimens will be placed in our display case.

To student **Pierre Gilson** of Gilem S.A., Switzerland, for his gift of 70 carats of Gilson synthetic emerald. Included in the parcel are some of the latest nonfluorescent as well as the fluorescent type of Gilson product which will be put to fine use in our resident Gem Identification course.

To **Igo Blaugrund**, Los Angeles, California, for a large parcel of rough opals and emeralds. These specimens will be useful in our classes.

To **Yukio Fujisaki**, Iizuka City, Japan, for over 20 books dealing with gemology, mineralogy and geology, all written in Japanese, which will be put to good use by our Japanese resident students.

Book Reviews

DIAMONDS by Eric Bruton, F.G.A. First published by N.A.G. Press Ltd., London, England, 1970; now available in an American edition published by Chilton Book Company, Philadelphia, Pennsylvania, 1971. 273 pages. Clothbound. Illustrated with black-and-white photographs and line drawings. Index, Table of Contents and Appendices. Price: $17.50.

DIAMONDS covers the diamond more thoroughly than any other book in English that we have encountered. It is very well illustrated and interestingly written and there is no question but that it will be a very popular book.

The following chapter headings will give an idea of its contents: Diamonds in History, Where Diamonds Are Found, The Big Mining Companies, Mining and Recovery Methods, Extracting Diamonds, Prospecting Methods, How the Market Operates, Sorting Crystals, The History of Diamond Cutting, The History of Cuts, Diamond Manufacturing, Grading Polished Stones for Colour, Clarity Grading of Polished Stones, Grading Polished Diamonds for Cut: Weighing and Weight Estimating, Prices of Diamonds: Valuations, Origin and Geological Distribution, Diamond Crystals, Physical Properties of Diamond, Synthetic Diamonds: Artificial Coloration, and Identification of Diamonds.

Sections on the history of diamonds, where they are found, big mining companies, mining and recovery methods, extracting diamonds are all done very well. Although *DIAMONDS* is up-to-date and will undoubtedly become an important addition to any jewelers library, there are, however, some portions not as well put together because Mr. Bruton's approach is that of a layman rather than that of one with a firsthand knowledge of diamonds.

Many of the book's diagrams of different cuts haven't been seen for generations. The oval brilliant, the pear-shaped brilliant, and the marquise are very dated and another cut is impossible as drawn. In Chapter 12, the book states: " ... For retail purposes, the traditional names are preferable ... " and " ... who can visualize a colour called E? ... " We would be equally interested to know what customer can visualize a color called Wesselton. In addition, we never thought of the traditional grades as terms chosen to create color images in the layman's mind.

In the same chapter, the reader is given a comparison of the AGS and GIA scales against standard past usage; the two scales are shown incorrectly in relation one to the other. We were interested with the following statement: " ... Blue white ... truly applies to the rare Jager colour but is commonly and incorrectly used for River stones all over the world ... " To this we might add Top Wesselton, Wesselton and Top Crystal at least, to the commonly named grades to which the term "blue white" is often applied.

In Chapter 13, under "A Basic Grading System" the following breakdown is given: " ... Top Grades: Flawless, VVS, and VS can only be identified with a 10X lens. If there is any mark under the table, the stone cannot generally be in these grades ... " This is an over simplification and suggests that what the author has in mind as a VS is considerably different from what we would have in America. Even a VVS_1 could have a very tiny inclusion in the heart.

In Chapter 14, "Grading Polished Diamonds for Cut," the book does not relate clearly the price to relative weight retention from the rough – a key factor. We also note, in the same chapter, illustrations showing different pavilions, one of which has been assessed incorrectly in the photograph. When illustrating an ideal pavilion plus a fish-eye and a dark center, the photograph chosen for the dark center shows a girdle reflection.

For many years, Eric Bruton was the editor of "The Gemmologist" magazine in England and is now editor and publisher of a semi-monthly trade newspaper entitled "Retail Jeweller." Mr. Bruton is indeed a capable writer and he has researched this book thoroughly. However, he tends to be long on claims of firsts and short on crediting the accomplishments of others. For example, in his preface Mr. Bruton states " ... Much later, through the urging of Mr. Norman Harper, chairman of the Gemmological Association of Great Britain, who had started in Birmingham the first course in gem diamonds in the world, I found myself running a parallel course at Sir John Cass College in London and in 1970 helped found a similar course at Barcelona University ... " According to the Journal of Gemmology (Volume VIII, No. 8) Harper started in 1962. GIA was teaching Diamond Grading and Appraising before 1950. A class covering diamonds only has been given several times a year since 1953.

In addition, Mr. Bruton fails to credit Robert Crowningshield with the discovery of the means of separating irradiated and heat treated yellow diamonds from their natural counterparts nor does he credit GIA with the means of determining pavilion depth and other factors of proportions at a glance by viewing the stone through the crown *("Rapid Sight Estimates of Diamond Cutting Quality" by Richard T. Liddicoat, Jr., in Volume X, Gems & Gemology, Fall and Winter 1962 issues).*

In spite of a few such minor faults Mr. Bruton's *DIAMONDS* is a very worthwhile addition to gemological books in print. It will surely be a treasured part of any library.

INTERNATIONAL DIAMOND ANNUAL, edited by A.N. Wilson, M.A. Published by Diamond Annual (Pty) Ltd., Johannesburg, South Africa. Volume I, 1971. 279 pages. Clothbound. Well illustrated with black-and-white and full-color photographs and line drawings. Index and Table of Contents. Price: $20.

A. N. Wilson, the distinguished and long-time editor of the quarterly journal "Optima," has compiled a truly comprehensive account of the diamond industry. The advent of this annual is notably timely with the centenary celebration of Kimberley's discovery having taken place in July of this year.

The *INTERNATIONAL DIAMOND ANNUAL* is unique for several reasons, the primary one being its broad spectrum of subject matter of the recent developments of interest to those associated with the diamond industry. The yearly publication of a volume devoted to the current survey of subjects pertinent for all those involved with the diamond in its many phases would be a welcome event. Some efforts in this direction have been undertaken in the past, but not with the scope of this publication.

The *ANNUAL* begins by dealing with key personalities in the industry, among them, Sir Philip Oppenheimer, George F. Prins and Lazare Kaplan.

An article on "The Lingua Franca of Diamonds," by Herbert Tillander, discusses the newly formulated Scandinavian Diamond Nomenclature, striving toward a uniform terminology. Sections follow on diamond production in each major diamond-producing country of the world. Each continent is outlined in detail, giving special emphasis to mining techniques and methods of recovery, with production figures noted for both gem quality and industrial material. Of special interest are articles on the recovery of diamond from the seabed on the continental shelf of South West Africa, and a concise account of the Siberian diamond situation.

One article that is very fascinating is that by M. Drukker, dealing with a legendary 5.05 carat red diamond, cut by the Goudvis firm, from a 33 carat piece of bort. Last evidence of this unusual gem was recorded in 1947, but presently, its whereabouts is not known.

Completing the picture, marketing aspects are covered on the retail and wholesale levels. The designing and fashion ends are also dealt with. Andrew Grima, a prominent designer, stressing the modern idiom in his work, discusses the future of his field in terms of increasing the availability of artistically designed jewelry to larger groups of the population.

In short, there is a vast array of subject matter, all written by qualified people. The Staff of the GIA will refer to the *INTERNATIONAL DIAMOND ANNUAL* for historical information, statistical fact and interesting reading. The producers of this publication may well be commended on an excellent compendium of the world of the diamond.

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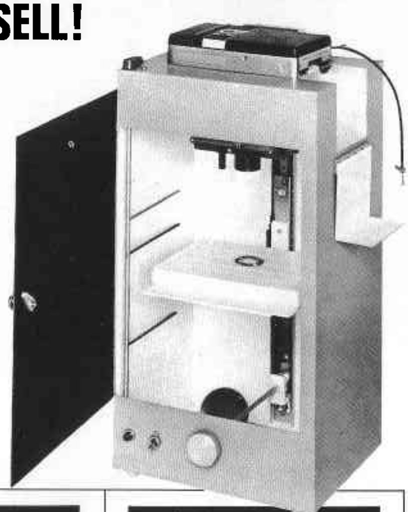

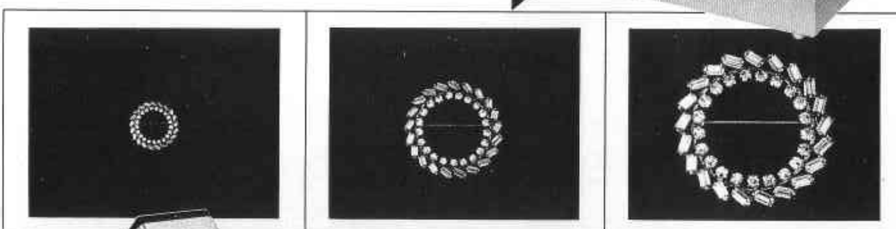

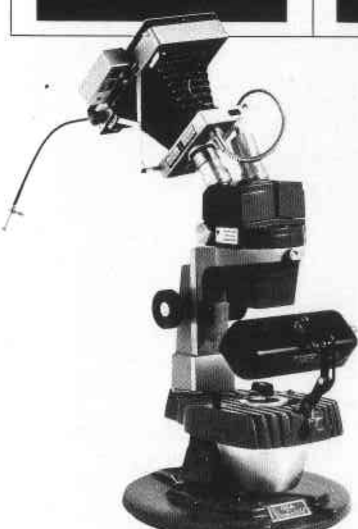

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