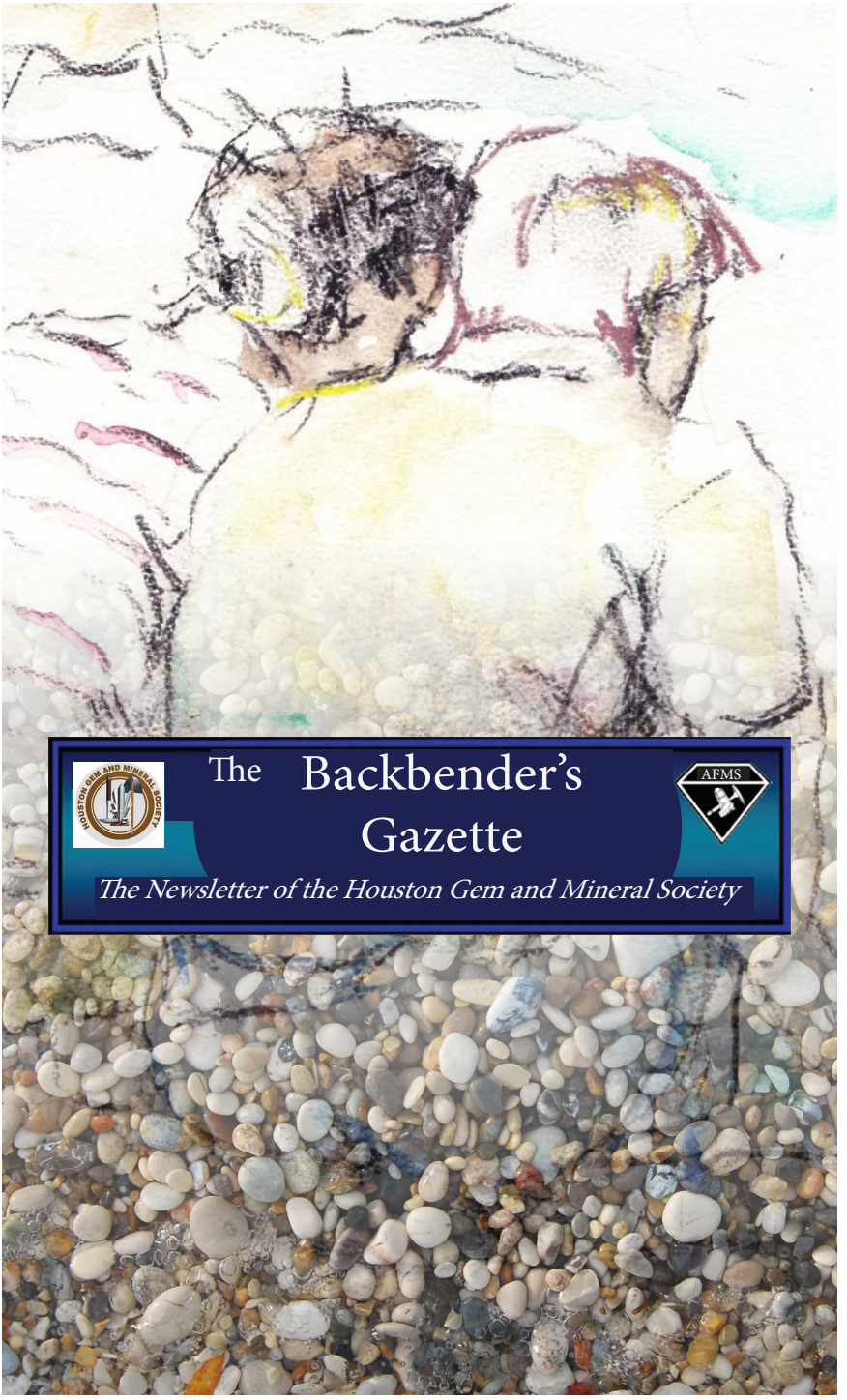

The Backbender's Gazette

The Newsletter of the Houston Gem and Mineral Society

Volume LXI March, 2020

The Backbender's Gazette

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President's Message

by Sigrid Stewart

It's a lot of fun to be a rockhound, and this is a great month for it! Why? Steve and I just returned from Tucson, the Center of the Rockhound Universe. We went to several shows, including the 66th Annual Tucson Gem & Mineral Society. This is the original the Tucson Gem & Mineral show, around which the other 45 or 50 shows staged in Tucson in January and February have grown. It was a long drive, over a thousand miles from Houston to Tucson.

Why drive, rather than fly? Steve was putting in a display case in the Tucson Gem & Miner- al Show – a case of prehnite from around the world, which will surprise no one who knows him. That meant hauling display case materials, several flats of specimens for the case and slabs to trade with friends, who were also visiting Tucson. His display was beautiful! It featured carefully chosen specimens and a backdrop created by his daughter Lauren, our web mistress. It was very well received, and he may do another case in the future.

Some of the shows were finished by the time we arrived, but we were able to attend the Westward Look Show, a Fine Mineral show run by Dave Waisman, who hosted the Fine Mineral Show at the Embassy Suites here in Houston the last few years. Whew! Lots of zeros on those prices, but absolutely wonderful specimens! The new Mineral City Show, in a custom-built facility, was excellent and had specimens for all price ranges. The Kino Show, a series of tents with a boulevard down the middle, was much rowdier and more down to earth, with materials for lapidaries and jewelers, some fossils, and other goods too numerous to list. The 22nd Street Show also had a huge variety of interesting materials and was held in 3 large tents. We didn't make any of the hotel shows, or wholesale shows this year. That's probably a good thing. At the Tucson shows, you can rapidly develop rock fever, and the infection quickly spreads to your wallet! We did find some interesting things and they will be showcased in some future Show and Tell.

And the month isn't over! As I write this, Steve is loading the vehicle to go and set up at the Clear Lake Gem & Mineral Show in Pasadena. We have to support our sister club! Our wonderful volunteers will be staffing a table at the show to promote our club and our own show coming up in November. And as always, there is chatting with other rockhounds. Show Chairman, Scott Singleton has designed a new quarter page flyer with a photo by club member Jack Opatrny, and we will all be passing those out.

After that there are plenty of new activities and classes to look forward to, back at our clubhouse.

Vice President's Message

by Mike Sommers

Upcoming is a presentation on "Iron Suflide" by Mike Sommers at the March General Meeting at the club on Tuesday March 31. Mike will present a short program about pyrite, marcasite, and pyrrhotite and discuss ways to visually distinguish pyrite from marcasite.

Contents

Purpose of HGMS

The objectives of this Society are to promote the advancement of the knowledge and practice of the arts and sciences associated with the collecting of rocks, minerals, fossils, artifacts and their identification and classification; the general lapidary art; the collecting and identification of gemstones; the designing and execution of jewelry or metal craft; and to provide the opportunity to obtain, exchange, and exhibit specimens and rough or finished materials.

Membership Rates

- Membership dues are $40 for an adult membership
- $60 for a couple, $75 for a family (including all children aged 5 - 18)
- $25 for a youth membership (ages 5-18), and
- $500 for an adult life membership.
- Advertising rates: $70 for 2 months, 1/4 page; $150 for 6 months, 1/4 page.

2020 HGMS Officers

- President ....…….....…… Sigrid Stewart .....…..…. President@HGMS.org
- First Vice President ……..... Mike Sommers ....……..…. Programs@HGMS.org
- Second Vice President ….... Beverly Mace …….... Membership@HGMS.org
- Secretary …..…….…..... Nancy English ……..…..... Secretary@HGMS.org
- Treasurer ……...….…..... Tatyana Kuhn ...…… Treasurer@HGMS.org
- Archaeology Board Member.. Nancy Engelhardt-Moore ....Archaeology@HGMS.org
- Beading Board Member ..... Maggie Manley …….....Beading@HGMS.org
- Daylight Board Member ....… Fred Brueckner
- Faceting Board Member …..... Matthew Phillips …… Faceting@HGMS.org
- Lapidary Board Member ….....Phyllis George
- Mineral Board Member ..... Steve Blyskal ……..…… Mineral@HGMS.org
- Paleo Board Member …….....Mike Dawkins ……..……. Field_trips@HGMS.org

HGMS Section Chairs

- Archaeology Section Chair …..… Bob Moore ……...Archaeology@HGMS.org
- Beading Section Chair .....… Kim Fuselier .....… Beading@HGMS.org
- Day Light Section Chair.....….…… Nancy Searle ..... Daylight@HGMS.org
- Gemstone & Faceting Section Chair. Randy Carlson ..... Faceting @ HGMS.org
- Lapidary & Silversmithing.....… Anthony Lucci ..... Lapidary@HGMS.org
- Mineral Section Chair ..... Stephen Blyskal .....… Mineral@HGMS.org
- Paleo Section Chair ..... Neal Immega ..... Paleo@HGMS.org
- Youth Section Chair ..... Beverly Mace ..... Youth@HGMS.org

All meetings are held at the Clubhouse, which is located at **10805 Brooklet near the intersection of Highway 59 (Southwest Freeway) and Sam Houston Parkway (Beltway 8)**.

See the calendar inside the back page for times when the Sections meet.
The General Meeting is the fourth Tuesday of each month (except Dec.) at 7:30.
The HGMS website address is **https://hgms.org**

Archaeology Section

by Nancy Engelhardt-Moore

February 8, 2020: The Section met on Saturday at 9:30 AM in the Grand Hall of the Houston Museum of Natural Science (HMNS) for a 1.5-hour guided tour of the Special Exhibit "Stonehenge: Ancient Mysteries and Modern Discoveries". Everyone had an entertaining time exploring the exhibit while Dr. Dirk Van Tuerenhout, tour guide and curator, reviewed the history, explained the construction, and talked about the artifacts recovered. The group also learned about ongoing research and new discoveries being made through displays and videos of the world-famous Neolithic monument included in the large-scale exhibit.

The photo (right) shows a few of the 300 actual artifacts found at Stonehenge on display in the HMNS exhibit. These beautiful handmade flint and stone items have been dated from 8000-4000 BCE. The exhibit will close March 22, so be sure to check it out!

Photo by Nancy Engelhardt-Moore

HGMS Archaeology Section Group with Dirk Van Tuerenhout (left) **Photo by Xiuju Liu**

Upcoming Archaeology Programs

March 5, 2020: On Thursday at 7:30 PM, the Section will hold a regular meeting at the HGMS Clubhouse. Our guest speaker, Christopher Kilgore will present ***The Invention of Rope and the Roots of Western Civilization***, Evidence from *Palaeolithic* Europe. Christopher will demonstrate horsehair rope making and attendees will receive a piece of handmade horsehair cordage as a souvenir. Please join us for this fun and informative program!

Upcoming Archaeology Programs Continued:

April 2, 2020: Dr. Justin Parkoff, Curator & Marine Archaeologist with the Houston Maritime Museum, will present the ***"USS Westfield Recovery and Restoration Project."*** Now complete, Justin will describe the 7-year project and how numerous components of the vessel were physically reconstructed and placed on permanent display at the Texas City Museum. Originally a ferryboat, the Westfield was purchased and converted into a gunboat by the Union Navy during the American Civil War to serve as the flagship in the Union's blockade of Confederate southern ports. The vessel last saw action in 1863 at the Battle of Galveston where it ran aground and was blown up by its crew to keep it out of Confederate hands. In 2009, the U.S. Army Corps of Engineers (USACE) orchestrated Westfield's recovery in advance of their operations to deepen the Texas City Channel. Archaeologists recovered approximately 8000 artifacts. The USACE sent these artifacts to the Conservation Research Laboratory at Texas A&M University where the artifacts underwent conservation and study. Learn the full story from Justin who designed and implemented long-term conservation and exhibit plans for several recovered maritime collections.

Westfield Explosion – Line Engraving Harper's Weekly 1863; Color enhanced by Andy Hall

A Texan's Journey Through Stone Age Texas

by David Calame

I started my journey through the Texas Stone Age past as a young boy, growing up in rural South Texas. I roamed the banks of the Francisco de la Perez Creek in Medina County, and there I came across many stone artifacts the natives had discarded thousands of years before. Later as an adult, I was fortunate enough to come in contact with Dr. Thomas Hester, then Director of the Texas Archaeological Research Laboratory at UT Austin. Dr. Hester invited me to join him in the search for Texas' Stone Age past and what a great ride it has been!

Over the years, I have learned how to record the archaeological sites that I had collected from, and to document the artifacts I found there. I also learned from Dr. Hester how to write up and publish sites, collections and special finds of others. Eventually, I learned how to scientifically excavate and document those excavations so that the findings could be analyzed later.

Early on in my journey, I realized it would be beneficial to me and to Texas archaeology if I would befriend other collectors and establish trusting relationships, so that the collectors would not be afraid to show me what they were finding. The world soon discovered Texas and Texas arrowheads through the internet and the unscientific excavating of archaeological sites across Texas began in earnest! So much was being lost, but so much was also being discovered! Before long, I was swamped with artifacts and sites to be documented and published. So, I founded an all-volunteer archaeological non-profit called Borderland Archaeology so that I could organize volunteers around potentially important sites that were endangered. We focused on Early Man in Texas and our motto became "At Borderland Archaeology we do archaeological triage!!"

Some of my more interesting discoveries are detailed below:
I excavated an Indian killed bison near Briggs, Texas that had one single flint arrowhead in the chest cavity. Those bison remains that I excavated are now mounted and on display in Marble Falls, Texas at the Falls of the Colorado Museum.

Excavating an Indian kill bison skull; Photo provided by David Calame

Another memorable excavation was a native burial site eroded by wave action on a barrier island near Port Aransas, Texas. We accessed the site by boat, which made the whole experience quite different! This individual was fully laid out on his back with his arms pulled under his back, making it appear as if his hands were bound behind his back. Carefully placed in his right elbow were two polished pebbles about the size of acorns, one green and one black, and on his upper left chest was a patch of asphaltum. I'm feel pretty sure this fella did not come to a happy end!

Another excavation was along the banks of the Nueces River in Uvalde County, where I discovered a buried surface that had been covered by 52 " of flood gravel, where folks had lived for thousands of years! The gravel protected and preserved the site so that the "horizon" was full of well-preserved charcoal. So far, one sample that was submitted, a beautiful flint spearhead, has produced a date of 7,813 years before present!

Borderland Archaeology needs your help. We are all volunteer with no government funding. Radiocarbon dates cost around 400.00 each! If you would like to donate there are two ways. You can subscribe to Borderland Archaeology Journal at www.borderlandarchaeology.com. The proceeds from the journal go to fund excavation materials and analysis such as radiocarbon dating. You can also donate through Borderlands Gofundme by visiting www.gofundme.com and searching for **Borderland Archaeology.** If you would like to volunteer you can contact David Calame off the Borderland Archaeology website at www.borderlandarchaeology.com Texas is being developed so fast and we are losing so much knowledge of our Stone Age past. We definitely need your help now!

Flint spearhead, dated 7,813 years old; Photo provided by David Calame

Gemstone and Faceting Section

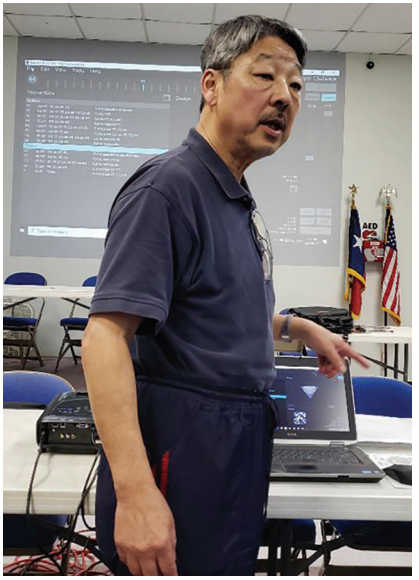
by Sharon Thomas

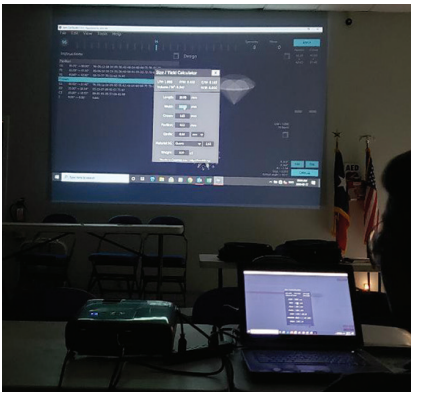
During our February meeting we were very fortunate to have John Lee, Grandmaster Faceter, explain how he uses Gemcut Studio software to cut his award winning gems. John's clarity in explanation made the program seem familiar to the audience. All the functions of the program were explored and John demonstrated to the audience just how powerful the program is, and the room available for personal creativity to design the brightest gem possible from any given material.

Below Left: John Lee; Photo by Sharon Thomas

Below Right: Gemcut Studio; Photo by Sharon Thomas

Bottom: Audience; Photo by Sharon Thomas





Faceting Class
by Pat Cockrell

The faceting class held on February 15, was months of preparation in the making. Pat designed the water tanks for all the faceting machines, made sure each machine was calibrated correctly, and repaired and replaced any missing or damaged parts.

Below Left: Water tank constructed from recycled materials
Below Right: Fine Tuning Machines and Putting Together Tool Boxes the Night Before Class
Clockwise: Pat Cockrell, Matt Phillips, John Lee and Glenn Parks; Photos by Sharon Thomas

Faceting class led by Pat Cockrell, assisted by John Lee, Matt Phillips, Glenn Parks, and Tatyana Kuhne; Photo by Matthew Phillips

Randy Carlson in Littleton, CO

by Randy Carlson

While staying temporarily in Colorado, I decided to visit the local gem club. The nearest was the Littleton Rock & Gem Club. Their Faceting and Cabbing group meet on the third Thursday of each month at a local Church. I showed up to their January meeting and was warmly welcomed by their leaders, John Kleber and John Reeves, and by their members. They had about 15 in attendance. They started out by sharing their "show and tells." I was quite surprised that everyone had something to show! Hmmmm, Houston section, can we aspire to the same? The featured stones were Jasper and Opal. Finally, one of their members did an excellent presentation on the cubic crystal system. Next month, their featured stone will be Quartz and John Kleber has agreed to have me do a presentation on gem identification, with the polariscope and the chelsea filter. I look forward to meeting with them again and hopefully, this will be the beginning of a good friendship with our brothers & sisters in rocks!

Using Epoxy to Glue Your Stones

by Randy Carlson

I am aware that some cutters like to use jeweler's wax and others use super glue, but I have never used either in 15 years and hundreds of stones, to glue my stones to the dop. I exclusively use a two-part epoxy glue. Why, you ask? First of all, it's how I was taught. Second, it works extremely well and is fast, if you know how to use it!
Also, there has been a recent development in the use of epoxy solvents, so I will update you on that. Now, let me explain my process for using epoxy to glue my stones to the dop.

Prep for the stone:

After I decide on the orientation of the stone, I will take the stone by hand and rough up the crown side surface with a 100/120/150 grit lap to ensure the glue has something to hang on to. This is especially true for stones that have a very smooth and slick surface in the rough condition. If you forget to do this, you risk that the glue connection will let go while you are cutting or polishing. I will even run the stone on the edge of the lap to put a groove on the surface of the stone (***See Photo 1***). If you've ever had a stone let go prematurely, you will appreciate this.

Photo 1: Uncut Gem with Groove Cut

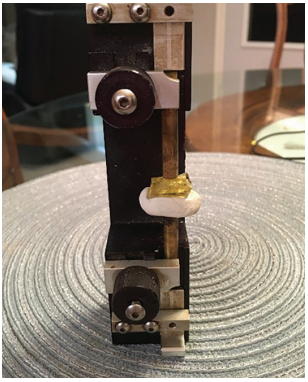


Photo 2: Dop Transfer with Clay

Initial setup:

On my transfer fixture, I put in a temporary dop to hold the stone in place, but not just the dop by itself. I put a piece of non-drying modeling clay on top of the dop to have something to temporarily hold my stone. You would think that most people know about this, but as I demonstrated this many years ago at our club, I heard several people go "Ah ha!" Even some of our experienced cutters didn't know about this. I'm not sure what they did before, but using the clay sure makes it easy. You can position the stone in any position with the clay, and get it properly aligned to accept the dop you want it glued to. I also stand the fixture on end, with the temporary dop and clay on the bottom and the dop to be glued on the top (***see Photo 2***). Start by pressing the stone into the clay so that it holds the stone in place. Place it in position on the bottom temporary dop, then push the upper dop down WITHOUT GLUE to make sure you have the stone in the proper place. Once you get it lined up properly, gently pull the upper dop up enough to have room to apply glue on the bottom of the upper dop. If you do this gently enough, gravity will hold the stone in place without moving.

Glue:

I use a 2-part gel epoxy that sets in 5 minutes. The important point is that it sets in 5 minutes and is a gel type. They also have a 5 minute epoxy that is not a gel, and it will work, but you have to wait a minute or two for it to begin to set up before you start to use it. If you don't wait you will have epoxy dripping all over everything and that is never any fun. The gel type is best! Do your best to find it. You can apply it right after you mix the two parts. In the states, I buy Devcon brand at Ace Hardware (***see Photo 3***). It works really well! Squeeze out an appropriate amount, mix it up and you are ready to go. I use a wooden toothpick on a scrap piece of paper to do the mixing.

Photo 3: Applying the glue

Once you have the stone lined up and have raised the upper dop, then mix equal amounts of your 2-part epoxy. I use a toothpick to stir the two parts together and apply the glue. I put a small amount on the bottom of the upper dop, then gently push it down to make contact with the stone, being careful to not push too hard to move it out of place, as the putty is still pliable. Then I tighten down the knob to hold the dop in place. I will next take the toothpick and add some more glue to the end of the dop and start to go around the circumference of the stone, going out to the edge of the stone and up the dop a few millimeters to make a solid connection (***see Photo 4)***. Now at this point, if you do not have the gel type glue, your epoxy may be bit runny. If so, keep turning the fixture upside down/right side up/sideways/etc. to keep the glue from running all over the stone, the dop, or the fixture. It will set up within 5 minutes and firm up. It's a bit of a challenge and another reason why you should find the gel type

epoxy if possible. Once it sets up, set it aside for 10 minutes to make sure it is good and firm. If you can let it sit even a bit longer, better. You don't want the stone to sag, or fall off.

Photo 4: Making a solid connection between the glue and the stone

Cooking your stone:

Once the glue has set, release the temporary bottom dop by pulling it gently back from the stone. Sometimes the clay will come with it, sometimes it will stick to the stone. No matter. If the clay sticks to the stone, just gently peel it away. Do not put the clay in the oven. It will melt and drip all over everything. Also, the clay is reusable. I have used the same piece for the last 15 years!

Next, pre-heat your oven to 240 F (116 C). Once you have it to temperature, put the transfer fixture with the stone in the oven and set your timer for 20 minutes. At this temperature and time, you will cure the epoxy, as if it was 24 hours. I have actually left it in much longer (by accident) to no detrimental effect. No harm occurred to the connection. Once you take it out of the oven, you can carefully take the stone and dop out of the fixture so it can cool off quicker. You should be able to handle it in about 10 minutes. If you leave it in the fixture, give it about 30 minutes to cool off. Then your stone is ready to be inserted in the quill to start cutting!

Once you have the pavilion cut, put the dop in the transfer fixture and fit the appropriately sized cone or vee dop on the other end. Mix your glue as mentioned above and with the toothpick, fill in the cone or vee dop with glue. Gently push it down onto of the stone and tighten down the dop. Again, use the toothpick to put more glue on the stone and up the shaft of the dop. Make sure you do not put glue over the girdle line. That is your reference position to cut the crown down to. Another good tip, is to take a black marker and mark the cone or vee dop so you know which dop to leave on after cooking your stone. Why do I say this? Because in my haste and not paying attention, I have removed the wrong dop. That too is no fun, because then you get to glue it all over again. Once you have the connection glued up, let it set up as mentioned above and again, cook your stone in the oven at 240F/116C for 20 minutes. When done, take it out and let it cool off.

This next step of the transfer involves using flame and heat, so take precautions to not burn yourself or your house down. I use a disposable aluminum pan to work over when using flame/heat. This time, when you pull your stone out of the fixture, you will have a dop on both ends. With a pair of scissors, cut a piece of paper towel about 1" wide by 4" long (26mm x 100mm). Wet the paper with water and wrap it around the stone and the end of the cone or vee dop. You will leave exposed the first dop that was glued to the stone (***see Photo 5***). If you forgot which end is the cone/vee dop, you should see your marker on the end you want to leave on. With an alcohol lamp, or a small gas burner (alcohol is preferred, as it will not get too hot), heat up the shaft of the original dop with the flame back away from the glue connection. You want to heat it up and let the heat gradually radiate down the shaft and hit the glue. It may take 20 – 30 seconds to get enough heat down to

the glue. Once enough heat hits the epoxy, it will release from the dop. As you are heating it, you can gently tap the heated dop on the bottom of the aluminum pan to see if it is hot enough to let go. The main concern is to not overheat, or you will compromise the new glue joint on the other dop. That is why you use the wet paper wrap on the other end; to help dissipate the heat that comes down to the stone and to the new glue joint.

If some of the glue sticks to the stone as the original dop comes off, don't worry about it. Your lap will easily cut it away. Your flat dop may also have some epoxy attached to it. Again, don't worry. We will save this for later when you remove the epoxy from the stone and cone/vee dop. You can now put the dop in your cutter and complete your cutting on the crown.

Transfer: Photo 5

Removing the cone/vee dop:

After cutting the crown, removing the cone/vee dop from the stone is a bit different. This time you will not wrap the dop with wet paper. You could wrap wet paper on the exposed stone if it is heat sensitive, but only wrap it around the stone. Take a pair of pliers, or vice grips (locking pliers) and gently grab the dop opposite from the stone end. You will need to do this to keep from burning your fingers, as you cannot hold the dop and apply heat to it from the burner. In my other hand, I hold a gem tweezer. I use this to flick the stone from the glue joint into the aluminum pan. Gradually heat the shaft of the dop while often flicking the stone with the gem tweezers to see if it will release from the epoxy. If some glue stays attached to the stone when it releases, let it cool down until you can handle it. Then with your fingernails only, try to peel off any glue that may still be stuck to the stone or dop. Sometimes it will come off, sometimes it will not.

Removing remaining glue from stone and dops using epoxy solvents:

Here is where some people had an issue with epoxy and rightly so. Many epoxy solvents in the past contained a chemical called methylene chloride. This was a toxic and nasty chemical. In May 2019, the US EPA has banned consumer products that contain methylene chloride. The solvent brand I use (Jasco) is now using a combination of dimethyl carbonate & xylene as the primary solvent ingredients. Both are much less dangerous, but be aware that it is still extremely flammable and have strong fumes. Therefore, take appropriate precautions for using this as you would any chemical. I buy the epoxy solvent at Home Depot. Understand that dimethyl carbonate and xylene are just two of the ingredients. There could be acetone or alcohols, or other ingredients in your solvent. You should always be able to go online and look at the MSDS (material safety data sheets) that are published for the chemicals, which will explain the ingredients and precautions that may be necessary in using them.

I always use the product in a well-ventilated room, with a fan blowing on me, and I wear chemical gloves and eye protection. This sounds like a lot of trouble, but you don't want this substance to get on you, or to breath in the fumes. It's not that difficult to use proper protective equipment, so don't let this stop you from using epoxy.

With my personal protective gear on and the fan blowing on me, I would put the stone and dops in a glass jar and pour in just enough of the solvent to cover the items. Then I would put the lid on and set it on my desk for approximately 12 - 24 hours, depending on how thick it is, to break down the epoxy. Once the epoxy has been in the solvent long enough, it will crumble or fall off of the stone and dops. After allowing enough time for the solvent to work on the epoxy, again using my chemical gloves, protective glasses and a fan directly on me, I would remove the items from the jar and wipe them off with a paper towel. I then take the dirty paper towels and put them in a plastic bag and dispose of them in a garbage can outside of my house. After wiping off the stone and dops, I would then wash them in a sink with soapy water, rinse and dry them off.

What I like about using epoxy is that it is strong, stays in place (doesn't shift) and I don't burn myself trying to mold and shape hot wax, or glue my fingers together with super glue. Still, be cautious and especially with smaller stones. As strong as an epoxy connection can be, it's still possible that you can put too much pressure on the connection and it can pop off the dop, which is never a good outcome. Also, always take care anytime you use an open flame and take appropriate precautions when using chemicals.

Photo 6: Clear Topaz in the "Lonestar Cut" by Randy Carlson

Lapidary and Silversmithing

by Sharon Thomas

Toni Lucci shared his extensive skills on soldering. milling, polishing, annealing and setting some beautiful lapidary pieces that he has collected over the years. This course is excellent as, Toni teaches to each individual student's level of development, with positive and patient encouragement. If you want to take his classes, you had better register early!

Students Learning to Solder Silver Earrings
Photo by: Sharon Thomas

DayLight Section

by Logan Wilcox

Tuesday was a fun day at the shop! My son, Logan brought in some California Jade and slabbed it up on the Texaco saw. He then handed out slabs to all members present, including a couple new members. It would be great to see what everyone makes of their pieces. A common question members are always asking is "where can I find rocks." We stopped by "The Fish Gallery" to check out what they had in stock as he's very into aquariums and it wasn't far from the shop. They had lots of green aventurine, jasper, and lepidolite going for $2.99 a pound. If you want to check them out, the address is **2909 Fountain View Dr. Houston, Texas 77057 Photo by Logan Wilcox**

Jewelry Tips

by Katiri

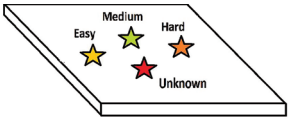
- Stamp out textures and designs ideas onto scrap leather or copper sheet for future ideas for jewelry.
- Keep your silver wire, chains and more shiny by rubbing dry baking soda on them, rinsing with some clean water and drying. I also often store a piece of chalk in with my sealed silver pieces to help pull away moisture and keep the silver from tarnishing.
- I recommend planning out your jewelry designs by drawing them, putting pieces and ideas together before creating.
- I will be offer classes at the Texas Mineral and Fossil Show on April 24-26, 2020. For more info and to sign up, go to www.RMGMPromotions.com

Brad Smith's Jewelry Tips

Identifying Unmarked Solders

by Brad Smith

There are plenty of ways to mark your sheet or wire solders, but suppose you forgot to mark them and have a couple that you can't identify. The answer is to compare the melting temperature of the unknowns with that of a known solder. What I do is take a thick scrap of copper or nickel and arrange several solders on it. Ideally, I would have a sample of easy, medium and hard known solders surrounding the unknown solder. Then I heat the plate from the bottom and watch the order in which the solders melt.



Drawing by: Brad Smith author of Bench Tips for Jewelry Making at www.amazon.com

Inexpensive Electric Wax Pen

You can make your own wax pen from a small soldering iron plugged into a light dimmer switch for heat control. Both components are easily found at a big hardware store or at Harbor Freight. As an example of the components, see items # 43060 and # 47887

File the tip of the soldering iron into the shape you prefer or even better get a soldering iron with replaceable tips. Then you can make several tip shapes for different tasks. Set the dimmer control just hot enough to melt the wax without producing any smoke.

A tip design that I find ideal for some work is a length of small gauge wire that lets me reach in around the model to melt some wax. The wire is 18ga and about 15mm long. I use Sterling wire to conduct heat easily to the tip, and I silver solder it into a hole on the end of a copper or brass rod that fits into the soldering iron.

What Are Petrified Woods Made of? Where Do They Form? How Do We Identify Them?

By: Donald Kasper, Feb-2020

Identifying petrified wood from other rocks can be difficult since seeing cell structure in specimen candidates is not always possible. Let's cover briefly what they are made of, what geologic conditions they form in, and how to identify petrified woods from other rocks. All this information as a set of approaches will help us in wood identification.
All petrified wood where the cell structure is preserved is formed in volcanic ash deposits. Erosion may move that wood somewhere else, but that is where they were originally formed. The micron-sized particles of silica glass in that ash is extremely reactive in the alkaline conditions of the ash and moved into solution right at and just after the eruption on a timeframe estimated by the author at under 1000 years, the time it takes a thick ash flow to cool or shortly thereafter. When that silica contacts acid conditions, the alkaline solution is changed to neutral acidity, and comes out of solution. Acidic rocks such as pyrite can do this, but the most common contact to neutralize the silica-alkali solution with an acid is from organic decay. Wood provides this environment as it decays under an ash flow in a wet environment. That wet system can be a depression, lake, stream, spring or saturated groundwater.

Using Microscopy, Polarizing Microscopy, & Infrared Spectroscopy to Study Minerals

The author's work encompasses using microscopy, polarizing microscopy, and infrared spectroscopy to study minerals. Infrared study may seem straightforward, but many common minerals have no agreed upon identification in infrared, or any other method of spectroscopy composition study (the other two methods are X-ray, and Raman spectroscopy). Some minerals are considered varieties of others, and not distinct in themselves. Many of the silica minerals have problems in infrared identification including quartzine, moganite, tridymite, and all the opal minerals, as well as the high temperature silica minerals such as beta-moganite, beta-cristobalite, beta-quartz, and hex-tridymite. The author has developed classification keys for several mineral groups where their identification is debated, including the silica minerals, clays, and feldspars. Here, the author uses a classification key developed over ten years in the study of silica minerals, applied here to the study of the composition of petrified woods. Some identifications correlate to published research and some are new discovery. Along the way, the author has proposed several new opal species. Two are introduced here, found in petrified woods.fungi, bacteria, and insects can decompose plants.

The first interesting outcome of petrified wood study in infrared spectroscopy is that no instance of any organic compounds from the original wood have been found, even though the instrument of choice in organic chemistry to study organic compounds is infrared spectroscopy. Klamath, OR basalt mixed with charred wood has an infrared carbon compound signature, but any specimen as silica infill of former wood, that signature is gone. Second, candidate high temperature silica minerals are found in petrified woods, while several low temperature silica minerals are not, so petrification doesn't fit into a model of low temperature weathering of silica and wood cell deposition.

Related to this, infrared spectroscopy can detect hard water scale found in rocks exposed to surface weathering water percolation, which is a mix of barite and calcite, which is not found in the petrified woods. The author finds a very large but unidentified carbon molecule/s in some silica rocks that is also found in bitumen and coal.

This is a Texas Springs, NV limb cast. Infrared study by the author proposes it is a mixture of quartz, alpha-moganite, and beta-moganite. Beta-moganite forms at a temperature of 354 C and is consistent with finding these types of specimens in volcanic rocks and this material in a volcanic pyroclastic ash flow. As a result of this correlation, the author does not propose that petrified wood forms from weathering but has mineral marker data consistently show they form at high temperatures. Those proposing they form at low temperatures don't study this mineral data and where the scientific literature is incomplete. Note, Hampton Butte, OR limb casts

Even though it is found in some agates, jaspers, and opals, for example hydrothermal mound jaspers and opals that probably had algae and grasses, this is missing from all petrified woods the author has studied to-date. The minerals found are consistent with high temperature, pyroclastic flows. One example is the Texas Springs, NV limb cast shown below. For an infrared study of such a specimen, the specimen core, outer shell (a white crust in this case), and matrix rock samples (if any are available) are scanned. Various structures and inclusions in the wood/cast will be scanned if they occur. This is all possible using reflectance infrared spectroscopy, where the specimen is not damaged or altered from scanning with the infrared laser. We can roam around specimens to study them using reflectance infrared.

Discussion of Findings

Infrared spectroscopy the author uses to study mineral composition shows that even petrified woods not found in identifiable ash any longer can retain the signature of that, through the presence of celadonite clay in ash coating a specimen, a clay only formed in volcanic rocks and not by weathering. There are many types of silica that can be deposited in the wood. One hundred percent of the original cellulose and lignin of that wood is destroyed, in that it is never found with infrared spectroscopy study of petrified woods. None is reported in the literature either, even though infrared is the main instrument to study organic compounds such as these. The only geologic condition the author identifies that is capable of this dissolution is very high temperatures above 374 C with water, and under moderate pressure. This is called in physics a supercritical fluid system, unique in geology, as it is a water-related fluid but has different properties such as no surface tension. Its presence is usually described in other terminology. "Fluid-rock interaction", "metasomatism", and "medium grade metamorphism" are all supercritical fluid systems. To such a fluid, "solid" rock is a sponge and the fluid goes right through it. Silica is many thousands of times more soluble in this fluid than it is in neutral pH (acidity) water. This fluid makes

minerals and carbon compounds highly soluble in solution and is a system documented for the dissolution of cellulose and lignin that comprise plants. At low temperatures only principally fungi, bacteria, algae (especially in water), and insects can decompose plants.

Jaspers (granular quartz with iron compounds and clays) can form at lower temperatures. These constitute some petrified woods, the author models have formed around 150 to 250 C. Eruptions can cycle with ash and basalt, also ash and rhyolite lavas, where the jaspers in the CA Mojave Desert are linked to basalt/ash strata. Apparently, the iron comes from the basalt. Silica does not intrude wood at a temperature, rather, conditions vary, so it is deposited over a range as high as (and typically at) supercritical up to about 425 C, a conclusion supported by all of the marker minerals found in these rocks. In the author's experience, the lime-green clay called celadonite that coats many agates and quartz-agate petrified woods, is formed at the supercritical transition. A silica-water supercritical system cannot occur at the surface because the water converts to steam, so must be buried and under pressure. One way to think of it is the existence of geysers. As supercritical water rises to the surface and decompresses, it flashes to steam. This is how geysers form, and with that the violence of this process does not allow large silica mineral structures to form, so the outfall silica is dominantly opal. If wood is trapped in that water, and that water has silica from ash percolation, we get opal wood instead of quartz wood.

Another Silica Species in Petrified Woods

To identify the types of silica in the wood, we first must advance our infrared study of them, which is not complete in our science. This includes a study of all the silica group minerals such as moganite, quartz, quartzine, cristobalite, tridymite, and others, as well as all the opals. The author considers quartzine distinct from moganite, while many published papers do not. The optical properties of these minerals are different in infrared spectroscopy, which allows them to be properly identified. There are more than the three opals documented in the literature that the author models in his work. One that has been particularly fascinating, the author calls opal-Q. Tied to electron microscopy study of some agates, this is a nanoparticle sized quartz-opal. The other opals are nanoparticles of cristobalite and tridymite. This is important to distinguish as our petrified woods commonly have opal-Q. Opal-Q is not a jasper, as jasper is large scale quartz grains, and graphs as quartz in infrared. The grain size of the silica changes the infrared spectral graph in identifiable ways. Opal-Q is found in relict hydrothermal mound deposits and other instances that had rapid silica deposition from solution. An example of an opal-Q petrified wood from a hydrothermal mound site is shown below. Opal-Q can comprise the tube and plume and moss structures seen in some agates. (This is not to leave the reader with the idea that they are only opal-Q as the moss and tube structures are zoned commonly with celadonite and nontronite clay cores and shells of opal-Q or other

Opal Species in General and in Petrified Wood

There are three opal species reported in our science. They are opal-A (which the author considers a tridymite opal as do a number of research papers; "A" means amorphous to X-ray spectroscopy identification), opal-CT (which, interestingly enough is another tridymite and has no cristobalite identified in infrared spectroscopy or any other means of spectroscopy study), and opal-C, a cristobalite opal. Formed at low temperature, opal-A can form from weathering. Ocean diatoms form shell fabrics (tests) of opal-A. It may surprise you to realize that the author has not found in ten years study of agates and jaspers, an opal-A in any of them, which by corollary means never in any petrified wood. One science paper reports an opal-A precious opal wood out of the Virgin Valley,

NV. This author has corresponded with the author of that paper. That other author would not loan a sample, but purchase of wood samples from the area are opal-CT. Why the difference? That author uses X-ray spectroscopy, which is almost completely blind

Photo by: Donald Kasper
A Tonopah, NV petrified wood. The brown core is literally the wood. All the rest is silicified algae mat crust. This comes from a lake margin system and is just a few tens of miles from the famous Gabbs, NV site. This was dug out of a volcanic ash flow, capped by basalt. This is all opal-Q, a nanocrystalline quartz.

to opal identification, and for that purpose is the wrong instrument to use. There is no opal-C in petrified woods, which the author only finds in volcanic geodes. For the opal petrified woods, there is just opal-CT of those three in the literature, an opal only found for continents in volcanic rocks. The opal woods are in hydrothermal systems related to ash flows, the combination of which means typically on fault systems.

Not only is opal-Q found in petrified woods, the author finds beta-cristobalite, which has two forms, a crystalline form and an opal form. The author calls the opal form opal-BC, where beta-cristobalite forms at a temperature of 198 C. Many petrified wood locales have opal-BC, but again, not the low temperature form opal-C. Key marker bands in infrared keyed to silica mineral species are different for these two opals; so most likely, poor resolution of X-ray study of those specimens would be historically confused with opal-C. Therefore, Gabbs, NV opal wood which comes from a large hydrothermal mound that is available from many dealers, is opal-BC in the author's classification. A pure beta-cristobalite glass wood from Fish Lake, Western NV is light as pumice, while opal-BC petrified woods sites include the Mt. Shasta, CA area, and Hampton Butte, OR.

Moganite and Other Minerals in Petrified Woods

Our petrified woods are comprised of opal-CT, opal-Q, opal-BC, quartz (so there are the very large crystals and structures above the nanometer size), quartzine, and moganite. Moganite is found with infrared spectroscopy, which the author has studied extensively and shared data in occasional collaboration over many years with infrared mineralogists at Caltech Univ. in Pasadena, CA. It is an optical and structural variation of quartz. For the mineral moganite, found in agates, jaspers, and petrified woods being commonly reported in our science as proof of an evaporite origin, keep in mind that the sites of high concentration moganite the author identifies with erionite (zeolite) ash flows on playa lake margins, where the common denominator is volcanic ash, and where a sodium silicate (magadiite) precursor is indicated. La Canaria Island off Morocco where high concentration moganite was discovered 40 years ago on the steep flank of a volcano, the sodium would have come from the eruption through sea water. Our agates and jaspers found in petrified woods are a low concentration (about 5%) population of moganite linked to volcanic rocks.

There are unusual woods such as the green chrome Arizona wood made with volkonskoite, a chromium bentonite clay, again where bentonite is only formed in volcanic ash flows. Then there are the black Indonesian opal sticks, that are made of the silica zeolite mineral clinoptilolite mixed with opal-CT. Here again, clinoptilolite is a silica-rich zeolite that only forms in ash flows. We see that a generic supply of quartz such as quartz sand or sandstone or shale or granite is not a source of silica for petrified wood. Calcite found in woods such as the Blue Forest, WY material, intruded from weathering after the silica was deposited, typically in splits in the wood. The calcite wood casts of the Barstow, CA region are mostly calcite with some silica. Barite is also found in this wood, so it is technically a hard water scale petrified wood. This would be our only petrified wood as a weathering candidate keeping in mind this is a carbonate-sulfate wood with trace silica and yet is still found in a volcanic ash flow.

Confusing Silicate Minerals with Petrified Woods

In terms of specimen identification, for many people the common mistake is to confuse silicate minerals (which are silica mixed with metal atoms in various structural arrangements) with petrified woods, since they also look glassy. The type of source rocks you are digging in will identify the likely silicate minerals. In granite systems, you can get epidote or a feldspar, but you cannot get a petrified wood. Keokuk, Iowa and South Dakota agates in cherty marine rocks still retain their celadonite signature in infrared, telling us the source ash that made them. For much of the Midwest, early volcanic systems are buried under sediments of major rivers. A huge Mississippi volcano covers the north part of the state, and central Kentucky is a huge relict volcano. Southwest Texas volcanics and the Yellowstone, WY, Mono Lake, CA, Crater Lake, OR, Newberry, OR, and Timberlake, NV supervolcanoes all contributed heavy ash events downwind to the east as far as the Mississippi River.

If the cell structure infill remains of the wood, a 10x loop lens will confirm it. Different types of woods and different cut directions of those woods show different cell types and shapes, respectively. The problem in identification occurs mainly when the cell structure is badly decomposed or not present. The Texas Springs, NV pink chalcedony casts (probably all roots) scan in infrared as the high temperature form of moganite (beta-moganite) with quartz. That moganite forms at 354 C. To be clear, that is based on the author's unpublished infrared work and collaboration with Caltech Univ.; regardless, it is a moganite-quartz where the candidate beta-moganite is linked to high temperature volcanic rocks.

Very commonly, a striated, laminar structured silica rock is confused with woods (see rhyolite and pumice examples below). Schists, which are metamorphic rocks with laminar layers of granular quartz and mica, are a typical misidentification. If you are on a major fault system such as the San Andreas of California and find these rocks, you are not in a petrified wood rock source. Where the author lives in the Southern California Mojave Desert, fine grained, laminar rhyolite volcanic lavas are commonly confused with petrified wood. The author remembers the time he debated with a rock shop owner in Utah that an oblong obsidian glass specimen that had caught up stones to look like tree knots with striations of streaming sand down the sides of the volcanic glass was not a petrified log. The author's study of the fine white striations in the Salton Sea, CA site obsidian are actually cristobalite silica mixed into and extruded along the rhyolite obsidian.

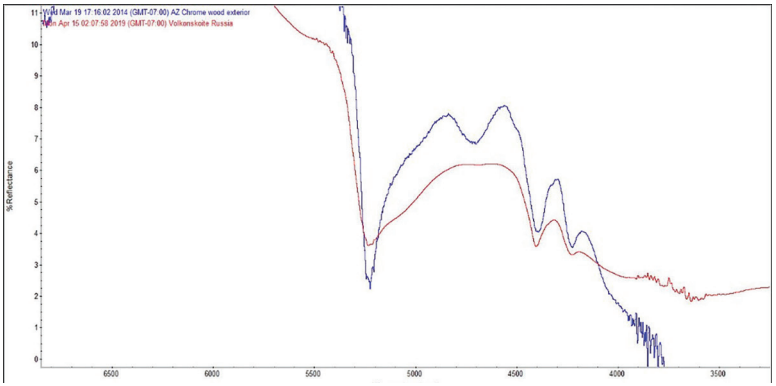
Photo by: Donald Kasper The author's most infamous personal cases of a finely striated and tubular rhyolite from a wood area west of the town of Mojave, CA (left image), and a piece of weathered pumice being sold as petrified wood at a gem show. A 10x loupe lens on the pumice shows the glassy grains distinctly.

Understand the Source Rocks Where You Are Collecting

The specimen itself does not always give us all the information we need to identify it as a wood, if the cell structure is missing. In some specimens, the wood was torn to pieces, and only patches of cell structure remain. We need to know the source rocks, and so the author encourages everyone to learn to collect for themselves to make these observations. Some wood sites the author has collected as an example are covered in cyanobacteria mats (see the previous picture example of Tonopah, NV wood). This is the slime that was coating wood in lakes before the site was engulfed in a pyroclastic flow. They will form short, arcuate stacked, discontinuous layers around wood cores. Some of these wood casts are a mix of calcite, barite, and quartz, where the barite represents hard water scale intrusion. The woods can be subject to very complex processes captured in petrification. An ancient Sweet Home, OR wood jam on a relict Oregon beach, now inland from uplifting, was intruded by radiolarians. These are the food chain bottom along with diatoms that marine crustaceans eat. As an ash flow engulfed this marine setting, the sea water formed dolomite around the radiolarians that are themselves intruded into the rotted wood. This dolomite nucleated on the radiolarians as their decay caused a microscopic acid system in the alkaline ash, depositing the dolomite. Dolomite is calcium-magnesium carbonate where the magnesium is commonly from sea water. It cannot form at the surface exposed to air, requiring anaerobic (oxygen-deficient) conditions to form. We get cubes, rhombs, and corner cropped rhombs all throughout this site wood, from this site, and for some reason people have been calling this halite (salt crystal) wood ever since and confusing the radiolarian cores (which are round) with salt hopper structures. From an infrared standpoint, quartz and the kaolinite group clay called halloysite are found. The dolomite rhombs are replaced with quartz. The author can detect halite (salt) residue in marine rocks with infrared spectroscopy, and yet this is not found in this site petrified wood. The halloysite is an alteration product of volcanic ash in wet conditions, typical in volcanic soils. Marine settings of woods occur, and the wood structures mix with marine things. The acid system linked to decay of those marine organisms in some systems also deposit pyrite and iron compounds in those organisms as bacteria consumed them.

Infrared Case Study

With infrared spectroscopy, we generally study minerals in mid-infrared (4000-400 cm-1 wavenumber range). Infrared spectroscopy is affordable but has a number of effects that prior to the author's work were not understood, so it has found limited use in mineralogy historically. In this example the author moved up to scan in near-infrared (scanning at higher wavenumbers up to 10,000 cm-1) and studied water in an Arizona chrome jasper. Infrared is the spectroscopy of choice for studying mineral water with no equal. The 4300 cm-1 region the author has found that the band locations are linked to the refractive index of the clay group of minerals, and so we can read their spectral location to discern what clay or clay mixture is present. The graph is unique for volkonskoite, a chromium-rich bentonite clay. The reference sample comparison comes from the type locality it is defined from, in Oblast, Russia. Knowing what the specimen composition is (quartz with volkonskoite), the author traces back to the appearance or look of the specimens studied to see if they can be identified by hand specimen study, a light green wood tint in this case



The doublet troughs on the right side of this spectral graph compares AZ chrome wood shell (red spectrum) to a Russian volkonskoite type locality reference (blue spectrum). Correlations to literature papers with spectra are also used to identify unknowns. The correlation of the 4300 cm-1 region bands to refractive index is based on the author's discovery in infrared to explain its behaviors that have confused scientists since early use in mineralogy. The shapes and spectral location of these water bands tell us what type of water we have in the mineral. The sharp band trough in the center is free water, meaning it is in void spaces in the minerals and not part of the bound crystal structure. The right doublet is crystallographically bound water, which is why it can be keyed to the clay mineral refractive index.

Conclusions

Petrified wood forms in wet conditions where volcanic ash pyroclastic flows knocked down the forest or engulfed it and dumped all of it into water or waterlogged terrain. Not any ash will do; it most certainly must be a high silica content rhyolite ash. All evidence of the silica minerals found shows that petrified wood formed at high temperatures (meaning, above surface air temperature conditions, and so not from weathering). The author models that agates and petrified woods form at high temperatures that are linked to volcanic rocks as lavas and ash outfalls.

Ash occurrences of outfalls dumped on sedimentary rocks does not make them sedimentary in origin, as volcanic clay signatures of celadonite, bentonite, and kaolinite remain. This means we hunt specific source rocks for petrified wood occurrences that are not anywhere as a matter of random luck. Only in major river systems and deposits will you find the woods moved out as they travelled from their source sites.

Temperature and other conditions dictate the type of silica from the ash that is formed and moved into the wood. Typical granular quartz nanoparticles (opal-Q), and opal-BC are deposited in the cell structures, along with quartz comprised of larger particles. The cellulose cores of cells appear to disintegrate first allowing silica infiltration. From an infrared study standpoint, no plant organic compounds have been seen in a petrified wood. The specimens themselves and their source rock origin helps us to identify them from other silica specimens and the silicate minerals. The most common source of misidentification is the quartz looking (glassy) silicate minerals, the striated metamorphic rocks, and laminar volcanic rocks.

The only candidate for wood infiltration by weathering is a mineral switch to dominant calcite deposition. This is due to the high surface and groundwater solubility of carbonates such as calcite, and very low solubility of quartz.

References

The author did compile a list of rocks he found over the years that he thought could be wood and studied them with infrared spectroscopy and microscopy to validate what they are. He photographed them and put them in a book with an infrared study of major wood mineral types. This can help you distinguish wood from non-wood specimens. You may find it interesting in your pursuit of petrified wood collecting. It is:

A Student's Guide to Identifying Petrified Wood and Related Fossil Structures, by Donald Kasper, ISBN: 978-0-9863674-2-7, on Amazon.com, 40 pages, full color, spiral bound.

Editor's note: It is with extreme gratitude that I accept from Donald Kasper this article written specifically for the Backbender's Gazette.

Show Time Calendar 2020

March 7 - 8 Robstown TX	Gulf Coast Gem and Mineral Society RMB Fairgrounds, 1213 Terry Shamsie Blvd, Exhibit Hall A gulfcoastgemandmineralsociety@gmail.com gcgms.org
March 14 - 15 San Antonio, TX	Southwest Gem and Mineral Society San Antonio Event Center 8111 Meadowleaf Drive lolabellelamb@yahoo.com https://www.facebook.com/bigspringprospectorsclubkrbotx@gvtc.com swgms.org
April 11 - 12 Abilene, TX	Central Texas Gem and Mineral Society Abilene Convention Center, 1100 North 6th Street and Pine linewalk26@yahoo.com; https://www.newcalichetimes.com/page13.html
May 30 - 31 Lubbock, TX	Lubbock Gem and Mineral Society Lubbock Memorial Civic Center, 1501 Mac Davis Lane walt@lubbockgemandmineral.org; www.lubbockgemandmineral.org
June 25 - 28 Lodi, CA	CFMS putting on its own show Lodi Grapevine Festival Grounds, 413 E. Lockeford St.
October 12 - 13 Temple, TX	SCFMS hosted by Tri-City Gem and Mineral Society Mayborn Civic and Convention Center, 3303 N. 3rd St David Farhie 512-826-2754, dfarhie@gmail.com;

March 2020

SU	MO	TU	WE	TH	FR	SA
1 10 – 4 Shop Open	**2**	**3** 11 – 3 Shop Open **7:30 Board Meeting**	**4** 10 – 3 Shop Open **1 – 3 Daylight Section**	**5** 10 – 3 Shop Open **7:30 Archaeology Section**	**6**	**7** 10 – 3 Shop Open **10 – 12 Youth Section**
8 10 – 4 Shop Open	**9**	**10** 11 – 3 Shop Open	**11** 10 – 3 Shop Open **6:30 Gemstone & Faceting Section**	**12** 10 – 3 Shop Open	**13**	**14** 10-3 Shop Open
15 10 – 4 Shop Open	**16** **7:30 Lapidary & Silversmithing Section**	**17** 11 – 3 Shop Open **7:30 Paleo Section**	**18** 10 – 3 Shop Open **7:30Mineral Section**	**19** 10 – 3 Shop Open	**20**	**21** 10 – 3 Shop Open **1:30 – 3 Beading Section** **10 – 12 Youth Section**
22 10 – 4 Shop Open	**23**	**24** 11 – 3 Shop Open **7:30 General Meeting**	**25** 10 – 3 Shop Open	**26** 10 – 3 Shop Open	**27**	**28** 10 – 3 Shop Open
29 10 – 4 Shop Open	**30**	**31** 11 – 3 Shop Open	**26** 10 – 3 Shop Open	**27** 10 – 3 Shop Open	**28**	**29** 10 – 3 Shop Open

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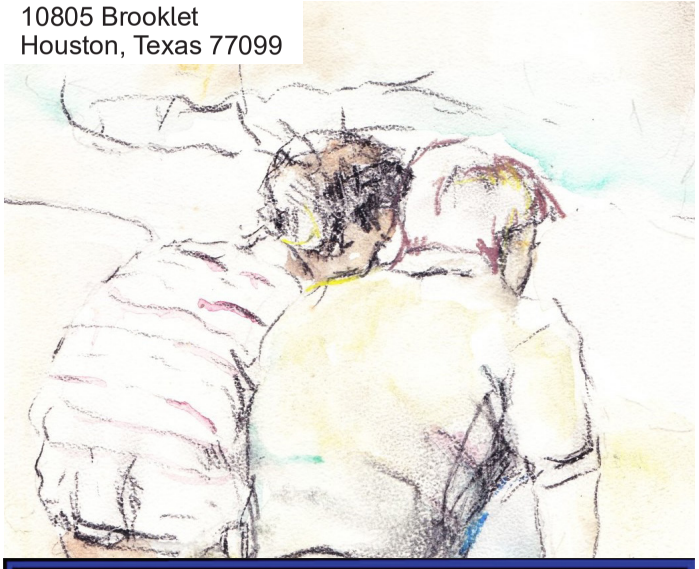

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