The New Mexico Facetor

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In This Issue

The Prez Sez:

by Scott R. Wilson, Ph.D.

MORE IS LESS, and LESS IS MORE

Where is the amateur faceting hobby going? That is a good question. That particular question remained in my mind as I strolled the aisles at the Tucson Show. Here are my raw observations.

There was a reduced presence of representatives of faceting equipment manufacturers than in past shows, but there was more lapidary equipment represented. In the publicly accessible shows, there was a reduced presence of cut stones, but I noticed an increased presence of carvings, beads, and tribal arts. In general, it seemed like there was less facet rough available. What rough was there was generally more expensive, often available only as a large-sized lot with a price tag out of range of many amateur cutters. There was lots of rough available that was purported to be facet grade, but actually it was not the quality that amateur cutters require in order to justify spending their time on it.

It has been conjectured that much of the situation regarding rough availability is due to suppliers selling their material over the internet to buyers who are purchasing lot quantities. That may work for those doing mass cutting for production but certainly not for amateur cutters, who will want to personally select each and every piece of rough.

There was more opportunity to find unusual cutting materials. One example is vanadinite, which was abundant as mineral specimens due to a new find in Morocco. Some of the mineral specimens were gem quality and showed an awesome color. This material might be showing up as cut gems in the near future. There were also quite a few color-change materials displayed, including garnet, sapphire, alexandrite, and feldspar. One dealer had clean gem crystals of celestite, easily cuttable although light in color, for less than $2 per gram.

I found one particularly unusual new gem material among the goodies of a Chinese mineral dealer. I happened to spy five faceted stones of a "jump-out-and-bite-ya" ruby-red colored feldspar. However, all were already sold. A single piece of rough was present as an example, also already sold. The dealer would not divulge the sales price nor the locality, but he implied that more could be obtained by special arrangement. I do not know what the material was exactly, but if it is for real, it could be a major hit.

Overall, prices appeared to be more variable than in previous years. Some rough dealers were quoting rough prices in carats instead of grams (i.e. $40 per carat instead of a more appropriate $40 per gram). This was sometimes seen for similar material only a few yards apart. The odd thing is that both had buyers! This simply points out that one really needs to keep a handle on reality when judging prices. Buyer beware.

So much for rough and materials. What about design trends and the faceting community? Well, it appears that the internet is having some influence on the national amateur faceting community. A dinner gathering of folk who subscribe to the "faceters' digest" was well attended and included cutters and guild members from all across the nation. It was an informative and educational gathering.

About the only way to judge design trends is by looking at the new, very coolest pieces displayed, such as AGTA's Spectrum Award winners. There were several designs there that made use of much fewer facets than we normally see. These were cleverly placed and combined with other features, such as partially polished facets or a single inclusion of twin-plane. These winning designs were quite spectacular, being both simple and elegantly powerful. We may be seeing more such work along this fashion.

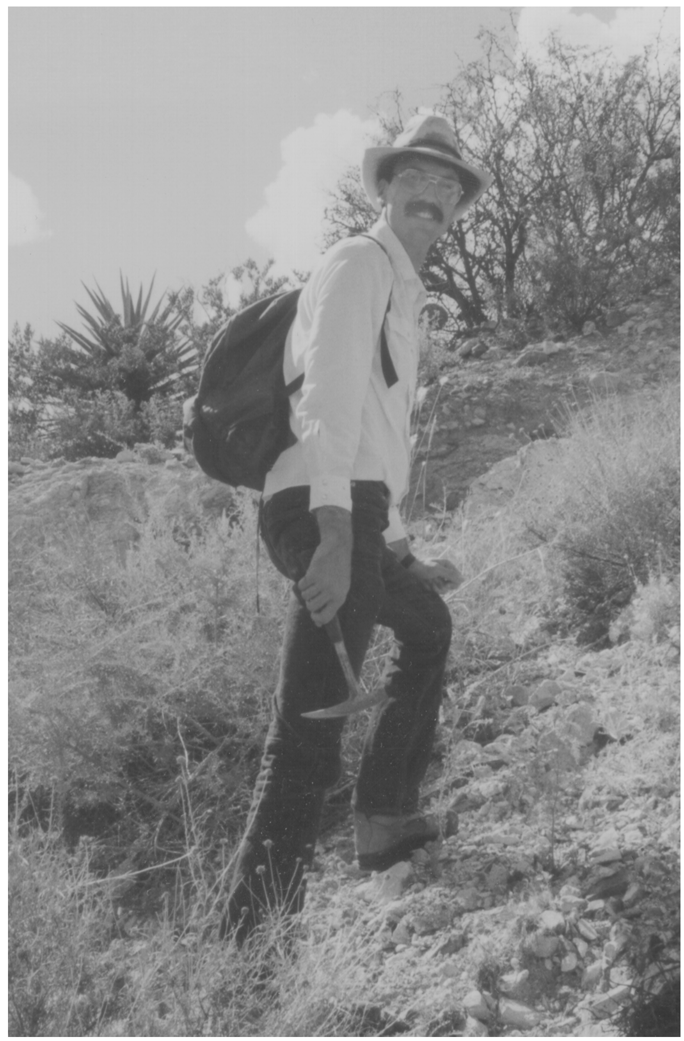
The established trend of including elements from carving with faceting was still going strong, although it is clear that there is a widespread search for uniqueness. It will be interesting to see what folks come up with as the designers try to differentiate themselves from one another next year.

So, back to the original question, where is amateur faceting going? It looks like full tilt into the future! Equipment and supplies are going to be a bit more expensive. Obtaining suitable rough will cost more, but diligence and flexibility (both amateur qualities) will reward you with quality material.

On the design front, we amateur cutters have proven that we can innovate with the best! Looks like exciting times ahead for faceting.

Dates for Future NMFG Meetings

Every year, the contract between the New Mexico Faceters Guild and the New Mexico Museum of Natural History is renewed. The following dates will represent meetings scheduled for the Guild during the year 2001: **January 11, March 8, May 9, July 12, September 13,** and **November 8**. As most of you know, the New Mexico Faceters Guild meets every other month on the second Thursday. Please note that there was a scheduling conflict for the date of May 10, a Thursday, which would have been the date scheduled. However, the museum will be opening the observatory at that time, and the date of May 9 was selected instead. Please note that **May 9 is a Wednesday.**



Guild President Scott Wilson

Minutes of NMFG Meeting

January 11, 2001

by Nancy L. Attaway

President Scott Wilson called the meeting to order at 7:05 p.m. and welcomed all members and guests. He asked the visitors to introduce themselves and tell of their gem and jewelry interests and other specialties.

Old Business

Ernie Hawes said that **Louie Natonek** undergoes chemotherapy once a week and is holding steady. Ernie encouraged folks to send cards or call and chat with Louie.

Steve Attaway remarked that the Guild newsletter needed articles and photos of work from Guild members. Steve said that he is able to scan a jewelry item or a stone directly and have the image transferred to the computer.

Nancy Attaway reminded Guild members of the Tucson party that she arranged at El Parador Restaurant for Saturday, February 3 at 7:00 p.m. in the party room.

New Business

President Scott Wilson said that the Guild still officially needed editors for the newsletter. **Steve** and **Nancy Attaway** agreed to another year's term as editors.

Nancy Attaway mentioned that Guild Treasurer Ina Swantner was in New Orleans with her husband Bill and would not be attending the Guild meeting. Nancy said that the members paying their dues during the meeting tonight could pay her, and she would give them to Ina next week.

President Scott Wilson explored various ways that the New Mexico Faceters Guild might expand their visibility and encourage new members. The Guild could host a one day class for six hours to introduce people to faceting. Sites available for the class include UNM's Continuing Education Conference Center, Mama's Minerals, or another site suitable for conferences. Faceting and carving demonstrations could be provided and accompanied with television video close-ups and displays of gemstones. Guild members **Paul Hlava** and **Scott Wilson** could present their talks on gemstones. The Guild could also be a part of Dr. Cornelis Klein's special class on gemstones, held in the spring.

Steve and **Nancy Attaway** said that they have assembled a slide show geared towards faceting and have presented it to several groups. Steve volunteered to compose a flier to advertise the New Mexico Faceters Guild and is interested in making posters that depict stones and jewelry.

Al Weisman suggested that the Albuquerque newspapers might print a human interest story about local faceters and the New Mexico Faceters Guild. He mentioned that Foley's department store's Oasis for senior citizens could be contacted for classes, talks, and demonstrations.

Paul Hlava and **Steve Attaway** both thought that Rio Grande of Albuquerque, Indian Jewelers Supply, Mama's Minerals, Southwest Minerals, and Thunderbird Supply might be interested in our classes and demonstrations.

Gary Peters thought that handing out brochures on faceting would be a good idea. These special brochures would include information on how faceting is done, what all is involved, and how to contact our Guild.

Show and Tell

The Show and Tell Case tonight held newly cut stones and jewelry items recently rendered by Guild members. Moderator **Steve Attaway** remarked that the Show and Tell Case was traditionally used as an educational tool to discuss gemstones, explain cutting techniques, and address problems in stone cutting and jewelry design. Steve said that the idea of a Show and Tell Case began years ago with Guild member and master facetor **Al Huebler**, now deceased. Al Huebler thought that the time spent on the items in the Show and Tell Case was very well worth it. Steve agreed with its importance as an educational tool and encouraged all Guild members to make a special effort to bring a stone or an item of jewelry in for display.

Elaine Weisman displayed her new pair of earrings and pendant that she hand-wrought in sterling silver. A friend had recently vacationed in the South Seas and purchased three natural black Tahitian pearls sold loose and unset as "seconds". Even though these lovely pearls were deemed as not having the top quality expected for black pearls and, thus, did not carry a high price tag, these pearls looked expensive. Elaine set the larger black pearl that had a somewhat elongated bell shape in a calla lily pendant setting. The other two smaller ones she set in floral designed earrings. Elaine remarked that these pearls were untreated and undrilled. She did not want to drill the pearls and instead glued them into the settings. She said that the prongs in earring settings wrapped around the pearls.

Steve Attaway mentioned that he has carefully drilled pearls with small carbide bits on a Foredom. **Paul Hlava** said that Stuller Settings of LaFayette, Louisiana sells a special pearl mounting for larger undrilled pearls that uses prongs. He also mentioned that natural black pearl "seconds" may be purchased from certain dealers at Tucson.

Nancy Attaway displayed a 17x17x17mm 17.88-carat triangular citrine that she cut in Merrill O. Murphy's "Tri-Polar" design. She has cut this lovely but complicated design in many types of gemstones but said that it does not get any easier. Not displayed were two matching 5x5x5mm triangle sapphires cut by Nancy, salvaged from a broken stone. Nancy rendered an original design for these stones, which appears in this issue of the *New Mexico Facetor.*

Steve Attaway displayed his latest jewelry design done in CAD with a 14Kt. white gold pendant that held the Madagascar rose quartz Nancy cut in her "Long Shield 2000" design. Steve and Nancy have been using SolidWorks CAD/CAM since October, 1999 for designing jewelry to showcase their specialty cut gemstones. A photo of this pendant design appeared in the November/December, 2000 issue of the *New Mexico Facetor*.

Refreshments

Nancy Attaway brought home-baked refreshments to the January meeting. Gourmet coffee was also served. **Merrill O. Murphy** and **Betty Annis** volunteered to bring refreshments to the meeting in March.

Future Programs

Guild Mineralogist and newly elected Vice-President of Programs, **Paul Hlava** will arrange for the intrepid consulting geologist, **Douglas Irving** to address the Guild during the March meeting. Douglas Irving will present his findings from a recent mineralogical trip to South Africa.

Paul Hlava mentioned that he had several ideas for future programs for the year 2001. These include a new talk by Paul Hlava himself on "The Materials Known as Gemstones", a talk by Scott Wilson on "Opal Synthesis", and a talk by Will Moats on "The Adventures of Selling Your Stones and Jewelry on the Web". Scott Wilson has first-hand knowledge of synthesizing opals and plans to share it and the problems encountered with the Guild. Will Moats wrote an article in the September/October, 1999 issue of the *New Mexico Facetor* on his experience of selling gems and jewelry on Ebay. Any suggestions for Paul on future programs would be greatly appreciated.

Program Speaker

by Nancy L. Attaway

Paul Hlava announced that Doug Irving, scheduled for tonight's speaking engagement, was out of the country on a commercial geology venture and would be re-scheduled for the March meeting. In his place, Paul Hlava presented a new and informative talk, "The Synthesis of Gemstones".

Paul began his presentation with a few introductory comments. He stated that the first synthetic gems were rubies produced in 1837. The mass production of synthetic rubies began in earnest in 1902. The first synthetic diamonds were produced in 1953 by ASEA, the Swedish Electric Company. The yearly US production of synthetic diamonds is 150 tons, mainly for industrial application.

Paul said that the concept of synthesizing gemstones is really very old. It was even fairly common in Pliny's time. A quote from Pliny states, "I have in my library certain books by authors now living, whom I would under no circumstances name, wherein there are descriptions as to how to give the color of smaragdus (emerald) to crystallus (rock crystal) and how to imitate other transparent gems: for example, how to make a sardonychus (sardonyx) from a sarda (carnelian, in part sard): in a word to transform one stone into another. To tell the truth, there is no fraud or deceit in the world which yields greater gain and profit that that of counterfeiting gems." Pliny lived from 23-79AD.

Paul introduced several definitions associated with his talk. He defined a gem as an outstanding example of its kind and a jewel as an object made of precious metal and enamel and/or gems used for ornamentation. He described a gemstone as a naturally-occurring material desirable for its beauty, valuable in its rarity, and both durable and stable enough to give lasting pleasure when worn as an ornament.

Paul further described other terms relating to his talk. He said that naturals were materials mined from the Earth. He stated that synthetics were identical to naturals but made by man in the laboratory. The term "man-made" has no natural equivalent, such as cubic zirconia or yttrium aluminum garnet. He defined simulants as any material with the wrong chemistry that exhibits physical properties masquerading as a gemstone, such as plastic and glass.

Paul said that before people knew the true composition of materials, they could only try to mimic natural gems. Many materials were lumped together as one gem, such as balas spinels and rubies. Emeralds, green sapphire, peridot, and tourmaline were all in the smaragdus group. Sapphire was the original name for lapis lazuli. Advances in the science of chemistry by the end of the 18th century revealed the constituent elements and coloring impurities of many gems and their proper proportions. Those of diamond were found in 1797, emerald in 1798, and ruby by 1800.

Trial and error associated with synthesizing gemstones with heat led to the development of potent torches and furnaces. Rubies and sapphires could be made at 2,200 degrees C or 4,000 degrees F. Diamonds require about 1,600 degrees C or 2,900 degrees F. The importance of pressure in making diamonds was not fully realized until recently. Diamonds require about 60,000 atmospheres of pressure. Other key ingredients necessitate the use of pure starting materials for gem synthesis, like ruby from alum.

Kurt Nassau lists over two dozen people who worked on ruby synthesis in the early 1800's. Gaudin in 1837 was the first to make rubies using a torch, alum, corundum, and salt to make rubies. However, he thought that he had made glass, since the pieces were cloudy and showed a low specific gravity. Subsequent investigations into his procedures revealed that he actually did synthesize rubies. Fremy in 1877 used large crucibles with lead oxide flux. He made small but commercial-quality rubies. His method was deemed too expensive to compete with natural rubies.

August Verneuil, a student of Fremy, perfected a viable furnace to synthesize rubies, and he later did the same with sapphires somewhere between 1888 and 1891. Consequently, commercial mass production began in 1902. The technique is now called "flame fusion" or the "Verneuil process". This process produces single crystals of both corundum and spinel, and almost any color is available, as well as colorless. Hundreds to thousands of furnaces currently produce millions of carats of synthetic gemstones every year. Costs run very low, just pennies per carat.

The Czochralski Crystal Pulling method of gem synthesis involves having a small seed on a rotating rod dipped into a pool of molten ruby. The rod is pulled up as the crystal grows. The end crystals result in very high quality material. The product from this method is more expensive, as the technique is tedious and requires an expensive iridium crucible. A variation of this method produces better quality boules of larger sizes.

Paul informed us that emerald synthesis poses more of a problem. Emeralds melt and recrystallize incongruently and recompose into other compounds before they melt, or they can also form these compounds upon cooling from a melt. The Verneuil method does not work for synthesizing emeralds. Emeralds must be crystallized from a solution.

Paul stated that the first successes of synthesizing emeralds emerged with high temperature solvents called fluxes. Platinum crucibles were used with flux and the correct chemicals to create the solutions needed. Emerald synthesis may or may not use seed crystals.

Paul listed several names credited with the first flux-grown emeralds. J. J. Ebelmen in 1848 used boric acid flux with powdered emerald, and tiny crystals formed upon cooling. Many researchers discovered that the best fluxes for emerald synthesis were Li_2MoO_7 with extra MoO_3 and /or V_2O_5. I. G. Farben in 1934 synthesized emerald and called it "igmerald", and Nacken synthesized emeralds between 1916 and 1928. Carroll Chatham is credited with the first homogeneous nucleations of emeralds. In 1935, he synthesized his first emerald crystals at age 21. In 1938, he had established repeatable and dependable techniques required for emerald synthesis. In 1939, he had trouble convincing the jewelry community that he had actually made emeralds. Gilson in 1964 used seeds with heterogeneous nucleation. It is thought that Chatham died of beryllium poisoning.

Paul related that flux growing of emeralds posed problems. Emerald synthesis from flux growth requires platinum crucibles that can be used only a few times before they must be replaced. The flux growth method also requires careful controls, lots of dependable electricity, and long times at temperature, about one year. All of these factors are expensive, making a pricey but excellent product.

History credits Humphrey Davy for growing quartz in 1822. He determined that quartz could grow from a saline solution by analyzing its fluid inclusions. Senarmont in 1851 synthesized quartz in small proportions. Giorgio Spezia in 1908 is given credit for his key work in synthesizing quartz, but he had placed his growing vessels upsidedown. Richard Nacken grew quartz for the Germans during WWII, and researchers in the US and in Britain successfully grew quartz also during WWII. A commercial process for quartz synthesis was established by 1950.

Paul described how quartz synthesis requires an alkaline (NaOH) aqueous solution, modest temperatures (just a bit over 300 degrees C), modest pressures (1700 bars), a modest temperature gradient (plus or minus 40 degrees C), and pure feed for about 33 days. Currently, millions of pounds of synthetic quartz are grown world-wide. Most are colorless, but some are smoky quartz, citrine, and amethyst.

Paul said that emeralds grow from solutions just like quartz, so we should be able to grow emeralds hydrothermally as well. Wyart and Scavinar attempted some of this work in 1957. In 1960, Lechleitner produced overgrowths on beryl that he called “emerita” and “symerald”. Between 1965 and 1970, Linde established a hydrothermal reaction process. Now, a number of companies can do this, also.

The Linde process is a hydrothermal reaction process and is similar to the flux-reaction process. The pressures needed run between 700 bars and 1,400 bars, and the temperatures required range between 500 degrees C to 600 degrees C. A strong acid solution is also necessary.

Paul related that the process of diamond synthesis differed greatly from the synthesis of other gemstones. Diamonds need more than heat to grow. They require a solvent and tremendous pressures, between 60,000 atmospheres to 70,000 atmospheres or about one million psi.

When researchers realized that diamonds originated from intense pressure rocks, the research on diamond synthesis accelerated. Many early workers claimed to have made diamonds. The most famous include: J. B. Hannay in 1880, who claimed to have made diamonds in iron tubes; F. F. H. Moissan, who also used iron rods, but made moissanite instead; and C. A. Parsons, who used a variety of methods and only made spinel. All were subsequently found to have failed at synthesizing diamonds, as the pressures used in their processes were way too low. Tales of laboratory experiments relate the many occurrences of explosions.

Regarding high pressure research associated with diamond synthesis, Paul said that the main problems stem from the need for materials that will continue to function at extreme temperature/pressure conditions. P.W. Bridgman is considered to be the father of high pressure research, and he published many papers on the subject.

One of Bridgman’s foremost problems was with his main seal that was not tight enough for conditions. Another researcher on a related team, Tracey Hall was able to create a seal that could withstand the intense pressures needed and still hold. Paul explained that while the majority of the Bridgman team used a 1,000-ton press and an older seal design, Tracey Hall was relegated to use the leaky old 400-ton press and his new seal design. Tracey Hall found success on December 16, 1954. The process was repeated by the team 12 out of 27 times during the next 15 days. An independent run by an outside team confirmed the technique on December 31, 1954.

The first researchers to actually synthesize diamonds were on a team at ASEA, the electric company of Sweden in 1953. To remain secretive, they did not publish their findings until after General Electric announced their success of synthesizing diamonds using a similar technique.

Paul explained that most synthetic diamonds are used for abrasives, and hundreds of millions of carats are produced each year for industrial applications. Each machine gets 6 to 8 runs per hour. Breakage still poses a problem.

During the production of synthetic diamonds, many small diamonds are made in just a few minutes. Big diamonds require a longer time period. Most synthetic diamonds are yellow in color, due to nitrogen contamination. Colorless diamonds are much more difficult to produce. Synthetic diamonds can be identified by their characteristic inclusions and by their particular fluorescence. CIS, GE, Sumitomo, and DeBeers are involved in diamond synthesis. Synthetic diamonds cost more than natural diamonds.

Paul stated that cubic zirconia is the king of diamond simulants. Many substitutes for diamonds have been tried, including TiO_2, YAG, GGG, spinel, sapphire, and $SrTiO_3$. Cubic zirconia has the best combination of properties that mimics a diamond and is very affordable. Many of these diamond simulants still require extremely high temperatures. Cubic zirconia is amazingly cheap, considering the exotic material and technique required for production. Cubic zirconia is also made in a wide variety of colors. Skull melting is used in making cubic zirconia, and the starting powder serves as a crucible. The skull is an open-ended cup made of copper cylinders, filled with zirconium oxide plus CaO or Y_2O_3. Radio frequency waves of energy melts solid zirconium chips in the core. Water-cooled copper tubes keep the outer portions from melting.

Paul concluded by saying that the sale of synthetic gems has not harmed sales of natural gems. Paul thinks that synthetic gems increase the sales of natural gems, as people still want jewelry with fine, natural gemstones. Determining the synthetic gems from their natural counterparts is difficult in some cases. Identification is usually based upon the inclusions contained. Synthetic gems have created their own niche in the gem market. Paul thinks that gems are usually not a good investment, but exceptions do exist. Also, Paul feels that disclosure is absolutely essential.

{Editor’s comment: See Dr. Joel E. Arem’s *Color Encyclopedia of Gemstones* for more information and illustrations of gem synthesis techniques on pages 211 to 235.}

In the News

Diamond Flaws Provide Clues of Genesis

Source: Science News, Vol. 158; October, 21, 2000

Scientists at the Russian Academy of Sciences in Novosibirsk reported how they measured remnants of the tremendous pressure that produced diamonds by analyzing the impurities trapped inside a diamond. Diamonds form when masses of carbon undergo elevated temperatures and pressures found at depths of 120 kilometers beneath the Earth's surface. Clumps of material trapped in the carbon become the flaws that typically reveal a range of pressures that the diamond may have endured during formation.

For example, coesite, a very dense type of quartz, forms at pressures between 26,000 atmospheres and 69,000 atmospheres. When researchers fired single-wavelength X-ray beams and then laser light through two small crystals of coesite trapped in a Venezuelan diamond, the patterns of light scattering from the crystals revealed that the material's atoms were more closely packed than they are at atmospheric pressure. The diamond surrounding the coesite had sealed in remnants of the high pressure that had formed the gem. The distances between atoms in the coesite indicated that the material is currently under a pressure of 36,000 atmospheres, which corresponds to a pressure of more than 54,000 atmospheres at the elevated temperatures where the diamond was formed. This technique of single-wavelength spectroscopy application can help link diamonds from a particular mine or region to the specific conditions under which they were produced.

New FTC Guidelines for Drilled Diamonds

Sources: Modern Jeweler January, 2001 and National Jeweler January 1, 2001

The Federal Trade Commission amended its disclosure guidelines last month on treated stones to require disclosure of any treatment that affects the value of treated diamonds and gems. Three new disclosure guidelines include: disclose non-permanent treatment; disclose when treatment requires special care; disclose when treatment significantly affects the value of a stone. These amendments address the new treatments that have emerged in the last three years, including the treatment of laser-drilling channels through diamonds to fill fractures with a glass-like substance.

Gem Profile: Lavender Chalcedony from Nevada

Source: Modern Jeweler January, 2001

The violet colored chalcedony from Nevada is not really new gem material. When first introduced five years ago, it was called "purple sage agate" and was cut to feature its tree-patterned dendrite inclusions. This was done to capitalize upon the trend seen then in stones with mineral inclusions, such as rutile needles and tourmaline needles in quartz. Now, the lavender chalcedony is cut en cabochon to primarily feature its lilac/purple body color and compete with the blue chalcedony from Namibia.

Ekati Diamond Mine in Canada for Sale

Source: JCK January, 2001

Dia Met has listed for sale its 40% stake in the Ekati diamond mine in Canada's Northwest Territories. The sale has come in the wake left by the divorce turmoil of founder Charles Fipke. DeBeers says it is not interested, but Australia's Ashton Mining and Canada's Windspear just might be.

Zircon Crystal Dated to 4.3 Billion Years Old

Source: Albuquerque Journal January 11, 2001

Scientists at the Swiss Federal Institute of Technology in Zurich dated a grain of zircon to be 4.3 years old, found inside a younger stone from the Jack Hills section of northwestern Australia. Zircon is a durable crystal composed of silicon, oxygen, and zirconium. Two studies of the grains were conducted independently by international research teams and reported in *Nature*. Both teams analyzed the grains' isotopes of uranium as it decays to lead, using high-resolution microprobe and mass spectrometry analysis.

Attempts to Discern Origin of African Diamonds

Source: Modern Jeweler January, 2001

Identifying origin of African diamonds remains a challenge, even though characteristics are found in diamonds from certain regions. Rough diamonds from Sierra Leone are high in grade with a beautiful lime green cast that polishes off clear or to lovely fancies. Many of the stones exhibit perfect octahedron and dodecahedron shapes. Sewa River diamonds show a grooved outer skin. Sierra Leone diamonds have an extremely high proportion of gem quality to industrial stones, 90 versus 10%. Angolan diamonds also show near perfect geometry and a glassy appearance.

Gems of the Southern Caribbean

by John Rhoads

D&J Rare Gems, Ltd.

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Last December, my wife, Donna and I traveled to the southern Caribbean and spent much of our time visiting the many jewelry stores that cater to the tourist trade. We even had the opportunity to assist a few of the passengers on the cruise with us with their purchases of jewelry.

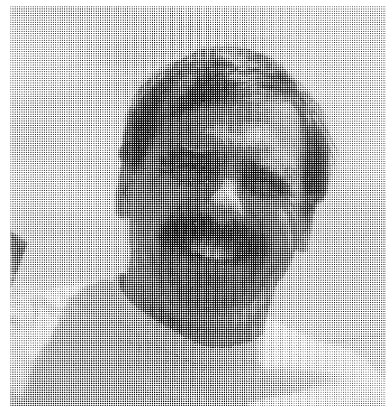
For all of you who have been under the impression that tanzanite is scarce, you only need to visit this area to be convinced otherwise. In shop after shop, we saw cases and cases of jewelry set with tanzanites. We priced a number of these items of jewelry and ascertained the carat weight of the tanzanites featured. Our impression was that bargains were to be had. However, one must act with some degree of caution, as we have experienced situations where the jewelry purchased from some shops contained simulated tanzanites. Be careful and only patronize businesses that are recommended by the cruise line. Cater to business that offers guarantees and that have offices in the United States, where complaints can be filed without going through the trouble of returning the item to the exact location in the Caribbean where you originally purchased the item.

We do have two complaints about the sale of tanzanites in the Caribbean. The first has to do with the faceting quality of the gems. We saw few gems that we considered well cut. Now, I know that many of us, myself included, are more discriminating than most lay people when it comes to noticing the cut of a gem. However, most of the gems that we saw were not even symmetrical, nor did the facets meet in any proper alignment. It was a crime what those cutters did to some of these gems, many of which were fine quality gem material and showed top color. These were all spoiled by poor cutting. No attention was paid to optics. These stones were only cut for carat retention.

Our second complaint centered around a sign that we saw in several locations that offered “lifetime guarantees on tanzanite”. Our question was, what exactly are they guaranteeing? Most of us know that tanzanites are fragile, brittle gems that chip easily and must be worn with care. Were these guarantees on stone identity, durability, or what? The intent of the guaranty was unclear.

We had one tanzanite that was brought to us this past summer for recutting. The customer specifically requested an invoice that she could send to the business where she purchased the stone and have the cost of recutting refunded to her under such a guaranty. I would be very surprised if she actually received the refund. I suspect that this is just another ploy in getting uninformed customers to part with their money.

Most of the jewelry stores that we visited had the usual assortment of diamonds, rubies, emeralds, sapphires, and, of course, tanzanites. We did visit several stores in St. Maarten that sold other types of gems. One display that caught our attention there had some very well-cut tourmalines and garnets. These stones were quite impressive, although the prices listed were on the high side.



We also saw more and more fancy colored diamonds for sale that were set in fine jewelry. A particularly large, fine canary yellow diamond was displayed prominently in a shop window in St. Maarten.

Overall, we visited St. Maarten, St. Kitts, St. Lucia, Barbados, and Aruba. We found that, by far, St. Maarten had the best selection and most reasonable prices for jewelry set with fine gemstones. Barbados and Aruba, on the other hand, had the best beaches. Barbados offered the best scuba diving. St. Kitts was, by far, the friendliest, and St. Lucia was the picture of a tropical paradise.

All of these locations had their own unique charm. However, where our experiences were positive, you may think otherwise. By the way, have any of you seen my lost suitcase in any airport in the United Sates with the label “John Rhoads” on it? That is another story I could tell!

Facet Designer's Workshop

By Ernie Hawes

Scott Wilson

New Designs for Corundum

We have two new designs for you in this issue, one from Nancy Attaway and one from me. By coincidence, both happen to be for corundum. Nancy's was created for a sapphire she re-cut, while mine was designed for a lab-created ruby my wife wants. I will let Nancy tell her story first.

"The *Cushion Triangle for Sapphire* evolved as a way to solve a problem. A customer gave me a 12x7mm oval native-cut sapphire that had been unfortunately damaged during a ring repair. The damage split the stone nearly in half. I told the customer that I could best salvage the stone by cutting two matched rounds, since the stone had been originally cut leaving a deep belly. He said that his wife preferred triangles, but I mentioned that two rounds would maintain carat weight better. I knew that I would lose more carat weight cutting triangles with straight sides.

Steve very carefully sliced the stone along the split, and two stones emerged that were triangular in shape. The slice was made possible by using a 1.25-inch Horico Diamond saw blade (part H340c300). This blade is only 0.28 mm thick and does a great job when run with water on a fixed shaft. The blade is very sharp, and you must be careful not to cut fingers or fingernails. Steve likes to hand-hold the stone as he cuts with these blades. He says that they work best for cutting those shallow cuts less than 1/4 inch deep.

When we saw the two halves of the sapphire left from the sawing, it occurred to Steve that I could facet two matched cushion-cut triangles as a compromise between a round shape and a triangular shape. I could even leave a thick girdle to increase the volume. Cushion-cut triangles would please the customer and salvage some carat weight at the same time.

I wanted a simple diagram that incorporated several sliver-type facets. I realized that some facets, particularly the culet facets, needed to be cut at shallow angles for sapphire. As I began faceting, I used the *Apollo Cut* as a basic starting point for a cushion-cut triangle and used some of the same facet placements. I remembered several sets of facets that were used in the barion-style emerald cuts, and I wanted to see if I could include them in this design.

The diagram evolved as I was cutting the pavilion of first stone, after I had set the geometry of the two stones. This cushion-cut triangular design uses several sets of facets that are strategically placed for a good return of light and brilliance. I ended up with two 5x5x5mm cushion-cut triangles that would make great side stones in a ring. The customer left happy, and a new design was born."

Back to Ernie: My design is called *The Queen's Cushion,* not for any special reason, other than I wanted to give it a fancy name. The design came about for two reasons. I wanted to design a cushion cut with more rounded corners, and my wife, as I already said, wanted another ruby.

The crown of *The Queen's Cushion* is a fairly standard pattern. The pavilion, on the other hand, is a bit unusual. Good light return is evident across almost all of the stone, and there is a nice play of fire any way you look at it.

Faceting *The Queen's Cushion* is moderately difficult, but the design should present few problems if the preform is carefully cut. I tried to get as few facets as possible with angles in hundredths of a degree, but I was not as successful as I would have liked. Most of them are on the pavilion. You will just have to ease into them, as no machine can be set to hundredths exactly. The crown should be much easier. I feel confident that you will be pleased with the results.

Let's Talk Gemology

By Edna B. Anthony, Gemologist

Scott Wilson

OLIVINE: [A NESOSILICATE]

FORSTERITE - PERIDOT -

HORTONOLITE - FAYALITE

Peridot, often called olivine and chrysolite, is a gem variety occurring in the solid solution series between fosterite (Mg2SiO4) and fayalite (Fe2SiO4). The members of this most common solid solution series of the olivine group are the primary crystallization products of silica-poor but magnesium and iron-rich magmas. Olivine frequently coexists with plagioclase and pyroxenes in igneous rocks. Magnetite, corundum, chromite and serpentine are its associates in crystalline dolomitic limestone formations. It readily alters to serpentine minerals, such as antigorite, and to talc, limonite and hematite.

In 1772, the German natural scientist Peter Pallas discovered a meteorite that fell to earth about 1749. This meteorite was thought to be a "messenger from heaven" by the inhabitants of the Yenisei region of Siberia. It contained numerous grains of chrysolite. Most of these grains were covered by tiny crystal faces. Others were rounded and lacked crystal edges. Some were large enough to facet. Iron meteorites from other regions of the earth also harbor these alien crystals that are called "pallasites".

The Latin word "oliva" gave us the name "olivine" that applies to the group and to the solid solution series. The Greek words meaning gold and stone are the origin of the name chrysolite. Throughout history, this name has been used in conjunction with such terms as "oriental", "Saxony", and "Ceylon" to denote numerous yellow and yellow-green transparent gemstones that include topaz, prehnite, apatite, sapphire, chrysoberyl, beryl, tourmaline, and andradite garnet. To avoid confusion, it is recommended that its use with reference to any gemstone should be discontinued. In *The Color Encyclopedia of Gemstones,* Dr. Joel Arem tells us that "peridot" is derived from the thirteenth-century English "peridota". Others claim the origin is French. The ancient Romans called the gem "topazus". This resulted in confusion by historians with the mineral topaz that lingers even today. Further confusion is caused by the use of the term "peridot of Ceylon" to denote honey colored tourmaline found in Sri Lanka.

Forsterite was named to honor the German mineralogist J. R. Forster. Forsterite seldom exists in pure form. The rare, almost colorless to pale yellow or light green mineral is the magnesium-rich end member of the series. Heat and pressure from igneous intrusions into magnesian limestones precipitate the formation of forsterite crystals. Forsterite's lack of gem quality characteristics preclude its use as a gemstone except as a collector's item.

Principal sources of forsterite crystals are the Nikolai-Maximilian mine near Zlatoust in the Ural mountains, the United States in Bolton, Massachusetts, and the Vesuvian lava deposits in Italy. Deposits of a banded structure of partially altered serpentine, calcite and forsterite crystals called eozoon are located in Grenville, Canada and near Raspenava in northern Bohemia. The alteration of forsterite crystals to serpentine in cracks resembling branches in the structures were once presumed to be fossilized remains of a large one-celled animal of the early Precambrian period until research revealed the mineral character of the deposits.

The iron content of hortonolite exceeds that of peridot, and manganese appears in its chemical composition. Though usually brown, its colors range from yellow-green to black. Several deposits are located in South Africa, but the O'Niel mine in New York in the United States produces the majority of this member of the series.

Fayalite is the iron-rich end member of the series and was first discovered on the shores of Fayal island in the Azores. It was thought that volcanic rocks there were the source of the crystals. Synthetic fayalite can develop as detritus from hot precipitates from large furnaces. The discarded cinders from such furnaces may have been the source of a number of the crystals. Other deposits are located in Yellowstone National Park in the United States and in the Mourne Mountains of northern Ireland. Fayalite exhibits a hardness of 6.5, a specific gravity of 4.39 and refractive indices of 1.827 to 1.879, each the highest of this solid solution series. Its darker colors of olive green, yellow and brown are usually muddied by its high content of iron. Weathered material becomes reddish to brown with a metallic luster.

The volcanic island in the Red Sea, variously referred to as Topazos, is the Isle of St. John. The Isle of St. John, Zarbargad, and Zebirget were the first known sources of peridot. The Isle of St. John is frequently obscured by fog, and ancient mariners incurred great difficulties to locate it. Its deposits were mined extensively until it was forgotten in the middle-ages. Since its rediscovery in about 1900, it has produced extremely fine material of considerable size. The rich medium green crystals are embedded in veins of nickel ore in peridotite formations.

Kozakov in Bohemia became the source of the gem for the Europeans during the period Topazos, or the Isle of St. John, was “lost”. Chihuahua, Mexico is the site of one of the largest known deposits of peridot, but most of the largest and finest deep green peridot crystals come from deposits near Mogok in Burma. In the continental United States, peridot is found in California, New Mexico, and Arizona. The Navajo Indian Reservation deposits in eastern Arizona yield beautiful material from which cut gems over 5 carats are rare. Tourists sometimes pick up small fragments of peridot from the beaches of Hawaii, and volcanic bombs there often contain crystals. Kenya and the Umba district in Tanzania are the sources in Africa. Peridot deposits of lesser importance are located in New Caledonia, Australia, Ross Island in Antarctica, Finland, Greenland, Italy, Germany, and Minas Gerais, Brazil.

Today, some very fine material comes from Pakistan and China. The recent find of peridot from Pakistan was discovered at altitudes that approach 14,000 feet in the Himalayas of central northern Pakistan near Islamabad, which has produced 10 carat-plus sizes. Norway is the source of lovely pale green crystals that contain less iron and are closer in chemical composition to fosterite than darker peridot. However, the almost colorless gem-quality crystals found at Ratnapura in Sri Lanka possess the chemical composition closest to that of fosterite. It is associated there with olive green material. A trace of chrome and an iron content of 12 to 15 percent produces the most desired deep rich green color of the this gem. Because of properties so similar to peridot, sinhalite was thought to be a brown variety of peridot until the mineral was correctly identified in 1952.

Fine peridot has a velvety appearance quite different from that of emerald and other green gemstones. Asterism and chatoyancy occur but are extremely rare in this olivine material. Such a gem would be highly prized by a collector. With hardness less than quartz, peridot scratches and chips easily. Although it has imperfect cleavage, sharp blows can cause it to fracture. The gem is best suited for use in earrings, necklaces and pendants.

The optical and physical properties of the olivines depend on the composition of the crystals and wide variations exist. The characteristics listed below best represent the averages of peridots used in the gem trade.

{Editor’s comment: Faceters should be aware that peridot is strongly birefringent (doubly refractive) and can show doubling of the facets. Orient the rough for dopping by looking for the C axis.}

COMPOSITION:	$Mg_2SiO_4Fe_2SiO_4$ +Mn +Crmagnesium iron silicate
CLASS:	Silicate
GROUP:	Olivine
SPECIES:	Forsterite
VARIETY:	Peridot
CRYSTAL SYSTEM:	Orthorhombic
HABIT:	Thick tabular – Short prisms - faces rarely striated
CLEAVAGE:	Imperfect
STREAK:	White
FRACTURE:	Conchoidal
FRACTURE LUSTRE:	Oily
LUSTRE:	Vitreous to Oily
DIAPHANEITY:	Translucent to Transparent
COLORS:	Yellow-green bright green olive green brownish-green
PHENOMENA:	Asterism and chatoyancy extremely rare
SPECIFIC GRAVITY:	3.27 to 3.37
HARDNESS:	6.5 to 7.0
TOUGHNESS:	Fair Brittle
REFRACTIVE INDICES:	1.654 – 1.690
BIREFRINGENCE:	+0.036
OPTIC CHARACTER:	Varies Forsterite - Biaxial positive Others - negative
DISPERSION:	0.020
PLEOCHROISM:	Weak - colorless to pale green, green, olive green
LUMINESCENCE:	None
ABSORPTION SPECTRUM:	Distinct bands at 496, 474, and 453 nm
CHELSEA FILTER:	No reaction
AQUA FILTER:	No reaction
SOLUBILITY:	Slow in HCL to form gelatinous silica
THERMAL TRAITS:	Infusible Avoid thermal shock
TREATMENTS:	None

INCLUSIONS: Biotite; mica crystals; tiny spheres of volcanic glass in Hawaiian peridot that could be mistaken for gas bubbles which would indicate a synthetic gem; smoke veils in San Carlos material from Arizona, - Lily-pad (lotus-leaf) –E. Gubelin surmised that a tiny chromite crystal precipitated from a drop of the chromite-rich mother liquor onto the face of the growing host crystal and the residual liquid spread and was enclosed by the host crystal to create this fascinating and diagnostic disc-like inclusion.

Expo 2001 - 32nd. annual

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Saturday - 10:00 am to 6:00 pm
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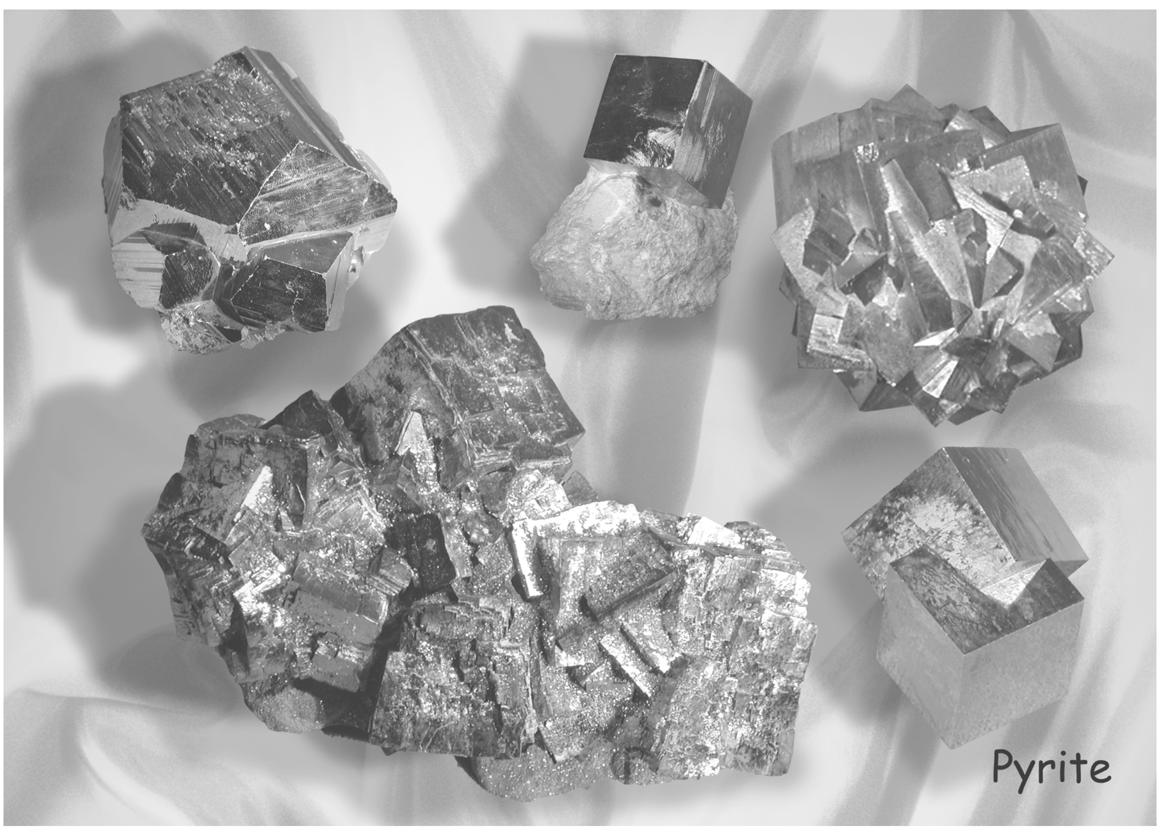

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NMFG Back Issues

Back issues of the *New Mexico Facetor* are available for the years 2000, 1999, 1998, and 1997. Please contact the Editor for any requests for back issues. Thank you.

Santa Fe Symposium

The 15th Annual Santa Fe Symposium, an international conference on jewelry manufacturing technology, is scheduled for May 20 - 23, 2001 at the Albuquerque Marriott on Louisiana Blvd. NE in Albuquerque, New Mexico. The symposium is sponsored by Rio Grande of Albuquerque. Please call 1-800-952-6222 or fax 505-839- 3248 for information and reservations. E-mail Rio Grande of Albuquerque at: www.riogrande.com or ct@tbg.riogrande.com

New Faceters Digest

Facetor Paul T. Ahlstedt moderates and maintains a digest on the web for faceters. The site may be reached at: www.gemking.com/digest/subscribe/index.html

Don't forget: next meeting is March 8, 2001 at 7:00 pm.

Meeting Location: NM Museum of Natural History.
Dues are $20.

Please send photos of your work to the Editors.