The New Mexico Facetor

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NMFG President Scott Wilson

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The Prez Sez:

by Scott R. Wilson, Ph.D

AIMPOINT for the New Mexico Faceters Guild

As the New Mexico Faceters Guild goes "over the hump" for 2002, it has become apparent that our club is changing in ways that will soon require a response from us. This is not unusual in many volunteer organizations, where the level of activity and involvement usually rises and falls with time.

At this point in time, the Guild is losing flow. A relatively small number of members has been organizing club activities and subsidizing events and has been doing so for a long time, which becomes tiresome. Our membership is once again falling, due to many factors. Some members move to new professions or careers and no longer find the Guild of interest. Life changes can occur that pull time away from previous interests in gems and gem cutting. Health issues and /or age rob us individually of our abilities. Our workshops have increased the interest and activity in cutting by new and old members (which is fantastic), but we are slowly loosing our steam.

In the present economic weakness, it also becomes more difficult to support an expensive hobby. The club is not in a position (nor should it be) to continually subsidize membership activities.

These points have been raised to the NMFG board, and some suggestions have been made about where the NMFG should go next. There are ideas that could raise membership, but, unfortunately, these require yet more investment of resources that we really do not have. There are also ideas of merging our group with a related professional organization or with a local amateur group. Other possibilities include reducing the amount of work being done so that it becomes an easier task to keep the NMFG going, such as going to fewer meetings/newsletters/events.

Please think about where you want the focus of the NMFG to be, and how you can personally help sustain that focus. We have a fascinating, unique, and rewarding hobby. Each of us needs to save a little energy and set it aside to keep our organization healthy and strong. We will be talking about these topics during the September meeting. Your opinion does count. Thanks.

Minutes of the NMFG Meeting

July 11, 2002

by Nancy L. Attaway

President Scott Wilson called the meeting to order at 7:10 p.m. and welcomed all members. We had a light meeting attendance tonight, due to summer vacations.

Old Business

Ernie Hawes reported on the workshop held May 11 at the home of Steve and Nancy Attaway. There was no classroom discussion during the morning session. However, the workshop was a very intense cutting session, as eight members faceted stones all day long.

New Business

Ernie Hawes announced that the **next workshop** is scheduled for **July 13** from 9:00 a.m. until 4:00 p.m. at the home of **Steve** and **Nancy Attaway**. Ernie plans a morning classroom session on polish, and members will facet stones after lunch. Members attending workshops are asked to give $5 towards food and the copies of information and faceting designs, but extra cash donations are always appreciated. Please contact Ernie regarding all workshops and any questions related to workshops. Ernie has two faceting machines available for those who do not own machines, so call him to reserve a machine for you at the next workshop.

Editor Nancy Attaway announced that *Lapidary Journal* published **Ernie Hawes**' "Queen's Fancy" design in the August, 2002 issue, along with a picture of the cut in blue topaz. Congratulations! **Ernie Hawes** said that he is to have another original faceting design published in Lapidary Journal at the end of the year.

Editor Steve Attaway announced that he recently purchased a digital camera for taking pictures of the gems and jewelry in the Show and Tell Case, as well documenting folks faceting stones during the Guild workshops. He also said that our publisher will print color photos of images on the cover of the Guild newsletter. Look for those in the next newsletter issue.

Steve and Nancy Attaway invited members to come to their studio and have Steve photograph their stones and jewelry with his digital camera. These pictures can then be placed directly into the computer and be prepared for the Guild newsletter and for the gallery section of the New Mexico Faceters Guild website.

Show and Tell

The Show and Tell Case tonight held many faceted stones and jewelry rendered by Guild members.

Elaine Weisman displayed two rings she made. Both showed a square design with small gold and silver balls and stones set on top. One was cast in sterling silver and set with a small rhodolite garnet. The other was cast in 14Kt. gold and set with a small benitoite. She made several of these rings, set with different stones. These could be worn alone or as stackable ring sets.

Carsten Brandt displayed three stones that he cut, a pale yellow square Barion apatite, a small pale green hexagonal tourmaline, and a small "Petal Cut" hessonite garnet. The hessonite garnet had 65 facets.

Paul Hlava displayed an assortment of emeralds that he purchased, along with a topaz, dyed green.

Dylan Houtman displayed many stones that he had cut. The two stones (a piece of silicon dioxide and an agate) that he found in his driveway yielded cabochons. He cut a small emerald cut emerald and a lovely triangular morganite, a design that we hope will be in a future issue of the *New Mexico Facetor*. He cut two danburites, a large elongated Barion emerald cut and a cut corner square with vertical facets on the crown for an interesting effect. Dylan cut a small marquis chromium zoisite with blunted, instead of pointed, ends and two petalites, a standard round brilliant and a pear-shape. The petalites were mostly clear with a hint of pale pink. He also cut five small tanzanites, one elongated pearshape and four shield cuts with interesting shapes. **Ernie Hawes** and **Steve Attaway** remarked that they both wanted to work with Dylan to transfer his faceting notes of his unique designs into GemCad so others may cut his interesting faceting diagrams.

Nancy Attaway displayed four stones that she had cut. Her large citrine showed the new "Antique Kite" cut, the design published in the May/June, 2002 issue of the *New Mexico Facetor*. She also cut three smaller Nigerian tourmalines, a pinkish-red emerald cut liddicoatite, a deep bluish green emerald cut, and a deep blue flasher cut (twelve-sided) round. Nancy remarked that having to eliminate inclusions in the stones caused the tourmalines to be smaller than she originally hoped.

Refreshments

Margaret Magail Medina and **Nancy Attaway** brought home-baked refreshments to the January meeting, plus gourmet coffee. Thank you all very much. **Phil Callow, Linda Vanya,** and **Scott Wilson** volunteered to bring refreshments to the September meeting.

Future Programs

Vice-President/Programs Paul Hlava scheduled **Mike Potts** and **Tom Katonek** of the Albuquerque Gem and Mineral Club for a talk in September. They will report on their recent trip to Canyon de Cobre in Mexico. Paul has also scheduled award-winning gem cutter, **John Rhoads** (D&J Rare Gems, Ltd. in Salida, Colorado) for a talk in November. We will change the date for the November meeting to **November 21**, when John Rhoads will be in Albuquerque as one of the dealers in the AGATE 2002 Gem and Jewelry Show, scheduled for November 23 and 24.

Program Speaker

by Nancy Attaway

Paul Hlava discussed "The Electron Microprobe and What It Can Do", as presented during July's meeting. He stated that the full name is the Electron Microprobe X-Ray Analyzer (EMPXA), also known as the electron microprobe analyzer, the electron probe microanaylzer, the electron microprobe, the microprobe, or just the probe. He remarked that he called the remarkable machine sweet names when it worked well and sour names when it did not.

Paul outlined his talk to describe the functions of the instrument, its capabilities and its limitations. He wanted to review the signals of interest created by the machine. Paul also wanted to review the basic design of the instrument and describe the information that it could gather, and he illustrated some examples of that.

Paul began by explaining that the electron microprobe was designed to non-destructively produce quantitative, elemental analyses of micro-volumes of material. The volume depends upon the material examined, as well as the beam conditions. Materials very closely examined were usually metals or ceramics. The instrument can be perverted to look at some polymers and organics. It can also be used qualitatively and semiquantitatively. The instrument's high spatial resolution enables photomicrography, such as SE, BSE, X-Rays.

The probe excels when a medium to large number of quantitative analyses are needed over a short distance. The probe performs well when looking across welds, brazes, solder joints, diffusion zones, reaction zones, mineral zoning, etc. Paul showed a slide of the compositional variations in a Kovar Weld, with concentrations relative to the distances. Sampling sizes can vary from a pinpoint to about three inches across by 3/4 of an inch high, the maximum.

Paul remarked on the probe's limitations. No information could be obtained on crystal structure, valence, or molecules. The instrument does not do hydrogen, helium, or lithium. It has problems with beryllium, boron, carbon, oxygen, fluorine, and neon, because of their very weak x-rays. New pseudo crystals help, but the analyses can become touchy. This is an active area of research that requires special handling. A background problem exists so that trace analyses are difficult. Heat limits some materials.

Paul explained how the probe works with the signals. When a high energy beam interacts with solid materials, as in the probe, a number (9 or 10) of new signals are generated. When using the probe, Paul ignores 1/3 of the signals (auger electrons, cathodoluminescence, etc.). He tolerates or works around 1/3 of the signals (heat, bremsstrahlung, etc.). He uses 1/3 of the signals to his advantage, SE or secondary electrons, BSE or back-scattered electrons, and x-rays or the characteristic of each element. The probe delves into the chemistry by counting the electrons that come off of it.

Paul said that the useful signals are the SE, the BSE, and the X-Rays. Secondary electrons are the valence electrons that are ripped off atoms by primary (beam) electrons. The weak SE signal and creative use of geometry allow for imaging of the topography. Back-scattered electrons are primary electrons repulsed by atomic nuclei. The compositional information is basically related to nucleus size. Characteristic x-rays are formed by the removal of inner shell electrons. The transfer of electrons from higher energy shells yield x-rays. Quantitative analyses are rendered by comparison with known standards. Paul showed examples of BE, BSE, and X-rays. Every signal has a different resolution. The resolution of the SEM runs under 10 nanometers, usually between 5 and 7.

The basic design of the electron microprobe x-ray analyzer includes an electron gun, which has to be stable and accurate, unlike a regular SEM. The basic design also has a column with electromagnetic lenses to focus the electron beam and a coaxial optical microscope to facilitate optical/x-ray focus. The sample stage must be precise. There are two kinds of x-ray spectrometers, WDS and EDS; SE detector, BSE detector, high vacuum system (clean or with cold finger). The instrument's electronics and data processing equipment accompanies it.

To give an example of a high tech instrument, Paul showed pictures of the JEOL 8900 and the Cameca SX 100. He wanted the audience to note the close-up of the gun, the column, the EDS, the WDS, the sample air-lock, and the optics. A light optical microscope is built into the instrument. Paul showed pictures of the SE detector, and he also showed a picture of JEOL stage, along with the sample holders and a universal mount. Paul said that it was imperative that an instrument be able to stabilize the beam position. He remarked on the cost of these machines. A probe can cost between $750,000 to $900,000, and an SEM can cost around $250,000.

Paul discussed the types of analyses available from the probe. His SE images were usually only for documentation. The BSE images obtained were usually only for documentation, as well. The x-ray maps generated were an extremely graphic display of information, and those from the JOEL are semi-quantitative. EDS analyses were usually a guide to WDS. WDS spectrometer scans are sometimes generated to search for trace elements and overlapping x-ray lines. Semi-quantitative WDS analyses allow for assays of individual elements. The probe could also perform spot quantitative and WDS analyses and quantitative WDS traverses. The machines work with solids only and cannot work with liquids or gasses. The usual life of a probe runs about ten years, but some universities have coddled them along for 20 years or more.

Paul's picture of a secondary electron image showed octahedrons, and he showed a back-scattered electron image. Paul also showed x-ray images. He had a BSE and element maps of a braze joint. Another picture showed corrosion rings around particles.

Paul performed an analysis of a new tourmaline from Nigeria's Ogbomosho area for GIA. The sample crystal was provided by Nancy Attaway. The crystals exhibited a purplish-pink rim color with an orange core. The two color zones were revealed to be a purplish-pink rim by manganese and an orange core by iron and manganese. Paul showed a plot from the quantitative analyses of Mn and Fe data. He had another plot of Na, Ca, and Bi data that showed an elevated concentration of bismuth from a traverse across the diameter of a Nigerian tourmaline. Paul determined that the Nigerian tourmaline was a liddicoatite. {See *Gems and Gemology*, Summer 2001, pages 152 and 153.}

Paul recently examined and assayed the contents of vanadium, chrome, and iron as found in Colombian emeralds and Zambian emeralds. He displayed several examples of these emerald species. Thanks, Paul!

Faceters Guild Workshop

by Nancy L. Attaway

The New Mexico Faceters Guild held a workshop at the home of **Steve** and **Nancy Attaway** on July 13 that lasted until 5:00pm. **Ernie Hawes** organized the workshop and served as its moderator. He was assisted by **Scott Wilson, Steve Attaway,** and **Nancy Attaway.**

Ernie Hawes began the morning session with a classroom discussion regarding polishing laps. A hand-out sheet listed his suggested polishing laps and polishing compounds, and he discussed each one on the list. Nancy Attaway provided comments and information.

The list began with the Lucite Lap and cerium oxide polishing compound. Lucite laps are used for polishing gem materials with a low to medium hardness. The laps, however, will round the facet edges. Cerium oxide polishes any silica-based gem material, which encompasses a variety of gems. These include opal, quartz, beryl, tourmaline, benitoite, tanzanite, peridot, and labradorite. The Dyna disc polishing lap charged with cerium oxide also works very well and can be re-charged. These eventually need replacement.

The Dyna System of laps and discs provide a variety of grinding laps or discs in many grit sizes. The cutting laps are resin-bonded diamond on thin copper discs. These seem to generate less of a damage layer than the steel laps embedded with diamond, especially the steel laps in coarse grain. They also have available several types of polishing discs (cerium oxide, aluminum oxide, and tin/lead) that are already charged with polishing compounds. The Dyna System of laps and discs requires a master lap to place the disc upon and an adaptor for the spindle on the faceting machine.

Ernie Hawes and Nancy Attaway recommended using the Dyna System of discs and laps for grinding and polishing. Nancy Attaway also recommended using the 1200-grit grinding discs from Hi-Tech Diamond Products as a good pre-polish lap. These discs also require a master lap but not an adaptor.

Phenolic Laps charged with diamond are used to polish gems. These laps were used years ago before the newer polishing laps became available. Tin laps, tin/lead, and tin/type-metal laps charged with diamond or aluminum oxide are used to polish gems, like topaz, chrysoberyl, garnet, peridot, tourmaline, and beryl.

The Last Lap and the Fast Lap polish a variety of gem materials, but they tend to round the facet edges.

Both laps are a resin-bonded zinc. A Last Lap or a Fast Lap charged with diamond polishes garnet, peridot, beryl, tourmaline, quartz, labradorite, and chrome diopside and can polish harder gems, like cubic zirconia.

The Corian Lap charged with diamond polishes a variety of gems that include topaz, liddicoatite, beryl, tourmaline, tanzanite, benitoite, peridot, garnet, and chrome diopside. Nancy Attaway originally purchased a Corian lap just to polish topaz, but she soon realized how well it polished many other gem materials.

The Ceramic Lap is the lap most used by competition faceters because of its attributes. The ceramic lap charged with diamond gives a high polish, makes flat facets, and allows crisp meetpoints. It is usually used to polish harder gem materials, like corundum, but it can polish cubic zirconia, beryl, and liddicoatite, if the facetor is careful. Nancy Attaway also uses a ceramic lap to polish in the small sliver facets in a pavilion and the small star facets on a crown in garnet and peridot. She remarked that certain placements on a ceramic lap of long and slender facets to be polished is important, as the ceramic lap will spread a facet one way and elongate a facet another way. Nancy also said that there are times to use firm pressure and certain situations to use a light touch when polishing with a ceramic lap. Small facets polished on the ceramic lap will come in fast and can spread too far with too much pressure.

The Wax Laps come in red, blue, and green colors that designate three different hardnesses. Wax laps charged with either diamond or aluminum oxide polish very soft gem materials, like apatite, calcite, kyanite, barite, fluorite, gypsum, and even kunzite.

The Batt Lap is a new type of polishing lap composed of tin and antimony. It was invented by Jonathan Rolf. A Batt lap charged with either diamond or aluminum oxide polishes a variety of gem materials, including quartz, beryl, tourmaline, topaz, cubic zirconia, and corundum. The Batt lap requires some preparation in embedding the diamond compound into it before it can be used. Ernie Hawes is very happy with his Batt lap.

The Pol-a-gem Lap, invented by Glenn Vargas, is a lap with a thick coating of cerium oxide and used to polish quartz. Neither Ernie or Nancy can get their Pol-a-gem lap to work for them. However, Nancy has just gotten the lap to work on a few facets on a quartz.

The Copper Lap charged with diamond polishes harder gem materials and gives flat facets. Nancy mentioned the Meehanite Iron Lap (iron with graphite particles) that is used by the diamond cutting industry. She has one of these laps. She used it once for polishing a large synthetic corundum alexandrite, where the ceramic lap with diamond would not yield a polish.

Ernie mentioned the Spectra laps, thin films placed on a master lap used for polishing. These are available in coatings of cerium oxide, aluminum oxide, tin oxide, and zinc oxide. Spectra laps come in packs.

Ernie also mentioned a special chrome oxide lap that he purchased years ago that was to be specifically used for polishing emerald. Nancy has the chrome oxide lap that Louie Natonek had purchased at that same time. Charged with diamond, the chrome oxide lap polishes beryl and tourmaline.

Ernie concluded the discussion on polishing laps and polishing compounds with brief remarks about colloidal silica. Colloidal silica, found in certain orange juices for particle suspension, is a polishing compound. It was popular in the late 1980's but fell out of favor due to health fears. When dry, it causes silicosis

Nancy ordered pizza for lunch and served Kona coffee, brewed iced tea, and baked a pineapple upside-down cake. **Becky Hawes** baked an apple cake. **Margaret Magail Medina** made tortilla roll-ups with Philadelphia cream cheese, green chili, and green olives and baked lemon cookies with pecans. Thank you all very much. We eat well at workshops.

Carsten Brandt worked with his RayTech Shaw on a triangular "Apollo" cut orange Mexican opal. **Doug Stone** worked with his Ultra Tec machine on cutting a heart shaped pink cubic zirconia. His daughter, **Aurelia,** worked on one of Ernie's Facetron machines and completed cutting a square almandine garnet.

Phil Callow finished the pavilion of a cut corner square of an oro verde (green gold) citrine with his Facetron machine. He did the pattern to learn Ernie's "Easy Square Emerald" cut**. Bill Wood** finished a lovely round brilliant synthetic ruby on his Facetron. Good job, everyone. Thanks to all who participated.

The Next NMFG Workshop

The next workshop of the New Mexico Faceters Guild was scheduled for September 14 at the home of Scott Wilson. Due to conflicts with the Denver Show and folks being out of town (including Workshop Chairman, Ernie Hawes), we will postpone the workshop until Saturday, **October 19.** The workshop on October 19 will be at the home of Scott Wilson in Corrales and will begin at 9:00am. See you there.

In the News

Thai Corundum Treatment Exposed

Sources: Colored Stone July/August, 2002 & Gems and Gemology Spring 2002

Gemologists recently pierced the veil of mystery surrounding the corundum treatment from Thailand that changed pink sapphire to padparadscha. Beryllium was discovered to be the key element responsible for the color change. Beryllium also caused colorless sapphires to change to yellow and turned dark red-purple sapphires to a vivid red. The process has now been successfully replicated by several gem lab researchers. Ken Scarratt of AGTA's Testing Center explained how beryllium is diffused into the stone from the outside to create an environment in a host chemistry that gives the orange color. The terminology describing this process will be called "bulk diffusion".

Researchers at GIA found a correlation between the presence of beryllium and the surface-related orange color zoning. They also discovered that the beryllium could diffuse into corundum from the surface. Dr. John Emmett of Crystal Chemistry stated that the likely cause of the color change was bulk diffusion of light elements, such as beryllium, magnesium, or calcium. These elements substitute for aluminum in the sapphire lattice to create trapped hole color centers. Dr. John Emmett conducted a set of experiments diffusing beryllium in a variety of sapphires, either in a flux or in a dry powder. He was able to replicate the color-change process used in Thailand. Dr. Emmett believes that beryllium is a causative agent of the yellow color, but he has not ruled out the diffusion of other elements.

Agreement on Thai Corundum Treatment

Source: JCK on the Web August 8, 2002

The American Gem Trade Association and the International Colored Stone Association have agreed to declare the new Thai corundum treatment as a "bulk diffusion process". This process involves the addition of foreign elements at temperatures well above those used in the traditional heating process to create and/or induce color alteration. Although the color induced by this process is permanent under normal conditions, the color does not permeate the entire stone. Depending upon the depth of the color alteration, color may be removed by re-polishing or by chipping the stone.

Controversy over Thai Sapphire Treatment

Sources: JCK 2002 & Professional Jeweler July 2002

The new high temperature sapphire treatment from Thailand has altered the stones to the point of re-crystallization, claims Ken Scarrett of AGTA's Gem Testing Center. He said that using flux melts the surface of the heated sapphire. The stone re-crystallizes as it cools, which produces a synthetic surface layer that is then polished off by the cutters. He is very concerned by the use of high temperature and flux for fracture healing. He also showed that synthetic features remained on the surface of some polished sapphires that had undergone the treatment, evidenced by the multiple grain boundaries seen just below the stone's polished surface. Sometimes this surface deposition of synthetic material is not always detectable. Also, the color of some treated material is not only confined to the surface but is diffused throughout the gem, making it nearly impossible to identify the type of treatment. Beryllium has been shown to come from chrysoberyl, and it diffuses much faster than titanium. Parcels of Madagascar sapphire were heated with chrysoberyl, which contains beryllium. Hence, the description "bulk diffusion".

Thai Gem Treaters Dispute Labs

Sources: JCK July 2002 and JCK August 2002

The Chanthaburi Gem and Jewelry Association of Thailand met with local heat-treaters to respond to the "bulk diffusion" description from AGTA's Gem Testing Center and GIA's Gem Trade Laboratory. The Chanthaburi Gem and Jewelry Association disagrees with the bulk diffusion label, as it implies the addition of an external agent. The bulk diffusion theory states that orange-pink sapphires are the result of heating pink Madagascar sapphires in the presence of chrysoberyl ($BeAlO_4$). It is believed that beryllium and other elements from the chrysoberyl enter the sapphire to react with the elements already present in the sapphire, which causes the color enhancement.

The bulk diffusion process substitutes beryllium or other light elements for aluminum in the sapphire lattice (AlO_2) to create a trapped-hole color center, the source of the new yellow color. Adding yellow to the top layer of a pink sapphire results in a padparadscha color. Adding yellow to a colorless sapphire creates a brighter, more saturated color than that seen in a yellow sapphire naturally colored by traces of iron impurities.

Research scientists note that color centers may be even more complex, possibly working in defect clusters.

A New Diopside Called Tashmarine

Sources: Colored Stone September/October, 2002 and JCK September, 2002

A new diopside from Central Asia, in one of the ex-Soviet Union republics, was discovered last year and has been named tashmarine. The pale green diopside, without the chrome, is untreated, and the color is stable. Tashmarine can show a bluish overtone, and it can exhibit a grayish-green to slightly yellow-green tone but not the strong yellowish tones sometimes seen in peridot. Tashmarine has a Mohs hardness of between 5.5 to 6, is doubly refractive, and usually free of inclusions. The gem is available in sizes up to five carats and is marked at $20 per carat for smaller stones. It is marked at $80 to $90 per carat for sizes over 5 carats, $75 to $125 per carat for the largest ones up to 40 carats, and $150 per carat for the stones with top color.

New Amethyst Deposits from Afghanistan, Nigeria, and Brazil

Source: Colored Stone September/October, 2002

A new deposit of fine color amethyst has been unearthed from the Koh-I-Sulaman mountain range in southeastern Afghanistan. The color shows a dark purple with red undertones, but the clarity suffers somewhat from the goethite inclusions. These inclusions prove a natural origin for this Afghanistan amethyst to those concerned about synthetics. About 2,000 carats have been mined so far. Also, a new deposit of amethyst has been discovered from a secret location in Nigeria. Some of the amethyst crystals from Nigeria weigh in close to 900 grams. The new Nigerian amethyst also has goethite inclusions. Both the amethyst from Afghanistan and the Nigerian amethyst are pegmatite amethyst and contain little silver threads. In addition, a new mine in the state of Rondonia, Brazil has yielded fine quality amethyst in large sizes. The miners extracted the entire mine run before selling it, instead of introducing the material as soon as it was found. The entire production of the mine has been stored, and over 400,000 tons of amethyst sit in a warehouse waiting to be processed.

New Joint Venture for Emeralds in Brazil

Source: Colored Stone September/October, 2002

A Canadian gold mining company and a Brazilian gem company have combined their efforts to search for emeralds in the Nova Era region of Brazil. Seahawk Minerals, a Canadian gold mining company, acquired an interest in the Brazilian company Piteiras Mineracao Ltda., which holds the mineral rights to the Itabira emerald deposit. Core sampling indicated that the deposit contained a reserve of 88.4 million carats of emerald, and between 2.7 million and 4.4 million carats were likely to be gem quality. The first emerald sale was made in 2001, where $100,000 was paid for a 10-kilogram parcel. The company ran out of money, and many of the initial staff were fired. Seahawk was saved by a partnership formed with Stone World Industria e Comercio, one of Brazil's largest emerald companies.

Stone World assumed control of Piteiras emerald. However, Seahawk's scientific exploration methods blazed new trails in the region with the use of the trace element analysis technique, as used in gold prospecting and diamond mining. Seahawk's involvement marks the first time that a mine in the emerald region had been located and explored through scientific means.

Ground Penetrating Radar Hunts Gems

Source: Colored Stone September/October, 2002

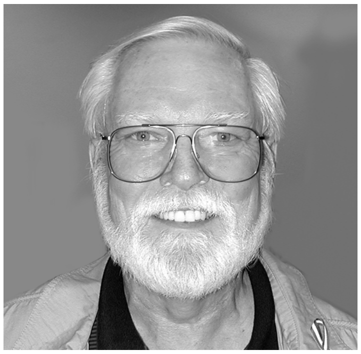
The most widely used exploration techniques in the hunt for gemstones today involve ground penetrating radar, trace element techniques, and refraction seismic methodology. Ground penetrating radar provides subsurface mapping of potential gem-bearing pockets called "vugs". This has been used successfully at the emerald mine in North Carolina. Trace elements analysis involves a systematic grid-sampling of soil, where a geochemistry survey is performed. Certain minerals will indicate the presence of other minerals and gems, as garnet and chrome diopside are indicator minerals for diamonds. Seismic surveying or "terra thumping" identifies differences in the structure of the host rock through seismic analysis. This method maps bedrock alluvial contours, like sapphire deposits.

Don’t forget: next meeting is September 12, 2002 at 7:00 pm.

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

Facet Designer's Workshop

By Ernie Hawes



In each issue of the *New Mexico Facetor,* we try to include two new designs. Sometimes, we reprint a design from another newsletter, but we are usually fortunate enough to be able to render two that have never been published. Nancy Attaway has been very helpful in achieving this goal, creating a new design several times throughout the year. This issue is no exception. Nancy has designed a very attractive pattern that she calls ***Aspen Leaf***. Experienced faceters will find this a challenging design to cut but will be pleased to have made the effort. A beautiful picture of the gem cut by Nancy appears elsewhere in the newsletter. Nancy's comments about her design follow.

"During last February's Tucson Show, I purchased a chunk of oro verde quartz (green-gold quartz). I have been wondering lately just what, besides a big round, I might cut from it. After cutting the antique kite in citrine, I thought that an angular pearshape might be yielded from the oro verde quartz. I wrestled with that concept for an afternoon, only to realize that my proposed course of action was just not happening. So, I decided to sleep on it. Dreams sometimes can be problem solvers for us, and the idea of an aspen leaf came to me during the night.

I traced the outline of a small aspen leaf on paper the next morning. A stylized shape emerged when I roughed in the aspen leaf concept in oro verde quartz. The outline really resembled an aspen leaf. However, cutting the pavilion that resulted from the leaf shape was a bit of a challenge. This is actually a semi-meetpoint design. Some of the pavilion facets meet, and some of the pavilion facets float. Also, the girdle outline may include as an option a small sliver of a facet on facet 48. Some gem materials tend to chip at the corner where it makes a sharp point, as seen in pearshapes and in triangles, squares, and emerald cuts that have no cut corners. I had to add a sliver facet at 90 degrees at facet 48 on the oro verde quartz to eliminate some chipping, but the effect of a sharp point remains. The crown uses step cuts in the design. Getting the correct configuration for the girdle outline is important. Once that is accomplished, the rest of the facets will cut in nicely.

Those of us who live in the western states look forward to seeing the aspens change color. The vivid yellow of an aspen grove can be spotted from miles away. The changing aspens can show as wide swaths of yellow on some mountains. Hiking or driving through an area where the golden-yellow aspen leaves are falling is truly a magical experience. Faceters can indeed be inspired by the shapes found in nature."

The well known designer of facet cuts for diamonds, Basil Watermeyer, developed a square cushion pattern back in the early 1980's that he called ***Split Facet Square Cushion***. The design appears on page 50 in ***Diagrams for Faceting***, ***vol. 3,*** published in 1987. I wanted to continue creating some relatively easy designs in different shapes to encourage novice cutters to facet a variety of shapes besides the round brilliant. The pavilion of this design looked like a good beginning point. I came up with a meetpoint variation that alters the outline slightly and, of course, has different angles and index settings. Rather than use Watermeyer's crown, I chose a step cut crown, both for its simplicity and to show the beginner that a mixed cut has some interesting optical properties. (Sometime, cut a stone with a SRB pavilion and a step cut crown to compare with a full SRB stone. You may be surprised with the scintillation you get from a stone cut this way.)

Cutting the pavilion is very straightforward. The girdle facets (steps one and two) should be cut to the same centerpoint. The girdle facets are then cut to an even girdle line. The mains (step three) meet steps one and two at the girdle and form a new centerpoint. The step cut facets on the crown require a little more care to meet all the way around, but good meets should be fairly easy to achieve.

Those of you who liked ***The Queen's Fancy***, published in the May/June, 2001 issue of the *New Mexico Facetor*, should check the August, 2002 issue of ***Lapidary Journal.*** They published a meetpoint version of the design that also includes a set of angles for lower refractive index materials, such as quartz or beryl.

Close-ups of Guild Members

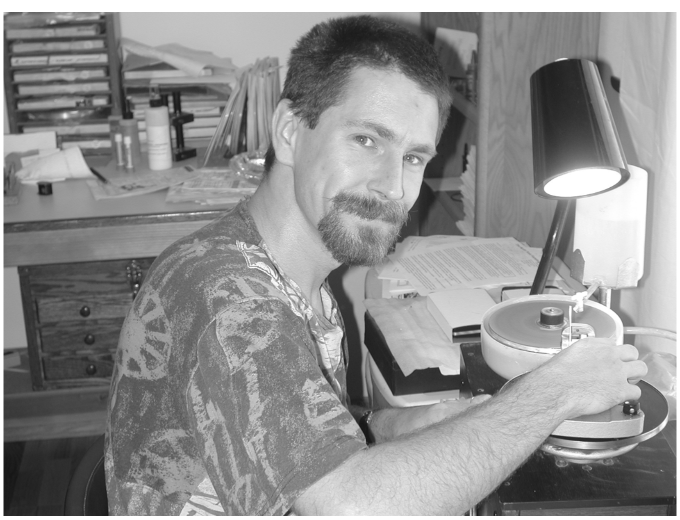
Elaine Weisman works in both gold and silver and sets faceted and cabbed gem stones in her work. Her jewelry has a modern flair. Elaine also is a noted artist who paints in watercolors.

Facetor, Phil Callow is shown here cutting a square in citrine on his Facetron at the last workshop.

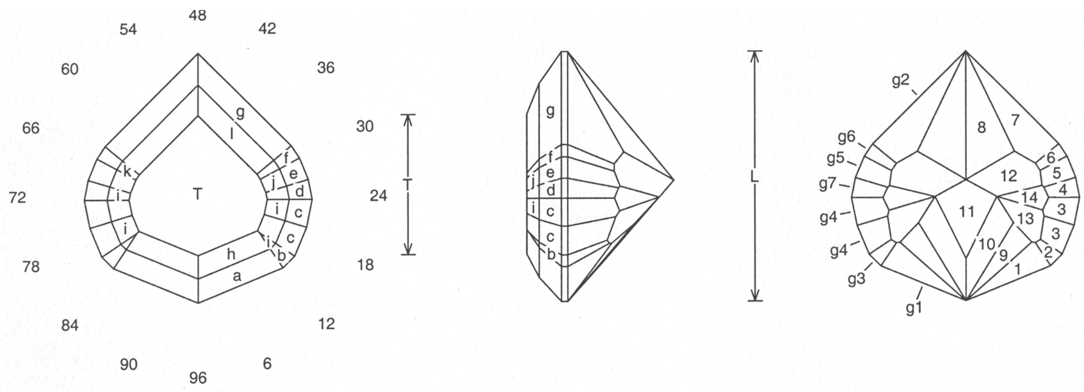
Facetor, Dylan Houtman brings many stones to the meetings, and he has created several designs for faceting. We hope to get his notes and have some of his designs put into GEMCAD.

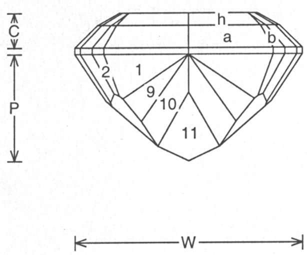
Facetor, Doug Stone cutting a stone on his Ultra Tec at the last workshop. Doug makes musical instruments and places cut stones in the designs of his instruments.

Facetor, Steve Vanya is show here smiling for the camera at the last meeting.



Facetor, Carsten Brandt is an active cutter at workshops. Here, he is cutting a stone on his Ray-tech Shaw.

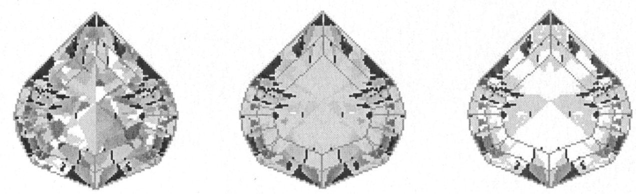




ASPEN LEAF

By Nancy Attaway

Angles for R.I. = 1.54
62 facets + 16 facets on girdle = 78
1-fold, mirror-image symmetry
96 index
L/W = 1.098 T/W = 0.615 T/L = 0.560
P/W = 0.469 C/W = 0.153
H/W = (P+C)/W+0.02 = 0.642
P/H = 0.730 C/H = 0.239
Vol./W^3 = 0.232
Brightness: COS = 65.0 %   ISO = 77.7 %

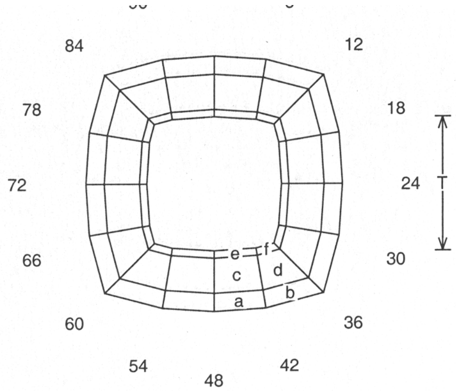


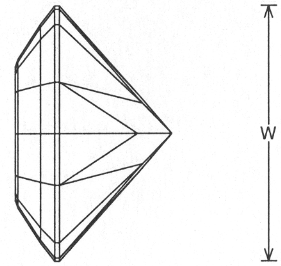
PAVILION

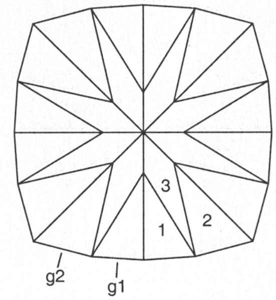
g1	90.00	06-90
g2	90.00	36-60
g3	90.00	12-84
g4	90.00	18-21-75-78
g5	90.00	30-66
g6	90.00	33-63
g7	90.00	27-69
1	57.00	06-90
2	57.00	12-84
3	57.00	18-21-75-78
4	57.00	27-69
5	57.00	30-66
6	57.00	33-63
7	57.00	36-60
8	45.00	39-57
9	45.00	03-93
10	42.00	01-95
11	41.00	96
12	42.00	33-63
13	41.00	15-81
14	41.00	24-72

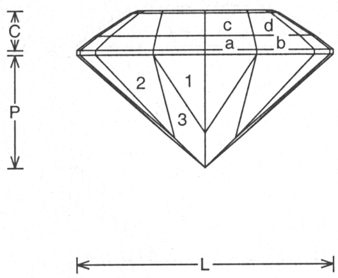
CROWN

a	45.00	06-90
b	45.00	12-84
c	45.00	18-21-75-78
d	45.00	27-69
e	45.00	30-66
f	45.00	33-63
g	45.00	36-60
h	30.00	06-90
i	30.00	12-18-21-27-69-75 -78-84
j	30.00	30-66
k	30.00	33-63
l	30.00	36-60
T	00.00	Table









EASY SQUARE CUSHION

By Ernie Hawes

Based on pavilion design by Basil Watermeyer

Angles for R.I. = 1.54

73 facets + 16 facets on girdle = 89

4-fold, mirror-image symmetry

96 index

L/W = 1.000 T/W = 0.524 T/L = 0.554

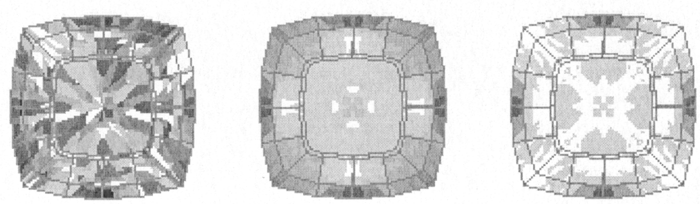
P/W = 0.442 C/W = 0.155

H/W = (P+C)/W+0.02 = 0.618

P/H = 0.716 C/H = 0.252

Vol./W^3 = 0.238

Brightness: COS = 77.1 %   ISO = 89.7 %

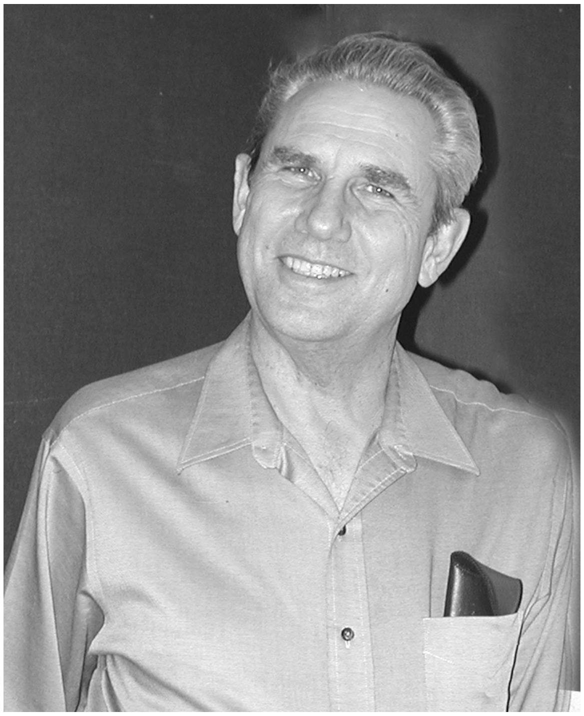


PAVILION

	41.90	01-23-25-47-49-71-73-95
	40.90	04-20-28-44-52-68-76-92
	90.00	01-23-25-47-49-71-73-95
	90.00	04-20-28-44-52-68-76-92
	41.00	02-22-26-46-50-70-74-94

CROWN

a	38.00	01-23-25-47-49-71-73-95
b	38.00	04-20-28-44-52-68-76-92
c	33.00	01-23-25-47-49-71-73-95
d	33.00	04-20-28-44-52-68-76-92
e	20.00	01-23-25-47-49-71-73-95
f	20.00	04-20-28-44-52-68-76-92
T	00.00	Table



Waylon Tracy is both a facetor and a experienced silversmith.

Facetor, Larry Plunket, seen here at the last meeting, is an accomplished cutter.

Facetor, Bill Wood is shown here finishing the polish of the crown on a large round synthetic ruby on his Facetron at the last workshop.

LET'S TALK GEMSTONES

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Phenakite Group

[A NESOSILICATE]

Phenakite

Until the early nineteenth century, certain crystals found with emerald in the mines on the Tokovaya River (east of Sverdlovsk in the Ural Mountains) were presumed to be quartz. In *The Illustrated Encyclopedia of Minerals and Rocks,* Dr. J. Kourimsky states that, during an inspection of the mines, the Russian inspector and mineral collector, Count Petrovsky, collected several specimens. A closer examination of the material revealed properties different from those of quartz, and further analysis identified beryllium silicate. An unknown mineral was discovered! Phenakite's resemblance to quartz caused the use of the Greek word meaning "deceiver" to be adopted as the name.

Phenakite is a member of the phenakite group of the nesosilicates. Phenakite develops primarily in pneumatolytic or hydrothermal environments, but the decomposition of beryl can produce it as a secondary mineral. Its short prismatic, acicular or frequently twinned, typically flat rhombohedral crystals develop in the hexagonal crystal system. Fibrous spherulites and granular forms also occur. A single direction of cleavage is indistinct. Although faceted gems seldom exceed the five-carat range, its usual pegmatitic origin does allow the development of rare, large, usually heavily included, transparent to translucent crystals. [The largest known was a 1470-carat pebble found in Sri Lanka. An eye-clean 569-carat faceted oval gem, inhabited by numerous tiny acicular inclusions, plus several smaller gems were cut from this find.] Less common environments for phenakite are mica schists and granites. The best known deposits are located in the Ural mountains, Kragero in Norway, San Miguel de Paracicaba in Brazil, Pala County in California, Lord's Hill in Maine, Colorado's Mount Antero and the Pike's Peak area, Virginia and New Hampshire in the USA, and Italy, Sri Lanka, Tanzania, Namibia, and Zimbabwe. Associated minerals include albite, amazonite, apatite, beryl, chrysoberyl, mica, quartz, fluorite, and topaz. Care must be taken not to mistake it for rock crystal, beryl, topaz, sapphire, or diamond.

Brazil is noted for its large, colorless, eye-clean, cuttable phenakite material. Extremely rare red crystals from the Urals yield unique gems rarely seen and seldom available. Though surface stains are responsible for the pink, pinkish red, brown, and yellow hues, as well as the impurities that produce colors in some crystals, phenakites are remarkably chemically pure. Inclusions of other minerals seldom occur. Numerous needle-like inclusions can produce a translucent crystal that, when properly cut, displays an attractive chatoyancy. Jaroslav Bauer and Vladimir Bouska caution in *A Guide in Color to Precious and Semi Precious Stones* that the typically delicate colors of phenakite are often light-sensitive and may fade in as little as a few months if frequently exposed to sunlight. Deep-toned phenakite gems usually exhibit strong pleochroism.

The brilliant cut displays phenakite's attractive gem attributes well. Phenakite is a bright gem, but its weak dispersion limits the fire and scintillation. However, a hardness of 7.5 - 8 and its toughness makes phenakite a durable choice for any type of jewelry for a collector of unusual gems.

TABLE 1.

	Phenakite
Composition	$Be_2[SiO_4]$ beryllium silicate
Class	silicates
Group	phenakite
Species Variety	phenakite colorless and by color
Crystal System	hexagonal (per Arem and Schumann; trigonal (per Bauer and Bouska)
Habit	crystal-rhombohedral, prismatic, acicular, granular, fibrous spherules
Cleavage Streak	imperfect; in one direction white
Fracture	conchoidal; brittle
Fracture Lustre	vitreous
Lustre Diaphaneity	vitreous transparent, translucent
Colors	colorless, brown, pink, red, yellow
Phenomena	chatoyancy
Specific Gravity Hardness	2.93 t0 3.0 7.5 to 8.0
Toughness	good
Refractive Indices	o= 1.654; e= 1.67
Birefringence Optic Character	0.016 uniaxial positive
Dispersion	0.015
Pleochroism	distinct; colorless: orange-yellow; blue: red-strong blue
Luminescence Spectrum	pale green or blue, possible light rose in UV light not diagnostic
Chelsea Filter	not applicable
Aqua Filter	not applicable
Solubility Thermal Traits	no information avoid thermal shock; infusible; [Manuel of Mineralogy: produces white enamel when fused with sodium carbonate
Treatments	none known
Inclusions	aikinite crystals, mica in material from Brazil

New Mexico Faceters Guild Website

The New Mexico Faceters Guild website may be accessed at: www.attawaygems.com/NMFG. The site contains many interesting articles written by Guild members, informative reports on our guest speakers, and gemological articles composed by Guild Gemologist, Edna Anthony. We are currently updating the archives and are putting in more photos of the work rendered by our Guild members.

E-Mail Addresses

Edna Anthony	eba@bwn.net
Bill Andrzejewski	sierragm@uswest.net
Nancy and Steve Attaway	attaway@highfiber.com
Moss Aubrey	drsaubrey@aol.com
Charles Bryant	crbryan@swcp.com
Ernie Hawes	ehawes7@comcast.net
Paul Hlava	hpf1@qwest.net
Mariani Luigi	ENVMA@IOL.IT
Will Moats	gemstone@flash.net
Merrill O. Murphy	momurphy2@juno.com
Gary and Rainy Peters	albpet@msn.com
Russ Spiering	DesignsByRKS@email.msn.com
Jim Summers:	commish1@worldnet.att.net
Bill Swantner	swantner@bscoptics.com
Herb and Maria Traulsen	htraulsen@mycidco.com
Stephen and Linda Vayna	Vayna@transatlantic.com
Elaine and Al Weisman	almgtcons@aol.com
Scott Wilson	swilson@copper.net

Alpha Taurus For Sale

As many local faceters know, I have more machines that anyone with good sense needs. I just bought a new Alpha Taurus to use as my primary machine. Although I want to keep some of the other machines to use in the Guild's workshops, I have decided to offer the two older Alpha Taurus machines for sale. Both have been carefully calibrated by me and are in good working condition. Each has a 96 index gear and comes with a basic set of laps and a standard set of dops. New Alpha Taurus machines, without laps, list in Alpha Supply's catalog for $2,250. I will take $1,100 for the older one and $1,200 for the newer one. I will even throw in some gem rough to sweeten the deal. If interested, call me, Ernie Hawes, at (505) 821-3201. My e-mail is: ehawes7@comcast.net

Advertisement

FOR SALE

Graves Mark IV

John Roberts, a former member of the New Mexico Faceters Guild has for sale a Graves Mark IV faceting machine. Ernie Hawes has examined the unit and believe it to be in very good condition. The machine comes with 96, 64, 32, 80, and 120 index gears, 65 dops with a wood holder, two 45 degree dops, a transfer block, and two notebooks full of faceting designs. No laps are included, as John will use them on another machine. John is asking $500 or best offer. For those interested, please call John at (505) 299-8209.

Obituary: Russell Annis

By Betty Annis

Russell Wayne Annis passed away July 15, 2002. Russell was born September 2, 1927 in Omaha, Nebraska. He is survived by Betty, his loving wife of 51 years; daughter Alison and her husband Keith Almquist; and daughter Jennifer and her husband Richard Marquardt. Grandchildren include Elaine, Brett, and Scott Almquist and Jason and Kristin Marquardt. All live in Albuquerque.

During his youth, Russell lived in different cities in Iowa and also in Port Author, Texas and Portland Oregon. He graduated from high school in Pasco, Washington. During WWII, Russell served in the U.S. Army at Camp Roberts, and he attended officer training at Fort Benning, Georgia. Russell received his BS, MA, and Ph.D. from the University of Kansas.

Russell taught high school English in Shawnee Mission, Kansas and later taught in the Department of Education at the University of Missouri in Kansas City, Missouri. Russell worked as a principal, counselor, and teacher for the Department of Defense in LaRochelle, France from 1963 until 1964. In 1964, the family moved to Panama, where Russell worked for the Panama Canal Company. At Canal Zone Junior College, Russell was a counselor and taught psychology. Later, he was the Branch Chief and Director of Curriculum for the Canal Zone school system. After retiring from Panama, Russell and Betty moved to Albuquerque to be close to their daughters and their families. Internment was at the Agenda Cemetery in Republic County, Kansas.

Obituary: Richard T. Liddicoat

Source: GIA Insider July 25, 2002

GIA President William E. Boyajian announced in a special issue of the GIA Insider that GIA's Chairman, Richard T. Liddicoat passed away July 24, 2002. Richard T. Liddicoat was born in 1918 and lived to be 84 years old. Until very recently, he was actively involved with GIA and the gemological community.

Richard T. Liddicoat joined GIA in 1940 after completing his M.S. in mineralogy at the University of Michigan. He assisted GIA's founder, Robert M. Shipley, in guiding the new institute as it grew into a source of education, research, gemological instrument development, and also as a laboratory service for diamonds and colored gemstones. Richard T. Liddicoat was the Editor-in-Chief of *Gems and Gemology* from 1952 until his death. Known as the "Father of Modern Gemology", Richard T. Liddicoat was revered by the jewelry industry and the gemological community for his pioneering efforts in advancing gemological education. He created GIA's diamond grading system in 1953, now accepted worldwide as the standard for grading diamonds. Through his efforts and influence on the ethical and professional standards in the international gem and jewelry industry, Richard T. Liddicoat changed how the public regards jewelers and gemologists. Gemology, once thought of as a trade, is now regarded as a profession, thanks to his contributions.

GIA's Spring, 2002 issue of *Gems and Gemology* showed a cover photograph of Richard T. Liddicoat. The Spring, 2002 issue featured a commemorative article that celebrated his 50 years of leadership. The gem species "liddicoatite" was named in his honor. Richard T. Liddicoat was considered the "ultimate gemologist".

Show and tell page

Nancy Attaway's stones

On the left is the "Antique Kite" rendered in Brazilian citrine. Below are three Nigerian tourmalines, a "Flasher Cut" (twelve sided) round blue tourmaline, a pinkish-red modified emerald cut tourmaline, and a teal-green modified emerald cut tourmaline.

Dylan Houtman's stones

The left stone is a triangular morganite. The right two stones are two danburites, an elongated Barion emerald cut and a cut corner square with vertical facets placed on the crown.

Carsten Brandts' stones

The left stone is a small pale green hexagonal tourmaline, the center stone is a pale yellow square Barion apatite, and the stone on the right is a small "Petal Cut" hessonite garnet.

Cover photo

This is the 75 dpi version. See the file Cover Photo.psd for the one to be used on the cover where the addresses used to go.