The New Mexico Facetor

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In This Issue

Don't forget: next meeting is on July 8, 1999 at 7:00 pm. Dues are $20.

The Prez Sez:

My husband, Scott and I were most fortunate to travel again to Britain this past May. We took our first trip across "the pond", as the Atlantic Ocean is referred to by frequent fliers, in the spring of 1997. We immensely enjoyed our time there. Fortunately, an opportunity presented itself for another visit. Scott's work required him to spend Monday and Tuesday, May 17 and 18, in York, England with his boss, and he was to attend a conference on Wednesday in Edinburgh (pronounced Ed-in-burra by the locals). I immediately jumped at the chance of returning to Britain. While Scott was busy with work duties, I was free to walk about, view the sights, and meet the locals. Yet again, I was stopped by older English ladies and asked for directions! It is always good to blend in with the locals! With this second trip, I am beginning to feel like I know the walled city of York quite well, and I ventured outside the centuries-old fortress walls into the suburbs during this trip.

We investigated the rockhounding possibilities in Britain. While still in York, we visited the only rock and gem store in town. I asked the woman behind the counter if she ever went "rockhounding". She stared at me, a bit perplexed (must have been my *strong* American accent). I quickly restated my question and used the words "fossiking or noodling". As her face showed signs of understanding, she replied, "Why yes, lots of a-gates about." Now, I was perplexed, but Scott translated this into "ag-ates". Agate is pronounced in Britain the same as "this gate, that gate, a gate". The woman did not know of any gemstone collecting localities except agates, which we were not too excited about collecting. We wandered about the small shop and found a copy of *Rock 'n' Gem* magazine, compiled by Tony Rance and Helen Carver. We were interested in the Spring 1999 issue, because it included an article on "Minerals and Gems of Scotland". We are hoping to be able to reprint parts of the article at a later time. The shop's display cases featured some beautiful mineral specimens of dark amethyst crystals and some fossils. One can find many fossils in the UK, but the amethyst had been purchased this past February in Tucson! What a small world it is!

One last piece of information we wanted to have before leaving York was a map. All the bookstores sold detailed maps of Scotland, and we purchased one in case we did get to venture off the beaten track for some rockhounding. At one of the bookstores, I found a series of maps known as the Ordnance Survey with a scale of 1.25-inch to one mile. Scotland is covered by over 80 of these maps, and I had to pick and choose them carefully since they cost about US $10 per map! One thing that struck me as odd about these maps was the lack of information designating whether the land was public or private. Luckily, there was a young man looking at the maps in preparation for a hiking vacation in Scotland. I initiated a conversation with him and asked about the land status in Scotland.

He informed me that, although he was not from Scotland, he understood that no distinction exists between public and private land in Scotland in regards to hiking or walking. In England, on the other hand, there are “pink paths”, the designated walkways and hiking trails with rights of public egress that cross private land. As far as he knew, we were allowed to cross sheep fields, highlands, and farmland in Scotland, providing we did not harass or destroy animals or property. What a concept! I tried to explain to this nice fellow all the different types of land status that exist in America: National Forest, Wilderness, private, BLM, reservation, patented claims, etc. It was mind boggling to him. I do think that, prior to rockhounding in Scotland, I will check further with their National Historic Society for the legal guidelines.

We left for Edinburgh, Scotland about 7:00am on Wednesday and boarded the Great North Eastern Railway, the Route of the Flying Scotsman. We headed north from York, and fields of brilliant yellow rapeseed soon covered the landscape. The rolling hills of Yorkshire passed by quickly, and we arrived in Edinburgh at noon. Edinburgh is an old city, and it felt to me more “European” in flavor and style than the smaller cities of York and Manchester. We stopped in an Indian restaurant by chance and were rewarded with one of the best meals during the whole trip.

When Scott left for the conference, I walked through the Princes Street Gardens. Originally, this area had been a lake (Nor’ Loch). It was later drained, filled in with dirt, and planted with lovely flowers and trees. The Gardens feature a gilded fountain, and an outdoor amphitheater hosts summer entertainment. The day I was there, it was about 70 degrees F and sunny. Office workers, children and parents crowded the park to enjoy the outdoors. I walked the hiking trail that switchbacks up a dormant volcanic dike, where Edinburgh Castle was built 9 centuries ago! The Castle towers over the old part of the city and houses the Scottish Crown Jewels, which I just had to see!

The Crown of Scotland in its present form consists of 68 pearls and 43 precious gemstones that include garnets, amethysts, and clear quartz. The original 20 gemstones of the old crown are cut into lozenge, circular, square, and triangular cuts. These stones are in settings below the fleurs de lis and the crosses that encircle the crown. The remaining 23 gemstones are not faceted at all! They are of varying size and were set in claw settings. They appeared to be garnets or colored quartz. There was no reference to any rubies, sapphires, or emeralds in the crown. The Crown weighs 3 pounds 10 ounces. King James V of Scotland had the original sceptre remodeled by an Edinburgh goldsmith, Adam Leys in 1536. The sceptre is a long hexagonal rod of solid silver with a gold finial on top. Around the finial are three stylized dolphins with backs arched outwards. Between the dolphins and set along the axis of the sceptre are figures of the Virgin Mary and Child, St. James with his staff and book, and St. Andrew, patron of Scotland. Above these figures is a two-inch diameter polished globe of rock crystal believed to have mystical powers in the Middle Ages. For comparison, recall that the British Crown sceptre, located in the Tower of London, holds a magnificent faceted diamond orb in its finial.

We were unable on this trip to visit the Museum of Science and Art in Edinburgh, where the finest collection of Scotland’s minerals reside. Most of these specimens were collected by Dr. Matthew Heddle, who was born in Scotland in 1828. Dr. Heddle wrote the definitive book *The Mineralogy of Scotland.* He is to Scottish mineralogy what Dr. Stuart Northrop is to New Mexico mineralogy.

Scott and I were not able to do any rockhounding while in Scotland. The main drawback was not having a rental car. Instead, we focused on taking the train to Inverness on the River Ness that feeds Loch Ness. Then, we traveled west to Kyle of Lochalsh and across the bridge to the Island of Skye in the Scottish Inner Hebrides. On our next trip there, we plan to rockhound and intend to find that elusive character loved by us all, Smoky MacLaren.

Special Events

The **Guild picnic** will be held **September 11** at 11:30a.m. at the home of Paul and Marge Hlava, 4000 Smith S.E in Albuquerque. Tables will be set, plates and eating utensils will be provided, and a charcoal grill will be ready for grilling meat. Please bring your meat to grill and a side dish and/or dessert to share. We will provide iced tea and flavored waters, but B.Y.O.B.

Minutes of the NMFG Meeting

May 13, 1999

By Nancy L. Attaway

President Susan Wilson called the meeting to order at 7:15 p.m. and welcomed all members and guests.

Treasurer's Report

Treasurer **Bill Andrzejewski** reported:

Heading	*Total*
Previous Balance	$1,412.85
Expenses	$333.37
Deposits	$132.00
Balance Forwarded	$1,211.48

Old Business

Vice-President/Programs Bill Swantner announced the science fair winners, who will receive special certificates, savings bonds, and a year's free membership in the New Mexico Faceters Guild.

New Business

Editor Nancy Attaway said that our publisher, Jim Summers informed her that he was behind schedule.

President Susan Wilson mentioned that three specials were scheduled for the Discovery Channel on cable television next week. **Nancy Attaway** said that diamonds, amber and pearls, and gold are the featured presentations.

Betty Annis mentioned that several of the Guild ladies gathered for lunch at Gardunos on Montgomery Blvd. Those attending shared delicious food and good conversation. Betty has scheduled another ladies' luncheon for October 16 at Paisano's on Eubank Blvd. N.E.

Nancy Attaway announced that Guild members **Tom** and **Eleanor Cannon** were moving to Boise, Idaho. Nancy scheduled a special Guild brunch on Sunday, May 16 for 11:00a.m. at the Rio Rancho Inn.

President Susan Wilson proposed having a tour of **Tripps', Inc.** in Socorro for either September or October. The Guild was graciously toured through the Tripps' plant some years ago. We now have enough new members who have not had the pleasure of observing the many interesting jewelry-making facilities at Tripps'. **Susan Wilson** and **Nancy Attaway** will plan this field trip to Tripps'. The final preparations will be announced in the newsletter. They will also organize a side tour of the Mineral Museum at the New Mexico Institute of Mining and Technology.

Guild Librarian Russell Spiering suggested that Guild members call or e-mail him with any requests for books from the Guild library. Guild members may ask Russ about books pertaining to specific topics or certain authors whose books the Guild library may contain.

Russell Spiering announced the "All That Glitters" gem and jewelry competition, sponsored by the New Mexico Jewelers Association, to be held this July. He said that he had extra copies of the entry forms. Any entries may be taken to either Harris Jewelers and Gemologists/Casa de Oro in Rio Rancho or Beauchamp and Co. Jewelers in Albuquerque. The entry deadline is July 16.

Show and Tell

The show and tell case displayed new glittering gems and some very interesting gem work in progress.

Will Moats faceted four absolutely gorgeous Nigerian tourmalines in the nine mains round brilliant cut. Will cut the two pink tourmalines on the C axis and cut the two green tourmalines on the long axis and shallowed the pavilion angles. He polished them all with alumina oxide. Will also brought an example of a Nigerian tourmaline crystal that had distinct crystal sides and a termination. The crystal showed no evidence of having been tumbled in a river. It had been extracted from a hillside pegmatite.

Will researched the critical angle of liddicoatite. He did not find any references to it, but he did locate several references for calcium tourmaline. He then decided to use Snell's Law to derive the refractive index of liddicoatite and found a critical angle of 38.1 degrees. He decided to use 38.5 degrees for his culet angle in the pavilion. His decision allowed a lot of sparkle in the stones and inhibited any extinction of color. Will asked Guild members whether anyone could help him better determine the critical angle of liddicoatite. Extinction of color has posed a problem in faceting the Nigerian liddicoatite tourmalines. **Scott** and **Susan Wilson** said that they would investigate the critical angle of liddicoatite tourmaline.

Nancy Attaway faceted five peridots from Pakistan, two matching square barions, two matching flasher cut twelve-sided rounds, and one emerald cut. These stones were somewhat included, but Nancy was able to remove any inclusions in the culet area. All five stones sparkled and exhibited an intense bright green color. Nancy developed a new pavilion for the emerald cut that she plans to have published in the *New Mexico Facetor*. Nancy cut three facets on the keel of the culet with the 45degree dop to remove some chipping. She polished the stones using both the Last lap and the ceramic lap with 60K diamond.

Nancy also faceted a rutilated quartz in a free-form design modified from an emerald cut, and she used both step cuts and scissors cuts in the design. The stone was deep enough to allow a pavilion that reflected some light back through the table. Nancy oriented the sprays of rutile horizontally to show their golden color through the table.

Steve Attaway brought a perfume bottle (magic love potion bottle) he carved from a large piece of Bolivian ametrine. Steve carved flowing lines and curves in the ametrine that resembled folds of drapery, and he utilized a heart shape on one side. He was not finished with carving and polishing the bottle, nor had he drilled out the reservoir completely. Work had not yet begun on the stopper. Steve plans to use a slice of ametrine for the handle of the stopper and have Nancy facet it into a step cut tablet. He will carve an ametrine cone for the dipper. Steve also carved a large black opal oval cabochon for Jim Eker.

Refreshments

Rainy Peters and **Nancy Attaway** brought refreshments to the May meeting. Thank you very much. **Troy** and **Eileen Smith** volunteered to bring refreshments to the meeting in July. **Scott** and **Susan Wilson** will prepare ice cream also for the July meeting. Our Guild members often prepare their own special goodies for refreshments, and we greatly appreciate their culinary efforts.

Future Programs

Vice-President/Programs Bill Swantner scheduled Jill Glass, who researched fracture mechanics at Sandia National Laboratory. She will discuss material behavior and the dynamics of crack growth.

Bill Swantner plans to take the speaker to dinner before the Guild meetings. Guild members who wish to be included in future dinner arrangements with the speaker are asked to please notify Bill prior to the meeting.

Usage of Snell's Law

by Will Moats

Instead of relying on the usual tables to obtain recommended cutting angles, I decided to use Snell's Law to better determine the critical angle for the new Nigerian tourmaline rough I recently acquired. Paul Hlava revealed during the March meeting of the New Mexico Faceters Guild that he determined this particular tourmaline species to be liddicoatite, a calcium tourmaline. I was not able to locate the specific refractive indices (RI) for liddicoatite in the references I have at home, but I was able to find refractive indices for "calcium tourmaline" in my old optical mineralogy book.

Remember that tourmaline is optically uniaxial and has both a minimum and a maximum refractive index. The refractive indices listed for "calcium tourmaline" are 1.641 (along the A axis) and 1.621 (along the C axis). These refractive index values are somewhat less than those reported for the various varieties of elbaite tourmaline.

For the special case involving the usage of Snell's Law, where a ray of light enters a gem from the air, the critical angle (CA) is found by the relationship:

$$\frac{1}{RI} = \sin(CA)$$

Using Snell's Law for the Nigerian tourmalines that I have, the critical angle for stones with the tables cut perpendicular to the C axis is 38.1 degrees. Also with Snell's Law, the critical angle for the stones with the tables cut perpendicular to the A axis is 37.5 degrees.

The round pink tourmalines that I showed during the Guild meeting in May were cut with the table perpendicular to the C axis at 38.5 degrees, at a slightly higher angle than what I calculated for the critical angle. When viewed through the table, these stones showed no "fish-eye" effect.

I suggested during the meeting that persons in the Guild who have the necessary equipment could measure the refractive index specifically for this Nigerian tourmaline. I look forward to knowing their results.

{Editor's comment: For more information regarding optical properties of gemstones, Snell's Law, refractive indices, and critical angles, please check *The Gemstone and Mineral Data Book* by John Sinkankas, page 293.}

Program Speaker:

by Stephen Attaway and Susan Wilson

Bruce Bunker of the Surface and Interface Science Department at Sandia National Laboratories presented an excellent talk for our May meeting on environmentally-caused fracture and crack growth in glass. Bruce investigates crack formation and propagation in glass in order to better understand environmental effects on trans-oceanic optical fiber cables used in telecommunications.

Bruce and his team at Sandia want to be able to predict the time dependence of crack growth, because this has the greatest effect on the viability of the fiber cable structure, aside from sharks using the fiber cables as dental floss. Bruce performed a series of experiments that proved how mechancal strain drastically enhances chemical reactions in silica glasses. His research showed how fracture behavior is drastically modified by water interacting with the glass atomic bonds, creating an atomic rupture mechanism. Basically, he showed that water molecules distort the bonds between the silica atoms, greatly enhancing the cracking behavior and lessening the time to failure.

The researchers found that the very high strain associated with crack tips enhance the chemical reactions between silica and water. A household advice tip relates that a piece of glass is easier to break if one first scores the glass with a sharp metal point and then licks the crack (you add water). Cracks on car windshields also propagate faster during rainy weather. Bruce described how strain promotes formation of reactive intermediates, explaining how strain can change the reaction rate between silica and water by several orders of maginitude. By using infrared spectroscopy, the relative reaction rates can be detected on selected strained surface defects that had a known silica bond angle. By using computer models of strained atomic structures, he concluded that mechanical strain energy increases the rate of chemical reaction. He was able to predict crack velocity curves for silica under a variety of conditions.

Bruce discussed technical topics like how SI-O bonds rupture, the kinetics of crack tip and surface defect reactions, and the effects of crack tips geometry. He further described attempts to model fracture behavior by atomic bond rupture mechanism, which are summarized in an article he coauthored in *Scientific American*. Bruce was able to show that the molecule size is also important in understanding crack growth rates. Before water or some other fluid can interact with the strained bonds at a crack tip, it must first be able to diffuse into the crack. He discussed how size constraints allow small molecules, like water, do damage, while large molecules, like oils and alcohols, are not as able to penetrate to the crack tip as fast due to their larger size.

Science Fair Presentation

By Bill Swantner, Ph.D.

At our May 1999 meeting, Paul Hillman made a presentation describing his award-winning Science Fair experiment. He had titled the work “Measuring the Speed of Light with a Ruler.” Paul is an eighth-grade student at Hoover Middle School, and he had been guided by his teacher, Pat Logan. His father, a physicist, had provided some of the hardware needed for the experiment.

Paul tried to repeat an experiment first conducted by the French physicist Fizeau in 1849. Other famous physicists have repeated the measurements since then. Paul’s scheme is not unlike the classical measurements of Fizeau, Foucault, and Arago. Lord Rayleigh had contributed some theory to the explanation of experimental configurations. The most famous of the classical physicists to make the measurement of the speed of light was Michelson, the first American to win a Nobel prize in physics. His measurements contributed to fundamental work done by Einstein in the derivation of the Special Theory of Relativity.

Michelson measured the speed of light for a period of nearly fifty years. Without nearly the apparatus and support of all these physicists, Paul tried to duplicate their work. He was not able to produce a measurement of the speed of light, but he did come to understand several of the most troublesome parts of the measurement. I have read a number of treatments of the measurement, but I do not recall that any of them mentioned all the critical issues. Paul learned that one must not only know the length of the path over which the light travels to a very accurate figure, but must also determine the rotation speed of the chopping wheel, the mirror, or whatever device is used to break the travel time into durations small enough to permit just one round trip of the light. (Light travels at 186,000 miles per second or about one foot per billionth of a second.)

We encouraged Paul to continue his study of light. The experimental determination of the speed of light now uses microwave or laser cavities, but the old way can be used to great accuracy and requires that the experimenter learn a great deal of physics. Einstein once gave a student the advice that the most interesting and promising field of physics was the study of light.

In the News

Large Moissanite Crystal

Source: National Jeweler May 16, 1999

C3, the manufacturer and marketer of synthetic moissanite, received a three-inch diameter moissanite crystal from its supplier, Cree Research. The three-inch crystal can produce twice as many synthetic moissanite stones as a two-inch crystal with the same percentage of usable material. With three-inch crystals, the production of high volumes of lower cost moissanite stones will be improved.

Canadian Diamond Venture

Source: National Jeweler May 16, 1999

Drilling for diamonds has begun on the 152.506-acre claim in the Yamba Lake area of Canada's Northwest Territories. SouthernEra Resources owns 51%, with the remaining property interest held by: Tanqueray Resources, Mill City International, and Cypango Ventures.

Four Peaks Amethyst

Source: Lapidary Journal May 1999

Arizona's Four Peaks amethyst mine in the Mazatzal Mountains is a 20-acre property claim at an elevation of 7,200 feet, surrounded by the protected Tonto National Forest reserve. Access is by helicopter or by hiking the jagged terrain through black bear and mountain lion territory. Amethyst there occurs in hydrothermal veins in quartzite faults caused by granite intrusions. Crystals are heavily zoned and produce low yields. Only a small percentage is gem quality, but those rival the best amethyst in the world. Since its debut at Tucson 1998, the mine has produced over 10,000 carats.

Synthetics Flood Gem Market

Source: Colored Stone May/June 1999

AGTA members have expressed concern regarding the continuing spread of synthetic material being mixed in with parcels of natural gemstones. Some estimate that nearly half of all the amethyst on the market is synthetic, with similar numbers for ametrine, citrine, and smoky quartz. This problem exists with other stones as well, including aquamarine, where it is estimated that 30% of the material on the market is synthetic. Dealers warn of material from China that is low in price and consistent in color that could possibly be flame-fusion spinel. Gem material from hydrothermal crystals are grown mainly in China and Russia. AGTA advised members to spot check stones regularly and have them batch-tested. The prevalence of synthetics on the market has driven some prices downward.

Montana Sapphire Venture

Source: Colored Stone May/June 1999

Sapphire River L.L.C. began sapphire production in Montana for the 1999 mining season. Sapphire River President, Tom Lee, formerly of Gem River Corporation, formed the new company to capitalize on the 4,000 acres of land he owns in Montana. He estimates 100 million carats of commercial-grade sapphire on his land and expects an annual production of 2 to 3 million carats. He says his sapphire material is clean, large, and occurs in seven different colors. Sales are planned for television shopping networks and large manufacturers.

Investing in Gemstones

Source: Colored Stone May/June 1999

People have regarded gemstones as valuable commodities that are easily stored, very portable, and can be traded during times of crisis. History also records where diamonds, gold, silver, and gems had all risen to unprecedented levels in 1980 and then plunged in value at the year's end. What happened to colored gems was not due to a sudden rise in production, but was the direct result of a domino effect that occurred throughout the hard asset world. Investors purchased these assets without much knowledge about them and then liquidated them upon discovering something amiss in the market. When most investors sold at the same time, prices soon crashed.

Sales from telemarketing, the Internet, and direct mail has fueled a new interest in colored gems. Gems are sold as luxury purchases, advertised as both hedges against inflation and as private assets that the government is powerless to confiscate.

Clients warned about scams are told that investments in gems should represent only a small portion of an investor's assets and should consist of gemstones that give pleasure to the investor. Whether investors outside the gem trade can make a profit from colored gems depends upon what their objectives are, how well they understand market variables, such as mine production and political changes, and how much risk can be assumed.

Price is a function of how well a stone is known, how long it has been marketed, and what sort of brand awareness it has, like Kashmire sapphires and Paraiba tourmalines. Rarity determines how valuable a stone can become, but it does not guarantee that a stone's value will indeed rise.

Tanzania Promotes Industry

Source: Colored Stone May/June 1999

The Tanzanian government is developing its gem industry to stimulate investment and growth. It encourages local dealers to cut gems, as having gemstones sold as finished goods benefits more small-scale miners and assists the government's foreign exchange earnings. A lack of financial resources for buying equipment hinders mine production and forces miners to sell their goods in rough form at lower prices. Tanzanian gems include tanzanite, ruby, sapphire, emerald, alexandrite, garnet, beryl, and tourmaline. The Tanzanian government has reduced taxes and introduced new licensing laws that make it easier to obtain licenses.

Q. and A. on Amethyst

Source: Lapidary Journal June 1999

Some myths and facts surrounding amethyst are presented in a series of questions and answers. Iron impurities and electrons give this hexagonal quartz its purple color. The color centers in amethyst can fade with heat and can be restored with radiation.

Zachery-treated Turquoise

Source: Gems and Gemology Spring 1999

Zachery-treatment for turquoise is a proprietary process that improves the ability of turquoise to assume a good polish. The process does not involve polymer impregnation, but it does decrease the stone's porosity and limits the absorption of oils and discoloring agents. The method is identified by chemical analysis, EDXFR spectroscopy. The presence of potassium as the only detectable additive is unique among gem treatments.

Colorless Sapphire

Source: Gems and Gemology Spring 1999

In the absence of inclusions or readily identifiable growth structure, natural colorless sapphire can now be separated from synthetic colorless sapphire by noting their trace-element composition and short-wave (SWUV) ultraviolet transparency. Energy-dispersive X-ray fluorescence (EDXFR) analysis shows higher concentrations of trace elements (Fe, Ti, Ca, and Ga) in natural sapphires. These impurities cause a reduction in SWUV transparency that is detected by UV-visible spectrophotometry, not seen in synthetic colorless sapphire.

Angola Diamond Restrictions

Source: The Economist May 29, 1999

The United Nations had imposed trade sanctions on UNITA, the Angolan rebel movement, for failing to comply with previous UN resolutions. The UN insists that no one buy diamonds from Angola unless they obtained certificates of origin that were approved by the Angolan government. Diamonds have been UNITA's main source of revenue used to purchase weapons, and Zambia is the usual route for smuggling diamonds in exchange for weapons.

Angola produces some of the finest diamonds in the world, about $700 million worth last year, a tenth of the world's production. An estimated $200 million came from UNITA. DeBeers has ordered its dealers to comply with the UN ban. Diamond dealers can recognize an uncut Angolan diamond from a Russian or an Australian one. Although DeBeers has offered to enforce the bans, none of these measures will halt the swapping of rough diamonds for guns.

Burma Ruby Controversy

Source: JCK June 1999

Most Burmese rubies undergo heat-treatment, where fractures are glass-filled. In some rubies, fissures have actually been healed, re-crystallized and repaired, during the heat process. The borax used to protect the ruby from excessive heat acts as a flux to reduce the heat necessary for treatment. At high temperatures, the flux dissolves ruby and enables the two dissolving inner sides of the fissure to re-crystallize and heal. This aspect is typical of the synthetic process for growing ruby in a laboratory. Also, new evidence reveals that heat treaters now use red colored glass to fill fractures. The borax is mixed with silica, sodium carbonate, and chromium. This filling is only detectable with X-rays and X-ray fluorescence.

North Carolina Emeralds Cut

Source: JCK June 1999

James Hill hired Manuel Marcial de Gomar, owner of Emeralds International in Key West, to facet some of his emeralds unearthed in Hiddenite. He faceted a 3.40-carat heart-shaped "Heart of Carolina" and a 3.37-carat emerald cut "Princess of Carolina".

New Moissanite Detection

Source: JCK June 1999

The "shadow patterns test", originally designed to detect cubic zirconia, can also distinguish moissanite from diamond. Place a stone table down into a small glass container of water on a dark table. Shine a focused bright light on the pavilion and view the pattern of dispersion projected around the stone and on the table. Short, somewhat dispersive colors indicate diamond. Long, very dispersive points indicate moissanite.

Lazare Kaplan Disclosure

Source: JCK June 1999, National Jeweler June 1, 1999, and Modern Jeweler June 1999

Lazare Kaplan International will laser-inscribe all diamonds improved by their undetectable and proprietary enhancement method, marking them with the acronym “GE POL” (General Electric, Pegasus Overseas, Ltd.). GIA will have the opportunity to view diamonds before and after the process to research possible identifying characteristics and will publish their data in an issue of *Gems and Gemology*.

Maine Tourmaline

Source: JCK June 1999

The Mount Mica tourmaline mine in Oxford County, Maine remains the oldest operating gem mine in the United Sates. Opened in 1822, the tourmaline occurs in medium dark saturated blue-green and blue colors, along with some pink and watermelon shades. The open-pit operation is run by Plumbago Mining Corporation and is open during the summer and fall. The supply of tourmaline is limited.

California Tourmaline

Source: JCK June 1999

Tourmalines were discovered in southern California in the late 1800’s. Many of the mines are now closed. Of the ones in operation, the Stewart Lithia mine on the Pala Indian reservation and the Himalaya mine south of Pala at Mesa Grande are the most important. The Stewart Lithia mine is famous for its bright pink crystals, while the Himalaya mine is famous for its dark purplish red crystals and bi-colors of pink and green. The Mesa Grande pegmatites have produced over 100 tons of gems this century.

Canadian Tourmaline

Source: JCK June 1999

The discovery of gem-quality tourmaline near O’Grady Lake in Canada’s Northwest Territories has revealed a large deposit of tourmaline in the Canadian Rockies. The claim, fifty miles from the nearest road and inaccessible by car, measures eighty meters in thickness by a kilometer long with pockets all throughout.

Altered & Synthetic Diamonds

Source: JCK June 1999

The process for improving a diamond’s color and brilliance remains a secret, but experts think it involves annealing and high pressure-high temperatures. Annealing changes the molecular structure of a diamond.

GIA reports several visual clues for detecting fancy-colored synthetic diamonds. Look for uneven color zoning, as synthetic color is deeper in some areas than in others and marked by sharp boundaries. Opaque, black, elongated inclusions in synthetic diamonds show a metallic luster in reflected light. Many synthetic diamonds are attracted to magnetics. Unusual graining with cross or stop-sign patterns tend to follow color zones in synthetic diamonds. Synthetic diamonds show a stronger fluorescence (with a pattern) to short-wave ultraviolet light. Most natural diamonds exhibit fluorescence in long-wave ultraviolet light. When examined under an ultraviolet light, colorless synthetic diamonds glow for a minute after the lamp is turned off.

Ultimate Created Diamonds of Golden, Colorado produces a regular supply of fancy-colored synthetic diamonds. The company has recently begun to produce color-treated natural whites and fancy diamonds.

Synthetic Diamonds

Source: The Economist June 12, 1999

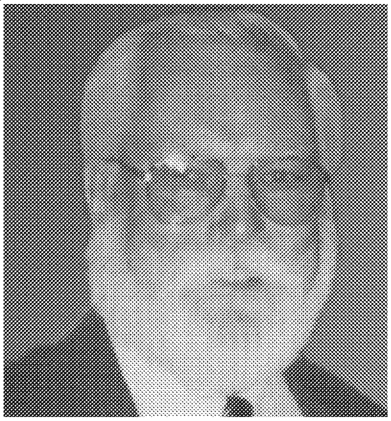
The unique atomic structure of chemical bonds makes diamond one of the hardest substances known and also one of the best conductors of heat. Synthetic diamonds, created by vapor deposition from chemical mixes, now serve as ideal heat sinks for top-of-the-line computer chips.

Heat energy in diamonds is transmitted through the chemical bonds as a series of vibrations. Slight irregularities in the vibration frequency of the bonds indicate that most diamonds are not as good at conducting heat as they could be. The irregularities are due to 1% of the atoms in the lattice weighing more than the neighboring atoms. These 1% have extra neutrons in their nuclei and are thus known as different isotopes. Bonds with a heavy carbon atom at one end vibrate at a different rate from those that link two lighter atoms. A group of South African physicists discovered how to avoid this imperfection by separating the light from the heavy carbon atoms, which enabled the growth of synthetic diamonds that are isotopically pure with 50% more heat conductivity.

The element to be purified is first mixed into a chemical that can be converted into a gas. The exact compound remains proprietary information. An infra-red laser is shone through the gas because chemical bonds tend to vibrate at the same frequencies as those in infra-red light. The laser is tuned to a frequency of one particular type of bond, like one with a heavy carbon atom at one end. The molecules are shaken until they explode to release atoms as electrically charged ions, which are pulled out of the gas by a strong electric field. What is removed and what remains becomes isotopically pure.

Facet Designer's Workshop

By Ernie Hawes



TRI-STARS

Over the years, I have worked on a variety of faceting designs in GemCad. I will begin something and maybe finish it, but still not be totally satisfied. I would be happy with it for the moment, but after revisiting it, I might decide it can be improved with some minor changes. I may change it a lot. Sometimes, I will make changes to both the pavilion and the crown. Sometimes, I will change the pavilion and keep the crown the same. Occasionally, I will design two different pavilions for one crown, or two crowns for one pavilion. Such is the case with the designs for this edition of *The New Mexico Facetor.*

About four or five years ago, I was working on some ideas for triangular cushions. I finished a couple using one pavilion and two different crowns. However, I was never totally satisfied with the pavilion. I set the designs aside (saved them in the computer) and figured I would get back to them some day. Well, today was the day. I changed the angles and added one more row of facets. I feel the results make much better designs than the originals. The crowns have remained the same. I call them ***TRI-STAR ONE*** and ***TRI-STAR TWO.*** The first one I recommend for smaller stones. The second would probably cut easier and look better in larger stones, say 12 mm. or larger.

TRI-STAR TWO helps prove a point that I have been telling people for a long time: More facets do not always mean a brighter or more brilliant gem. You will note that the brightness calculations for ***TRI-STAR ONE*** are slightly better than they are for ***TRI-STAR TWO.*** I think the additional facets on the ***TRI-STAR TWO*** crown add interest and may give a little more "sparkle" to a large stone, but they do not add to the gem's actual brightness. The difference is slight, as I said, and might not be perceptible to the average viewer. I will discuss this idea that "less is more" in many cases in a future issue. In the meanwhile, I hope you find these designs interesting and will give both of them a try. If you cut two the same size, let me know how you feel they compare. I would appreciate hearing from anyone who cuts one or both patterns. I can be contacted through the Guild's address or my e-mail address: *hawes@aps.edu*. Happy faceting.

Datavue2: Update '98

Letter from John Franke to The New Mexico Facetor:

I am sending you the recently completed 1997-1998 Datavue2 update. Feel free to make copies of this disk and share it with anyone who is currently using Datavue2. This will soon be a free download from the Facet Shoppe web site at: http:t/www.gemcutter.com. Please pass this information along to anyone interested in Datavue2. The program and the update are both free downloads.

I would like to offer my thanks and appreciation to the large number of people and faceting guilds around the world that have helped in the making of this update. There are too many to list here, but I feel a special thanks should go to Bob Long, Grover Sparkman, Robert Strickland, and Fred Van Sant for their exceptional involvement.

I will continue to maintain the database. I am asking that any original designs published in 1999 (or earlier published designs that have been omitted) be forwarded to me for inclusion in Datavue2 and to be forwarded to the Columbia-Willamette Faceters Guild for consideration in their "12 Best" Award. Any GemCad format would be handy (.ASC files are especially quick to attach to e-mail), they can be FAXed to us at (360) 385-9256, or mailed to:

John Franke
P. O. Box 499
Port Townsend, Washington 98368
(306) 385-4520

Gem Myth of the Month

By John Rhoads, D & J Rare Gems, Ltd.
raregems@amigo.net

Gem Myth: “Natural star sapphires and Linde star sapphires should look the same.”

One of the most difficult gems to sell via the newsletter, next to opals, are star gems. We include some star gems on each list, but they are, by far, one of the most commonly returned gems. Returns are accompanied by the comment, “The star does not appear strong enough.”

Some time back, I commented on how the color-change in alexandrite, as seen in photographs, is shown in the best conditions possible. Rarely will this optimum color-change be duplicated in everyday natural and incandescent light. This runs also true for star gems. The pictures of star rubies and star sapphires, shown in reference books, are also taken under the best conditions that can be created. Even then, the stars often do not appear as strong as those found in Linde star sapphires.

Nature creates few things that are perfect. Star sapphires are among those gems not created perfectly, in most cases. Often, a very fine gem will exhibit only five strong rays, due to the uneven distribution of silk throughout the stone. At other times, the silk may appear so strong that the star is considered excellent. However, the color and the transparency of the gem pales in comparison. The stone may show as a translucent gray with a great looking star.

The price of a star gem usually reflects the color saturation, the transparency, and the strength of the star. What is considered a strong star in a sapphire may not be the same as a strong star displayed by a scapolite or a spinel.

To be absolutely assured of having both fine color and a strong star, I advise customers to purchase Linde star gems. If you want a strong star in a transparent natural gem, be prepared to be patient and willing to pay the price.

Gem Myth: “The round brilliant cut is the ultimate cut for brilliance and beauty.”

A round brilliant cut gemstone, when the proportions are done correctly, can certainly be one of the most beautiful cuts for a gem. However, it is not the ultimate cut for a gemstone by any means. Many gem materials are much better suited for cutting into other shapes to produce the maximum brilliance and beauty.

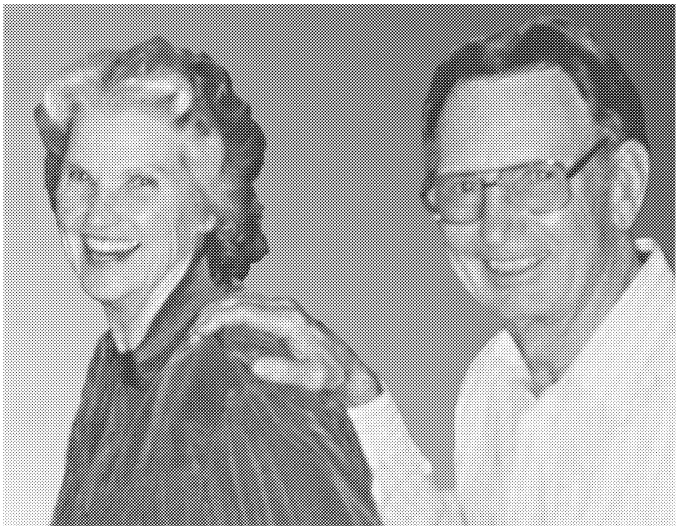
Imperial precious topaz from Brazil, for example, shows poorly in a round brilliant cut, as often the secondary color that is present does not make an appearance unless the shape is elongated. A fine apricot-colored imperial precious topaz can exhibit pink to orange highlights at the ends of ovals, pears, and long emerald cuts. These cuts certainly enhance the beauty of the gem. Providing that the cut was executed properly, they also do not diminish the brilliance.

Tourmaline, as another example, shows better when the dichroic colors can be either enhanced or reduced by elongated cuts, such as ovals and emerald cuts. A round brilliant cut tourmaline, when cut down the C axis, will display a single, usually strong color. When both colors of a tourmaline are appealing, an emerald cut or an oval can display both color and brilliance. Often, the elongated cuts can enhance stones that have an exceptional mix of colors, where a round brilliant cut will only show a single color.

{Editor’s comment: The July 1999 issue of Lapidary Journal highlights the tools and supplies used in the jewelry trade. The issue also features an article about faceting on page 71, where a picture of an amethyst faceted by John Rhoads accompanies the article. John cut the 21.41 carat amethyst in a hexagonal bar brilliant design.}

Let's Talk Gemstones

By Edna B. Anthony, Gemologist



Edna and Tony

(Contact the author for permission to reproduce this article in any form.) P.0. BOX # 49371; Colorado Springs, Co. 80949-9371

E-MAIL eba@bwn.net

ZOISITE: a Sorosilicate

TANZANITE

Tanzanite! Baron Sigismund Zois von Edelstein of Slovenia could never have imagined that a variety of the mineral he discovered in 1805 in the Sau-Alp Mountains would cause tremendous excitement in the jewelry industry more than a century later. The name zoisite has replaced the name saualpite that he bestowed upon this member of the epidote group of sorosilicates. The scholar-collector was probably more interested in its chemical make-up and crystal structure. In the sorosilicates, two SiO_4 tetrahedra share a single apical oxygen atom and form isolated, double tetrahedral groups. Such Si_2O_7 groups and independent SiO_4 tetrahedra link chains of AlO_6 and $AlO_4(OH)_2$ octahedra that share edges to form the monoclinic crystals characteristic of the epidote group. Formation at higher temperatures in regionally metamorphosed calcareous schists and shales and a twin-like doubling of the cell along the A axis cause zoisite to develop in the orthorhombic crystal system. Clinozoisite, its chemically identical twin, retains the characteristic monoclinic crystal structure of the epidote group.

Three varieties of zoisite are used as gemstones today. Thulite, the dense massive red or mottled pink and white variety, found in manganese deposits in Norway, Austria, Italy, western Australia, and in North Carolina, can be confused with rhodonite. It and the massive green variety that often houses ruby crystals and inclusions of dark hornblende are used for cabochons and carved ornamental objects. However, it is transparent tanzanite that has vaulted to a "most desired" status in the jewelry industry since its discovery in 1967 on the African continent in Tanzania. According to Dr. J. Kourimsky in *The Illustrated Encyclopedia of Minerals and Rocks*, an Indian tailor, Manuel d'Souza, found a beautiful blue gem crystal southwest of Kilimanjaro near his hometown of Arusha. Its color resembled an especially vivid sapphire. Speculation that it was a very fine iolite (cordierite), an exceptionally large crystal of dumortierite, or a new mineral was rampant. The crystal was sent to the German Society for Precious Stones in Idar-Oberstein for cutting and finishing. Experts there determined that it was not a new mineral, despite its high content of strontium and low incidence of iron. It was, rather, a variety of the mineral zoisite. Tiffany of New York exhibited a keen interest in this "blue treasure of Africa" and named it tanzanite. With a blitz of publicity, the new star in the realm of gemstones was launched.

Tanzanite develops in fissures of igneous rocks as a secondary mineral through alteration of the minerals, where the surrounding rock is composed. It is also found in contact metamorphic zones of calcareous (calcium rich) schists and shales. The largest known tanzanite crystal weighs 126 carats. Gems over 5 carats are rare indeed. Most natural crystals are grayish or brownish blue. Dr. Joel Arem states that "crystals are heated to about 700 degrees F to create a deep, intense blue with violet dichroism."

Gem tanzanite has been found only in Tanzania and Kenya. Few known deposits, primitive mining conditions, natural disasters, uncertain controls, changing marketing practices, a very active rumor mill, and the great demand for the gem has kept the situation in a constant state of flux. What is known now is that the demand has exceeded the present supply of quality material available.

Although synthetic tanzanite has not been created, several simulants have appeared on the market. Doublets composed of natural tanzanite crowns attached to glass pavilions, synthetic spinel components cemented with colored glue, and paste imitations exist. Cortanite and coranite are trademarked names for tanzanite-colored synthetic corundum. Many unscrupulous dealers are offering these simulants globally and also to especially vulnerable tourists in resort areas. Any tanzanite jewelry should be purchased from known and trusted sources.

The appeal of fine tanzanite's vibrant purplish-blue color has made it a very popular choice for rings, despite its fragility and relative lack of hardness. A perfect plane of cleavage makes it extremely vulnerable to knocks, and it should **never** be subjected to ultrasonic cleaning. The gem is better suited for mounting in pendants, pins, earrings, and other jewelry receiving less wear and tear.

TABLE 1. Gemstone Properties

SPECIE	*zoisite*
Composition:	calcium aluminum silicate $Ca_2Al_3[O/OH/Si_4/Si_2O_7]$ + Sr+Cr+Fe
Class:	sorosilicate
Group	epidote
Species:	zoisite
Crystal System:	orthorhombic
Variety:	tanzanite
Colors:	blue; violet
Phenomena:	chatoyancy
Streak:	white
Diaphaneity:	transparent; translucent
Habit:	elongated prismatic
Cleavage:	perfect
Fracture:	uneven; brittle
Fracture Lustre:	vitreous; pearly
Lustre:	vitreous
Specific Gravity	3.35
Hardness	7.50 to 8.0
Toughness:	very poor
Refractive Index	o=1.692 to 1.693; e= 1.70
Birefringence:	0.009
Optic Character	biaxial positive
Dispersion:	0.030, per Schumann; 0.019, per Arem
Pleochroism	strong trichroic; deep blue/purple/green
Luminescence	inert
Ultraviolet Fluorescence	inert
Absorption Spectrum	broad band in yellow, green; weak bands at 5280 and 4550; weak lines in the red
Aqua Filter	brownish-red in private collection specimen
Chelsea Filter	brownish-red in private collection specimen
Solubility	soluble in acids
Thermal Traits	very sensitive to heat; avoid thermal shock; fuses easily to pebbly (blister-like) glass
Treatments	heat improves color
Inclusions	hollow growth tubes; graphite platelets; actinolite, staurite, and diopside crystals (very rare)

TABLE 1. Gemstone Properties
SPECIE zoisite

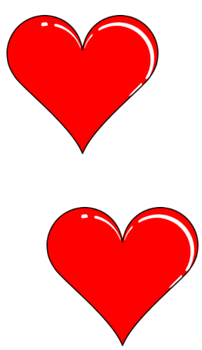
Advertisements

Bill Swantner lists for sale an American Optical stereo microscope for sale at his cost. It has 15x eyepieces and offers total magnification of 10x, 15x, 20x, 30x, and 40x. Price is $325. Bill may be contacted by phone at 505-856-6863 or by e-mail at swantner@bscoptics.com.

Don Krause lists for sale his Graves Mark IV variable speed faceting machine. The unit is complete as shipped from the Graves Company and has never been used. Don also lists for sale the following extras: an offset preformer, three extra index wheels (120, 96, and 72), a girdling attachment, an automatic preformer attachment with drive motor, one additional twenty-piece dop set, two books on faceting by Glenn Vargas, four books on meetpoint faceting, six books of faceting designs, and an assortment of gem rough. Price is $650. Don may be contacted by phone at 505-294-0247.

50th Wedding Anniversary

Tony and Edna Anthony will celebrate their 50th. Golden Wedding Anniversary on July 20, 1999. The New Mexico Faceters Guild congratulates Tony and Edna on a major matrimonial milestone, a very proud achievement. Edna serves as our Guild Gemologist and writes gemstone columns that provide pertinent and informative reading.



Happy 50th Anniversary

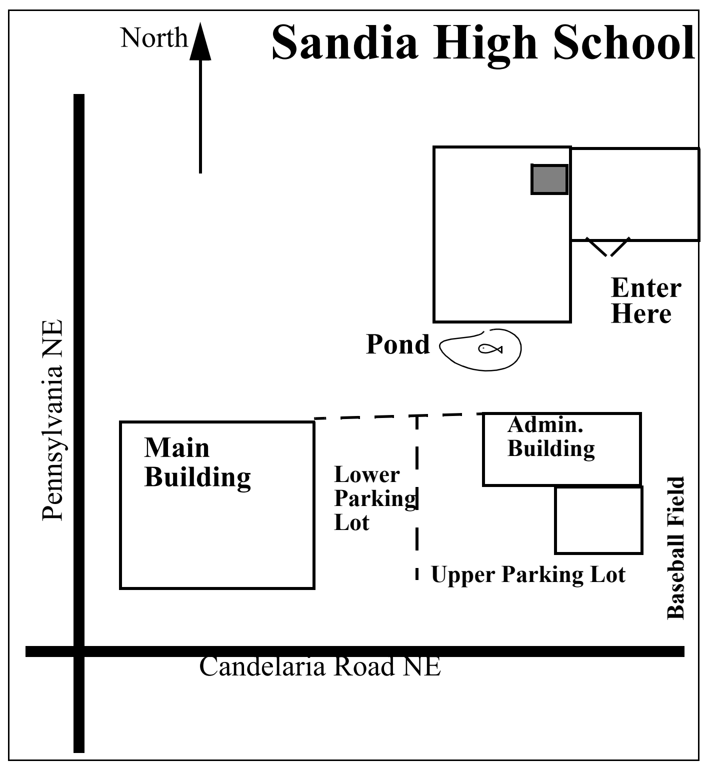
A Change in the New Mexico Faceters Guild Meeting Location

for NMFG meeting date July 8, 1999

Location: Sandia High School

Due to the construction problems at the New Mexico Natural History Museum, Guild member Ernie Hawes has graciously arranged for the New Mexico Faceters Guild to meet July 8, 1999 at 7:00p.m. at Sandia High School, located at Pennsylvania and Candelaria Roads NE. We will be meeting in Room K6, the same geology/astronomy room where we held our faceting symposium a few years ago. Please park at the north end of the lower parking lot.

The science teacher whose room we will be using would greatly appreciate any donations of New Mexico rocks and minerals you may wish to give. Thank you. to those who left mineral donations during the May meeting.



We exchange newsletters with the following guilds

Anglic Gemcutter, Beaver Creek, Oregon
Facets, Portland, Oregon
Tacoma Faceters Guild, Tacoma, Washington
Stoney Statements, Houston, Texas
The Permain Faceter, Midland, Texas
Angles, Woodland Hills, California
Texas Faceters Guild, Cedar Park, Texas
Albuquerque Gem and Mineral Club, Albuquerque, N.M.
The Roadrunner, Big Springs, Texas
Intermountain Facetors Guild, Port Townsend, Washington
The Midwest Facetor, Birch Run, Michigan
The Transfer Block, Sacramento, California
USFG, Kalispell, Montana
Facet Talk, Ashgrove West, Queensland, Australia
Calgary Faceters Guild, Saskatoon, Saskatchewan, Canada
North York Faceting Guild, Markham, Ontario, Canada
Ottawa Gem Facetor's Guild, Ottawa, Ontario, Canada

{Please let me know if I have accidently omitted any group.}

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Will Moats: gemstone@flash.net
Mariani Luigi: ENVMA@IOL.IT
Stephen A Vayna: Vayna@transatlantic.com

TABLE 2. Shows of Special Interest

Name	*Location*	*Date*
Four Corners Gem and Mineral Club's 47th Annual Show	Durango, Colorado; La Plata County Fairgrounds	July 9 - 11
Rockhounders' Roundup 25th Annual Gem and Mineral Show	Cortez, Colorado; Montezuma County Annex	July 17 & 18
Colorado Federation of Gem and Mineral Societies' 16th Annual Contin-tail Show	Buena Vista, Colorado; Buena Vista Rodeo Fairgrounds	Aug. 13 - 15
Grant County Rolling Stones Gem and Mineral Society's 16th Annual Show	Silver City, New Mexico; Silver City Recreation Center	Sept. 4 - 6
Gem, Lapidary, and Mineral Show	Tucson, Arizona; downtown buildings	Sept. 4 - 12
Gem and Lapidary Wholesalers, Inc.	Tucson, Arizona; The Rodeway Inn; Holiday Inn/Holidome	Sept. 9 - 12
Pacifica Trade Show	Tucson, Arizona; Howard Johnsons	Sept. 9 - 12
Denver Expo 1999; Gem, Mineral, Jewelry, and Fossil Show	Denver, Colorado; Best Western-Denver Central Hotel	Sept. 15 - 19
Colorado Mineral and Fossil Show	Denver, Colorado; Holiday Inn-Denver North	Sept. 15 - 19
Denver Four Points Expo	Denver, Colorado	Sept. 15 - 19
International Gem and Jewelry Wholesale Show	Denver, Colorado; Merchandise Mart	Sept. 16 - 19