The New Mexico Facetor

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In This Issue

The Prez Sez:

by Scott R. Wilson, Ph.D.

Be the first on your block to own a laser polisher!

Sound a bit crazy? Think again! With the proliferation of laser-this and laser-that widgets that seem to pervade our lives, who in their right mind would consider laser polishing? Well, it really is not as far out as you might think. This topic appears to have a reasonably well established body of literature in the scientific community, where it has been applied to the final polishing process for precision optical components made from diamond, fused quartz, and other materials.

The earliest work I found was done in our own backyard by scientists at Kirtland Air Force Base[1] in Albuquerque. Studies examined the effect of illuminating a pre-polished surface with a high-powered carbon dioxide laser. It was found that if the laser intensity was high enough, then sufficient power could be absorbed in the surface to cause partial melting and a resultant smoothing of the surface. This achieves much the same effect as standard polishing. It was also unfortunately found that, by doing this, sufficient enough stress was "frozen" into the sample that would allow fracture sometime in the future, as the stress drove the propagation of minute internal cracks.

Although these results were a mixed bag, science did not stand still. More work has been published on this topic, as additional materials have been studied for laser polishing and other strategies tried.

The smoothing or polishing of diamond films and substrates [2] appears to have attracted some degree of interest, mostly from the aerospace electronics community. Diamond is vastly more resistant to thermal damage than typical optical materials, and the laser polishing approach appears to have worked quite well. In this case referenced, scientists in Switzerland and from the General Physics Institute in Moscow used an ultraviolet laser at a glancing angle of incidence from different directions to process pre-polished samples. Surface quality was apparently nearly as good as the best mechanical/abrasive polish. I can-

not say if laser polishing is being used in commercial diamond processing. If it is not, then I would expect to see at least some use of it in the coming years, particularly for large volume production, where it would provide a significant economic advantage.

Other work in this area has addressed the fracture issue that plagued early work[3]. The approach taken was to raise the temperature of the sample sufficiently that the stress induced by the laser polishing was immediately relieved. This technique was applied, with some success, to materials similar to many gem materials that exhibit a high temperature coefficient of expansion. Surface roughness was found to decrease from an initial value of 500 nm RMS to 1 nm RMS, considered to be a very high quality surface.

I would NOT want to heat up a prize tourmaline or emerald to the temperature required for laser polishing for fear of damaging the crystal. Mineral inclusions within a crystal expand upon heating and may explode, and water inclusions generate steam explosions when heated. Many other gem species would fall in this same category. However, it just might work for gems like sapphire, ruby, and other high temperature oxides, particularly those that commonly undergo serious heat treatment to enhance color.

Feasible laser polishing of gem materials will take some time, but someone will eventually accomplish it. Given the rapidly falling price of laser technology, someday we gemcutters will be able to purchase a tabletop laser polishing attachment to accompany our faceting machines. What a remarkable concept!

References:

1. Durn. Cannot find the reference. Sometime around 1987. Alan Stewart and others, Boulder Laser Damage Symposium. I still have some of the samples.

2. A.V. Khomich, V.V. Kononenko, S.M. Pimenov, V.I. Konev, S. Gloor, W.A. Luethy, H.P. Weber, “Optical properties of laser-modified diamond surfaces”, Proc. SPIE Vol. 3484 (1998), p166-174. ISBN 0-8194-2942-2

3. F.L. Laguarta, N.B. Lupon, F. Vega, J. Armengol, “Laser application for glass polishing”, Proc SPIE Vol 2775 (1996), p603-610. ISBN 0-8194-2160-X

Guild President Scott Wilson

Minutes of NMFG Meeting

July 13, 2000

by Nancy L. Attaway

President Scott Wilson called the meeting to order at 7:10 p.m. and greeted all members and guests.

Old Business

The New Mexico Faceters Guild will elect a slate of officers at the November meeting to serve a two-year term for the years 2001 and 2002. Nominations for all Guild offices will be entertained during the September meeting.

New Business

Steve Attaway solicited pictures of work by our Guild member artisans for publication in the Guild newsletter.

Russ Spiering mentioned that he had made major changes to the Guild library. He also announced that **Betty Annis** made a generous donation of books to the library. Russ will have a complete list of the library contents soon.

Russ Spiering announced the "*All That Glitters*" gem and jewelry competition sponsored by the New Mexico Jewelers Association. Deadline for entries is August 1. Bring entries to either Harris Jewelers/Casa de Oro in Rio Rancho or to Beauchamp and Co. Jewelers in Albuquerque.

Show and Tell

The show and tell case tonight held interesting gem crystals, many new faceted gems, and new jewelry items.

Moss Aubrey displayed four boxes that contained many small faceted party-colored sapphires, along with spinels, zircons, chrysoberyls, and garnets. The stones were cut in Sri Lanka and in Bangkok, Thailand. Moss asked Guild members to rate the stones according to which lot they liked best, second best, and so forth. Moss briefly described the process of sending the rough overseas for cutting. He sent cutting instructions with the rough. The turnaround time was about three to six weeks, and cutting costs ranged from $1.90 and $6.50 per carat. Other factors were considered, such as a fee on the added value after cutting, an appraisal fee tacked onto the parcel, and an import/export tax levied. Moss plans an article for the Guild newsletter on this unique experience.

Will Moats displayed the synthetic gem crystals that he purchased at the February Tucson Show. These crystals provided the subjects of his recent article in the May/June 2000 issue of the *New Mexico Facetor*. Will showed a slab of Russian synthetic ametrine that exhibited a very hard line between the yellow and purple zones. He had one crystal of Chinese hydrothermal ruby. He brought four rare-earth flux-grown synthetic garnets that were colored green, blue, red, and orange from the different rare earth elements. Will also had two pieces of colorless synthetic clear quartz that contained the wires from the manufacturing process. One quartz piece was a pseudo-hexagonal shape. Will said that these were grown for optical purposes.

Elaine Weisman displayed a V-shaped ring cast in silver and embellished with dots of gold. She used her flex-shaft to carve a Mexican fire opal in a freeform triangle and set the stone in the ring. The fire opal had deep concaved facets on the sides and a flat bottom to show the color. The textured surface of the ring was done in wax before casting.

Scott Wilson displayed a two-carat round faceted synthetic moissanite set in a man's gold ring. The stone exhibited a very high dispersion and showed a rainbow of colors. Scott mentioned that there were needle-like inclusions held within the stone, and that these were oriented vertically, perpendicular to the table, to diminish their presence. Scott set up a microscope so Guild members could see the inclusions and better view the stone's double refraction. **Steve Attaway** noticed that the polished girdle was rounded, meaning that the dopped stone was held by hand when the girdle was polished. Scott also brought a black, crypto-crystalline (poly-crystalline) chunk of silicon carbide.

Nancy Attaway only displayed the 19.94-carat emerald cut, deep red Nigerian rubellite liddicoatite, shown at the last meeting. Her emerald cut pavilion design was published in the May/June 2000 issue of the *New Mexico Facetor.* Nancy said that she developed the pavilion design totally without the aid of GemCad, but that GemCad was used in preparing the diagram for publication. Nancy had not faceted any stones recently due to the hot weather. **Steve Attaway** displayed a 14Kt. gold ring made for Ina Swantner's apricot-colored square cubic zirconia.

Refreshments

Betty Annis and **Nancy Attaway** brought home-baked refreshments to the July meeting. **Eileen Smith** brought iced tea and lemonade. Thank you very much. **Ina Swantner** and **Eileen Smith** volunteered to bring refreshments to the meeting in September. Gourmet coffee will be served.

Future Programs

Geologist William Mansker will speak to the Guild at the September meeting. He plans to discuss diamonds in kimberlite and will show examples of pyrope garnets in kimberlite pipes that he collected years ago in Buell Park, an eroded volcano that lies northwest of Gallup.

Master gemologist appraiser, Larry Phillips, ISA, CGA, ASA, will address the Guild at the November meeting. Larry will discuss the changes he recently saw during his trip to China, and he will also provide information on appraisals, gem inclusions, and gem treatments.

Program Speaker

by Nancy L. Attaway

Suzanne Cowan, curator of the New Mexico Museum of Natural History, discussed mineral procurement, the specialty displays, and the recent structural changes within the museum. She accompanied her presentation with slides that depicted displays before and after renovation, as well as the various stages of the museum's complete reconstruction.

Suzanne Cowan has an advanced anthropology degree and studied at UCLA and at UNM. She has worked within the National Park System at Chaco Canyon and at the Maxwell Museum. Besides being the museum curator, Suzanne serves as the registrar and also cares for the archives.

Suzanne explained the many factors involved in the museum's broad expansion. The museum is known for its dinosaurs, and the Triassic Hall needed to be enlarged to house more dinosaur exhibits. The museum boasts one of the best Triassic exhibits in the world, and it wanted to capitalize upon that theme. The museum also needed more biology exhibits, a larger Dynamax theatre, and a new planetarium. More monumental rock art was required for the surrounding grounds, as well as dinosaur works in bronze.

The museum remained open during the entire construction process. Suzanne remarked how that was quite a feat. She said that the Astrophysics Department at UNM and the U.S. Air Force contributed greatly to the budget for the new planetarium, now called Lodestar. Slides showed the dome for the planetarium being assembled across the side street, where the museum annex and a parking lot now reside.

Suzanne's slides showed how cranes were used to move the existing sculptures to their new places in the modified landscape. New biological and geological outside exhibits accompanied the monumental rock art sculptures to landscape the grounds. The museum wanted to stay with the landscaping theme that depicted the Rio Grande Rift.

Inside the museum, Suzanne Cowan described how the mineral displays were constructed to have the viewer walk through time, showing the rocks and minerals found deep in the earth and up to the surface. Entire new mineral display cabinets were constructed from scratch, and the minerals rested upon new three prong holders. The labels that identify and describe the minerals "float out" from the displays. Suzanne explained how labor-intensive the new case construction was, requiring metal welding, precise woodworking, and electrical wiring for alarms. Several slides depicted the stages of progress in building display cases. One slide showed the faceting display arranged years ago by **Louie Natonek** and **Nancy Attaway** for the New Mexico Faceters Guild.

One room in the museum houses the mineral study cases. Over 3,000 different minerals are being cataloged by Florence A. LaBruzza, who revised the third edition of Stuart A. Northop's *Minerals of New Mexico* a few years ago. Students of geology are welcome to work in the mineral study cases. The annex also houses geo-science classes and rooms for paleontological preparations. Although many fossils are large, Suzanne said that some fossils are so small that a microscope is used while the operator sifts the dirt and sands for fossil bones.

Seismosaurus from San Isidro, New Mexico is a world-famous sauropod. It was air-lifted by helicopter last year from the site to the Natural History Museum. The museum made cast replicas of its skeleton. One copy was recently shipped to Japan. Canada has agreed to cast and mold another replica. Suzanne's slides showed the enormous framing units built for shipping dinosaurs overseas, and how they contain the fragile plaster jackets that house the skeletons. Suzanne remarked that $1,000 is an average price to build a shipping crate. She related how one case that contained a dinosaur was reported lost at sea when the ship was sunk during World War I. Also, an Egypt Airlines plane that contained crates of minerals and works of Picasso was reported to have crashed into the Atlantic Ocean.

The museum is self-insured with a fine arts insurer. Appraisals are estimated for traveling exhibits and for items to be shipped elsewhere. Gloves are worn when opening boxes and crates. The entire unpacking procedure is documented by films and photographs in the event of discovering any damage from shipping and handling.

Last year, the New Mexico Natural History Museum purchased a fluorite pocket from Bingham, New Mexico, a famous known collecting site for fluorite, galena, quartz, linarite, and other rare minerals. A large pocket filled with blue and purple fluorite cubes was excavated in its entirety by Mike Saunders, Ray DeMark, Tom Massis, and Brian Huntsman. Suzanne Cowan's idea was to build an exhibit similar to the Sweet Home rhodochrosite wall constructed and displayed in Denver's Natural History Museum. The exhibit for the Bingham fluorite pocket from the Sunshine #2 tunnel is not yet finished. The pocket measures six feet by seven feet and is very heavy. Suzanne was unsure whether or not the fluorite would fade in direct light. Virgil Lueth, geology professor at the New Mexico Institute of Mining and Technology in Socorro and curator of its museum, suggested that the Natural History Museum use a viewer-operated flashlight to pinpoint and highlight sections of the fluorite pocket, instead of installing a system of bright lights. A flashlight approach would better simulate how the fluorite pocket would appear in an actual mine.

The Natural History Museum is currently entertaining donations for the procurement of the largest known gold nugget from a particular locale in New Mexico. This famous nugget weighs ten ounces. Suzanne also mentioned that the entries for this year's New Mexico Jewelers Association's *All That Glitters* gem and jewelry competition will be displayed at the museum for a three-week period during September.

The New Mexico Faceters Guild thanks the museum curator Suzanne Cowan for an interesting and lively presentation. The Natural History Museum displays a number of lovely faceted gems, some cut by Guild members past and present. Current Guild members might consider donating a faceted stone or two to this exhibit. Donations of gemstones, crystals, and mineral specimens that are accompanied with an appraisal may qualify as a tax deduction.

The New Mexico Faceters Guild has enjoyed a very good working relationship with the New Mexico Museum of Natural History. Guild members have provided faceting and carving demonstrations for special museum events, and some members have donated faceted gems to the museum collection. The New Mexico Natural History Museum has been a fine place to hold our meetings, and we hope to continue meeting there in years to come. Thank you, Suzanne.

Gem Myth of the Month

by John Rhoads, D & J Rare Gems, Ltd.
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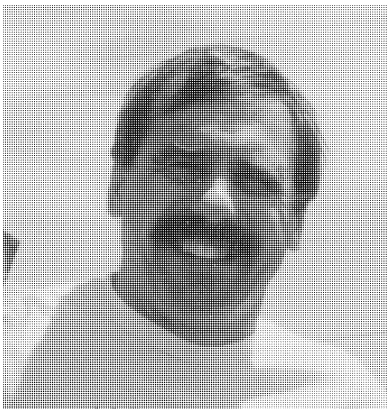


Gem Myth: "If you keep heating a gem, then the color keeps getting better." We have heard this comment made in reference to tanzanites and aquamarines. This myth must have originated from the idea that more is always better.

Heating a gem adds nothing to the gem itself. What heat-treatment does is take what is already in the gem and alters the gem slightly to improve its color. In aquamarine, heat-treatment tends to remove the yellow overtones, leaving just the blue tone. However, if the blue tone is weak, then heat-treatment will result in a much paler blue color.

Tanzanites respond in varying degrees to heat-treatment. The best color change in tanzanites is from a deep coffee brown to a rich, intense purplish blue. However, if the change is weak and the color is light to begin with, then all the heating in the world will not improve the color.

Some gems react negatively to heat-treatment. We have seen tourmalines where the color is vastly improved when heated at certain temperatures, while additional heating at higher temperatures results in a total loss of color. The heat-treatment of sapphires has been one of the most studied subjects in the gem world. The improvement of the color in sapphires results from many years of trial and error experiments that often produced less than desired results. The heat-treatment of gems to improve their color will undoubtedly continue. Remember that there is just so much that the addition of temperature can do to improve a gem.

In the News

FTC Guides for Web Sites

Source: National Jeweler July 16, 2000

The Federal Trade Commission is increasing its surveillance of operators of e-commerce, insisting that they adhere to the same disclosure guidelines set for traditional retailers. According to the FTC, it is deceptive to use the word "flawless" as a quality description if the stone has inclusions seen with a 10x loupe, and it is deceptive to use "ruby, sapphire, emerald, topaz, etc." to describe synthetic or lab-grown versions of the same. Diamond treatments must be disclosed.

Emerald Treatment Promoted

Source: National Jeweler July 16, 2000

Emerald dealer Arthur Groom will unveil a consumer marketing campaign this fall to promote the use of his patented Gematrat emerald treatment. The campaign plans to advertise in major publications and will encourage consumers to ask for Arthur Groom emeralds. Gematrat is a two-step process, where thorough machine cleaning eliminates previous treatments and is followed by the injection of a colorless epoxy resin that fills the fissures in emeralds.

Beware of Chinese Amber

Source: Lapidary Journal August, 2000

Baltic amber that contains insects and spiders is being reworked in China and sold as rare Chinese amber.

Scott Sucher's New Articles

Source: Lapidary Journal August, 2000

Lapidary Journal will publish six articles by master facetor, Scott Sucher. The articles are advanced faceting projects and will describe how to cut replicas of the world's famous diamonds in cubic zirconia. Scott presented two excellent talks to the New Mexico Faceters Guild on cutting replicas of these diamonds, citing their significance and history.

Krivanek Wins First Place

Source: Modern Jeweler July, 2000

Joseph Mark Krivanek, former partner of D & J Rare Gems, Ltd., wowed the judges at this year's AGTA Cutting Edge Awards and won first place in the faceting category with a 12.93-carat princess cut square Colorado rhodochrosite. (If they liked that one, then they should have seen the 60-carat pearshape he had at the Tucson Show in February of 1999.)

Diamonds Considered Deadly

Source: Modern Jeweler July, 2000

Behind the controversy surrounding secret diamond treatments that hide flaws and change colors lies a grimmer reality. The diamond trade is being implicated in war crimes and mass murder as making them possible. Sales of diamond rough have financed African wars that have been fought for a decade. No one can deny that diamonds have played a major role in arms distribution in war-torn African countries. The political groups responsible for most of the savagery control much of the profits obtained from sales of diamond rough. The diamond industry has remained passive on this for years.

Lab-Grown Gems' Popularity

Source: National Jeweler July 16, 2000

Jewelers have seen a surge in popularity with sales of jewelry items that feature lab-created gemstones. Consumers who purchase synthetic gems range from the frugal to the ones who can afford the natural ones. Lab-grown rubies and emeralds are especially popular because the color is good, they contain few inclusions, the cost is much less than natural gems, and the customer does not need to worry about any treatments. The Russians have flooded the gem market with synthetic stones of many colors. Russian scientists who now grow gems commercially grew crystals for the military during the Cold War.

CAD/CAM Using Jewelers

Source: Computer Graphics World Magazine July, 2000

Audrey Doyle wrote an article that featured several jewelers who use CAD/CAM programs to design custom jewelry. Her article included Steve and Nancy Attaway, who use SolidWorks software to make unique designs for their specialty-cut gemstones. (see: www.cgw.com)

GIA & Synthetic Moissanite

Source: The Loupe Summer 2000

Studies performed by GIA compared the differences found between colorless diamond, cubic zirconia, and synthetic moissanite and listed their means for identification. The study mentioned that synthetic moissanite has a very strong dispersion, is doubly refractive, exhibits a DR reaction when viewed in cross-polarized illumination, has rounded girdles, and contains needle-like growth tubes.

BHP Fined in Canada

Source: National Jeweler 8/1/ 2000

Australia's Broken Hill Proprietary Company (BHP Diamonds) was recently charged with eight counts of harming the fish habitats of three lakes by dumping hazardous waste when the Ekati mine was constructed. The fines may exceed $5 million. A court hearing is currently in session.

World's Largest Diamond Mine

Source: JCK August, 2000

The Orapa mine in Botswana now ranks as the world's largest diamond mine. A recent expansion doubled its output to 12 million carats annually.

Rio Verde & Emeralds

Source: JCK August, 2000

Rio Verde Industries, Inc. of Canada plans to develop a multi-national Colombian emerald business. It has merged an emerald marketing company, EmeraldStone, with a team of specialists in exploration, mining, grading, cutting, wholesale distribution, and marketing of Colombian emeralds. Five of the top Colombian emerald producers have joined, but only one is in production. Two are past sources hoped to be revived, and two are new sources not yet in production. Their emphasis will be on cedar wood oil treatment, and all stones will have this disclosure.

Dresden Green at Smithsonian

Source: Modern Jeweler August, 2000 & National Jeweler 8/1/2000

The Smithsonian will display the famous Dresden Green diamond beside the Hope diamond this fall.

DeBeers Changes its Business

Source: Modern Jeweler August, 2000 & National Jeweler 8/1/2000

DeBeers has changed its old policy that stabilized diamond supply and demand by absorbing overproduction to one that centers upon mining and marketing. The Central Selling Organization has been replaced by the Diamond Trading Company. The Diamond Trading Company now works alongside its sightholders, who are expected to increase advertising. The "Forevermark" trademark and the slogan, "a diamond is forever" are to be used in advertising. Sightholders must follow a code of ethics and standards and have been given twelve months to comply. The Forevermark, the combination of a star and a cube (the cube represents the natural crystalline shape of a diamond), will become the symbol and official logo of the Diamond Trading Company.

Namibian Green Tourmaline

Source: Professional Jeweler August, 2000

The pegmatite dikes of the Namib Desert in Namibia yield mint green tourmalines in clear, finger-size crystals and also rounded forms called "kugels" (balls in German). Mining at Usakos began 70 years ago and continues today with the discovery of new gem pockets. The tourmaline from Usakos is open axis, where light splits and travels at near the same speed through the gem. Tourmaline is doubly refractive, meaning that light splits into two directions upon entering the gem. Often in tourmaline, light is perceived in one direction as bright and dark in the other direction. According to Joel Arem, chromium is the coloring agent in Usakos tourmaline. The Neu Schwaben tourmaline mine lies near the Usakos mine.

Natural Sapphire Fingerprints

Source: Professional Jeweler August, 2000

Natural sapphires contain inclusions called fingerprints that appear like a human fingerprint. Known as feather inclusions, they are composed of liquid droplets in tension fissures. These fissures form around another mineral crystal, such as apatite. Flux-grown sapphires have fingerprints, remnants of a substance that causes aluminum oxide from the manufacturing process. These tend to fold over each other and appear as wispy veils.

New Diamond Cuts

Source: Gems & Gemology Summer, 2000 and National Jeweler 8/16/ 2000

Master diamond cutter Gabi Tolkowsky recently developed two new diamond cuts. One is a round brilliant with one hundred facets called the **Zoe**, named after his granddaughter. It is cut in multiples of nine, instead of the standard eight, allowing more brilliance. The other, called the **Tycoon** cut, is a new cut for squares and rectangles that features a diamond-shaped table surrounded by eight smaller table facets with a step cut pavilion. The nine-facet table increases the brilliance of an emerald cut by 50%, compared to a standard emerald cut with only one table facet.

Chinese Freshwater Pearls

Source: Gems & Gemology Summer, 2000

GIA reports its findings on the nucleation of Chinese freshwater cultured pearls. X-radiographs showed normal, but large, tissue implant nucleation. No beads were found.

ONCE UPON A TIME.....AND COME AGAIN

by Merrill O. Murphy

Once upon a time, long before my hair turned white and started marching toward the back of my head, my employer sent two other fellows and me to Germany to a little old town named Spang-Dolom. We worked umteen hours a day on a technical device, but we did get weekends off to look around the area.

Now, once upon a time, Spang was a little farming town on one side of the road. Dolom was another little town on the other side of the road. With the coming of a U.S. military base, the two towns grew and soon became Spang-Dolom. There was only one restaurant outside the military base. It was just across the narrow street from a farm house with front yard piled high with cow manure. We ate at that restaurant, and we worked on the base. However, Spang-Dolom has little to do with my story.

On weekends, I managed to talk my co-workers into driving a few dozen miles to see a world-famous gem museum at a larger town named Idar Oberstein. Somewhere along the line, Idar and Oberstein had became world famous for its lapidary works, and again, the two halves grew together. Now, this growth came about when fine quality agate and jasper were found in abundance on the surrounding hills. The local people became known for their agate/jasper gemstones and carvings. Eventually, the agates and jaspers became fewer and fewer, so the cutters began to import rough. They became faceters as well as carvers and cabochon cutters. This too, however, has little to do with my story that really started only a few months ago.

Kind of boring, huh? But do bear with me, as the story is about to unfold.

Someone just recently found vividly blue little bits of clear stone in the hills that once produced the Idar Oberstein agate and jasper. Geologists determined that these blue stones were something called hauyne or hauynite. Some treatises call it a sodium and aluminum silicate combined with calcium sulfate. Others list it as sodium calcium aluminosilicate sulfate chloride.

As a gemstone, hauyne has only two attractions to gem cutters. First, there is that wonderful blue color. Secondly, it is rare as false teeth on a duck, and cutting rough is mostly found as small bits and pieces. Its rarity automatically drives the price upward.

On the negative side, hauyne is: 1) just too rare to meet any reasonable demand; 2) too soft for regular wear; (Note that its rarity is both a positive and a negative factor. The demand is great, but cannot be met.); 3) hauyne is not very hard, just 5 ½ to 6 on Mohs hardness scale; 4) It is brittle and exhibits a fairly easy cleavage.

Just a few months ago, a gem magazine published a photograph showing several handfuls of faceted hauyne stones, wonderful blue stones. The caption said that demand was instantaneous and great at the AGTA Show in Tucson. End of story? Not on your half-life. Now comes the really interesting part.

Stuart A. Northrop's *Minerals of New Mexico* lists hauyne (and hauynite) in Colfax County. The nearest town is Raton. There are several locations listed, but none of them are really close to civilization and, therefore, involve a lot of hard walking at altitudes around 7,000 to 8,000 feet. Interested walkers should peruse one of the original editions of *Minerals of New Mexico*. The third edition revised by Florence A. LaBruzza contains considerably less information on hauyne than previous ones.

Northrop said that hauyne is isometric, in dodecahedrons, octahedrons, etc., often as rounded grains. He described it as exhibiting a vitreous to greasy appearance. Colors may be various shades of blue, asparagus-green, red or yellow. Some pieces are highly included or only translucent. Some specimens may fluoresce orange-red under long-wave ultraviolet light. Specimens are described as reaching 0.5 mm, rather small for faceting. However, investigation by competent geologists appears to have been minimal. Listed are: Mertie, 1922, in the hauynite basalt of Hunter Mesa and in a sill south of Johnson Mesa; also Stobbe, 1949, in nepheline basalt of Robinsons Peak and in hauyne basalt at several places in eastern Colfax County.

So, there you are. If you relish rough high country walking, here is something new to entice you. However, I cannot guarantee success. Gates may be locked, there may be no roads, and trails may be nearly invisible. It will not be easy. Get good maps and study them well before you go. Start with Raton. It is a small town on I-25 and about eight or nine miles south of the Colorado line. The altitude is listed as 6,680 feet. Good luck to you.

Let's Talk Gemstones

By Edna B. Anthony, Gemologist

Scott Wilson

GADOLINITE GROUP

[NESOSILICATES]

DATOLITE, YTTRIUM GADOLINITE and CERIUM GADOLINITE

Of the gadolinite group of minerals, named to honor the Finnish chemist J. Gadolin, the ones most apt to be used for gem purposes are datolite [$Ca_2B_2Si_2O_8(OH)_2$], yttrium gadolinite [$Y_2Fe^{2+}Be_2Si_2O_{10}$], and cerium gadolinite [$(Ce,La,Nd,Y)_2Fe^{2+}Be_2Si_2O_{10}$]. These latter two frequently metamict minerals are usually the source of the rare-earth elements gadolinium, rhenium, and holmium, but the massive material can yield cabochons weighing several pounds. Though some gadolinite crystals found in Norway have attained a four-inch cross-section, transparent crystals are tiny and extremely rare. Faceted gems of yttrium gadolinite and cerium gadolinite are unknown. It seems appropriate, then, to present the information concerning these two minerals in narrative form before proceeding to datolite data.

These monoclinic biaxial positive beryllium iron silicates, containing yttrium or cerium, occur in both massive and crystalline forms. They occur in lithoclases of Alpine metamorphic rocks, granites, and granite and syenite pegmatites. Major sources of these minerals are deposits located in the former USSR, Austria, Italy, Switzerland, Sweden, Norway, Greenland, Japan, Australia and in the United States in Arizona, Colorado, and Texas. Although no area in South America is mentioned in the references as a source of any member of the gadolinite group, a sister-member is named minasgeriasite.

In yttrium gadolinite and cerium gadolinite, the replacement of some of the yttrium or cerium atoms by uranium, thorium and/or the rare-earth elements cause damage to the atomic structure and result in their near amorphous isotropic state. A greenish-grey residue is left on the streak plate. A flaky brown mass forms with heating, but fusion does not occur. Immersion in acids leaves a gelatinous residue. No cleavage is apparent in the brittle, frequently intergrown and terminated irregular crystals. Deep striations occur on the crystal faces. The vitreous or resinous luster also appears on the conchoidal or splintery fracture surfaces. Density varies from 4.0 to 4.65 with a Mohs hardness of 6.5 to 7.0. Refractive indices of 1.77 – 1.78 and 1.78 – 1.82 produce a lofty variable birefringence of 0.01 – 0.04. The rarely attractive color can be brown, black, greenish-black or, rarely, pale green. The minerals are primarily of interest to collectors and scientists, but any gem collector would consider even a tiny faceted gemstone of these minerals a great prize.

DATOLITE

Datolite is the only member of the gadolinite group of minerals that is sometimes faceted for use as a gemstone. Transparent crystals of pale green, yellow, pink, and white can yield brilliant faceted gems up to five carats. These occur in basic igneous and traprock formations in Austria, England, Canada, and the United States. It is associated with calcite, prehnite, and zeolites in hydrothermal deposits. The pale green crystals from Somerset County in New Jersey, crystals of other colors from deposits in Massachusetts and colorless crystals from Ontario, Canada provide the best material for faceting.

Humboldtite and dystome spar are other names for datolite. The name is derived from the Greek word meaning *to divide,* which describes its granular nature in the massive form. This form sometimes resembles unglazed porcelain. Colorful nodules of massive datolite resembling cannon balls are common in the copper mining area of the Keweenaw Peninsula of Lake Superior and Minnesota. Scuba divers often recover specimens from submerged veins offshore. In *Gemstones of North America, volume III,* John Sinkankas discusses the nature of these nodules. He quotes a publication of Foster & Whitney that describes them as "massive, translucent, highly vitreous in luster, and of light flesh-red color, owing to the presence of a minute quantity of suboxyd of copper (cuprite) diffused through

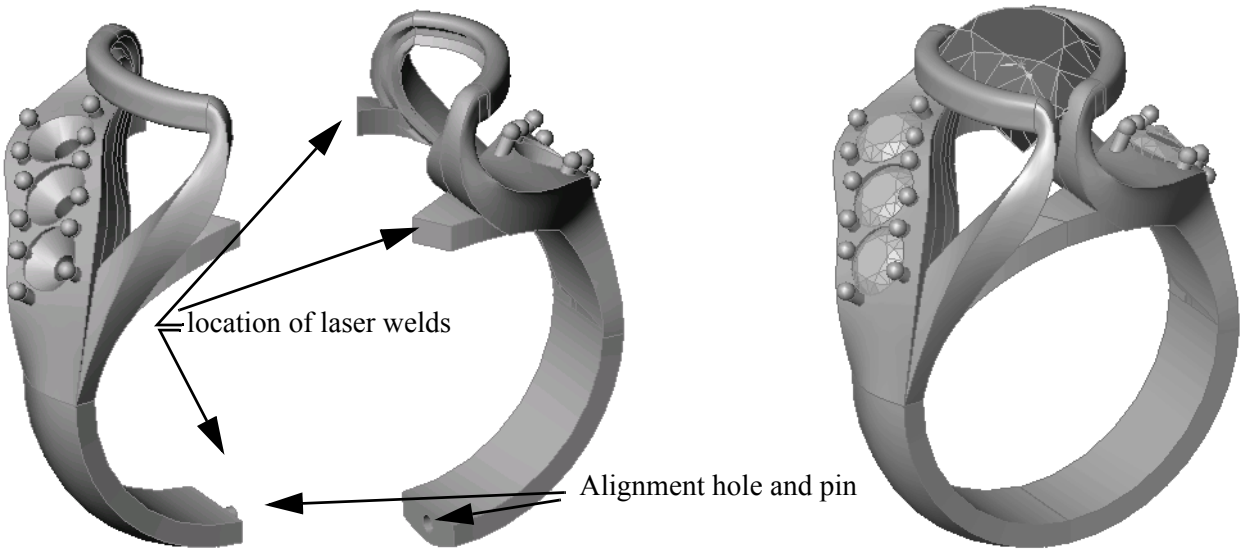
it." The resemblance to "the purest and most close-grained marble" was also noted. Other colors include white, yellow, green, blue, violet, red, orange, brown, black, and variegated material. It is thought that the opaque "green on white (is) due to very tiny raspberry shaped copper aggregates that have an outer coating of malachite." Native copper inclusions account for the brown color. Cabochons are sometimes cut from these materials, but collectors usually prefer to slice the nodules and display the polished surfaces. Faceted datolite is soft, requires special care, and is suitable for jewelry for a collector who craves the unusual.

TABLE 1. Gemstone Properties

SPECIE	*datolite*
Composition	hydrous calcium borosilicate $CaBSiO_4(OH)$
Class	silicates
Group	gadolinites
Species	datolite
Crystal System	monoclinic
Variety	by color
Colors	colorless, white, green, pink, red, violet, yellow, orange, brown, black
Phenomena	none known
Streak	colorless
Diaphaneity	transparent, translucent, opaque
Habit	short prismatic, massive, granular
Cleavage	none
Fracture	vitreous
Fracture Lustre	vitreous

TABLE 1. Gemstone Properties

SPECIE	*datolite*
Lustre	vitreous, porcelaneous
Specific Gravity	2.80 to 3.00
Hardness	5.0-5.5
Toughness	fair
Refractive Index	a=1.22-1.626; b=1.649-1.658; y-1.666-1.670
Birefringence	0.044 to 0.047
Optic Character	biaxial negative
Dispersion	0.016
Pleochroism	none
Luminescence	SW - blue; LW - none
Absorption Spectrum	not diagnostic
Aqua Filter	no reaction
Chelsea Filter	no reaction
Solubility	easily soluble in acids, resulting in a silicate gel
Thermal Traits	fuses at 2-2.5 to a transparent glass
Treatments	none known
Inclusions	cuprite, chalcotrichite, tenorite, bornite, malachite


location of laser welds
Alignment hole and pin

How did you do that?

by Stephen and Nancy Attaway

We recently completed a tanzanite and diamond ring that incorporated SolidWorks CAD/CAM design with traditional jewelrymaking and the use of a laser welder. The finished ring showed a 12x9 mm 3.95-carat pearshape tanzanite set in a high bezel and accented by five quarter-carat diamonds. The bezel lifted the stone upward to reveal much of the pavilion of the pearshape. The diamonds were bead set, three in a line on one side and two on the other.

We wanted to design an asymmetric ring with the pearshape tanzanite mostly in the center. Setting a large, sensitive stone in a ring in such a way that the stone would be protected is always a difficult task. The usual manner of accomplishing this is with a bezel. However, bezel setting a large tanzanite can be somewhat risky. Usually, a bezel hides much of the stone and does not allow a lot of light to enter the pavilion of the stone. Bezels must also be hammer set, or bent into place using a burnishing tool. This means that the base of the bezel must be strong enough to endure the harsh bending forces required to set the stone.

We used SoildWorks to render the design on the computer. The design that we agreed upon relied on joining two halves together using a laser-welder. By precisely fitting the bezel to the stone, the two halves were laser-welded together along the ring shank both top and bottom. We designed the full ring in SolidWorks and then split it in half. Alignment pins and holes were added to enable the ring to be accurately reassembled around the tanzanite.

The design was a challenge in SolidWorks because of the complex flowing shape that we wanted. By creating cross sections in "three space", segments of the ring were lofted along smooth curves that blended with the bezel. Holes for the diamonds were pre-set with beads printed in the wax. The precise stone geometry was output from a beta version of GemCad 2000 using a VMRL format.

Neil George used a Sander's Prototype machine to print the 3D wax pattern. The complex design required a finer, more expensive printing process than normal, however, the cast results allowed minimal cleanup around the beads and along the bezel. Mark Guerin used his laser-welder to assemble the ring. So far, the response to this new design has been **"Wow, how did you do that?".**

Facet Designer's Workshop

By Ernie Hawes

Scott Wilson

Having a Little Fun

As many members of the Guild may have known, I retired on July 1, 2000 after thirty-seven years as an educator. Now, I'm having a little fun. I celebrated my retirement by taking my wife and youngest grandson, who lives in northwestern Minnesota, on a trip across western Canada. We traveled down through Glacier, Yellowstone, and Grand Teton National Parks. We drove on through the Black Hills, visiting Mount Rushmore and the badlands of South Dakota. It lasted twenty-nine days in all and was quite a trip.

While my wife and grandson like to sleep late, I have been an early riser for many years. Often, while they slept, I was up front in our motorhome working on various ideas for gem designs. The patterns for this month's newsletter are a result of those early mornings of puttering around on the computer.

In the first one, only the pavilion is my own design. I may work on a different crown design later, but for now, it has a step-cut crown. This design is simply called ***Cushion Square 2000.*** I purposely had the table meet at the tip of facets "f" because it seemed a little cleaner to me. However, step cuts generally are not meet-point, so use your own judgement and cut the crown however it pleases you. Usually on step cut crowns, the last facets before the table are the smallest. Unless you are cutting a large stone, I recommend polishing-in the "f" facets. Otherwise, it will require an extremely light and fast touch to keep from overcutting.

The second design was created just to see what I could come up with that had a very minimal number of facets. Surprisingly, it turned out to have a fairly interesting play of reflections. I realize that the angles do not seem to be ideal for quartz. However, I tried several combinations, and this turned out to be the best of the lot. It probably would not be a good design for a large stone, but it should be quite interesting for smaller stones. Be careful when you cut this pattern to not reverse the crown. If you do, you will lose much of the "twist" effect. I think ***Square Twist*** describes this design very well.

Happy faceting.

Special Dates for Guild Members

Elaine Weisman will celebrate her birthday August 2. Merrill O. Murphy will celebrate his birthday August 16. Ernie and Becky Hawes will celebrate their 40th wedding anniversary August 20. Rainy Peters will celebrate her birthday August 21. Troy Smith will celebrate his birthday August 21. Heidi Ruffner will celebrate her birthday August 22. Louie and Harriet Natonek will celebrate their 37th wedding anniversary August 24. Paul and Marge Hlava will celebrate their 33rd wedding anniversary September 2. Scott Wilson will celebrate his birthday September 24. Ernie Hawes will celebrate his birthday September 26. Troy and Eileen Smith will celebrate their 3rd wedding anniversary September 28.

Advertisement

Steve Attaway lists for sale an **eighteen-inch vibratory flat lap** made by Contempo Lapidary. The unit comes with two trays, one for grinding and one for polishing. His asking price is $150. Steve may be reached by phone at 505-281-4163 and by e-mail: attaway@highfiber.com

Moss Aubrey lists the following items for sale: **Sphere Cutter:** This is a home-made device for cutting small spheres. Consists of two electric motors mounted on a board to allow re-positioning. I never used this, so I cannot assist in its operation. $10./ **Lamps:** Four electric swing arm lamps, suitable for workshop or trade show. One of the base clamps needs to be altered, but three are operational. $15 for all./ **Light box.** This is a metal box with a glass lid and light fixture inside. It's a commercial light for recessed ceiling mount, but it makes a good box for examining gem rough. Some electrical cord and plug (120 v.) will be needed. $15./ Moss may be reached by phone at 505-842-6968 or e-mail: DRsAubrey@aol.com.

Ernie Hawes lists for sale a used Facetron faceting machine, including laps, dops, transfer jig, and some gem rough. Ernie may be contacted by phone at 505-821-3201 or by e-mail: hawes@flash.net.

Heidi Ruffner lists for sale an wooden antique jeweler's bench and an acetylene torch. Heidi may be contacted by phone at 505-275-5764.

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NMFG Back Issues

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

Don't forget: next meeting is September 14, 2000 at 7:00 pm.

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

Please send the editors photos of your work for the next newsletter!