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Contents

Cover photo courtesy and copyright of Erin Delventhal of the San Juan County Gem and Mineral Society. "Mineralized breccia, Cooke's Peak District, Luna County, New Mexico".

From the Editor

Thank you to Steven Veatch and Mike Nelson for their solid commitment to keeping us supplied with content.

Please submit your contributions for the next issue by **December 10th** to rmfmseditor@gmail.com.

Heather Woods, PG

Affiliations

The Rocky Mountain Federation of Mineralogical Societies (RMFMS) is a member of the American Federation of Mineralogical Societies (AFMS).

Letter from the President – November 2018

By Liz Thomas, RMFMS President

November 1, 2018 starts my final year to be your president. I have so enjoyed doing this job. There is a lot do this coming year.

I do hope I get to see a lot of you at our AFMS conference in Cedar Rapids, Iowa, March 21 through the 24th. All the information is on the amfed.org website. Then the RMFMS conference and show will be in Prescott, Arizona, August 2nd to 4th.

The show and conference in Prescott will be a lot of fun. They are very excited to be hosting this and have a lot of exciting things for us to do in the way of field trips. Their show is very large. They usually have over 70 venders. We will get this on our website as soon as all information comes available.

I was so happy and pleased with our executive board and delegates this last conference. They approved the conference in Big Piney, Wyoming in 2020 and the shared conference with the American Federation in Sandy, Utah. I am so elated that we have clubs wanting to host these shows and conference. It sure makes the presidents job easier when we have this planned out so far in advance.

We have a new list of committee people for this coming year. Please look at who they are. There are a few that still need to be filled. If you know of anyone in the clubs that would like to fill these positions, please let me know. The biggest one is the Webmaster. I am really needing this filled now. If you know of anyone in any of the clubs that can do this job for us, please let me know asap. There are things that need to be put on there now.

At the end of the month will be Thanksgiving. The time to be thankful for all our blessing we have been given. But this should not be the only time we give thanks. I am so thankful for everyone that helps me with my job within the federation. If I did not have these people, I am not so sure I could do this job. I am thankful for my local club. It is a growing club and with all the new faces coming in it means we have new voices in our club with new ideas and new prospective to make it even better. Our junior rock hounds grow in number all the time. It is a joy to see them learn and get excited over rocks. I am blessed to have friends within and out of the rock clubs. They bring me such happiness daily. Close friends I can talk to, cry on their shoulder and tell my troubles to but also share my adventures with. I am blessed to have family that supports me in everything I do. They show me love every minute of the day. I am blessed, and I pray that you too are blessed.

Liz Thomas

RMFMS President

RMFMS Treasurer Article – October 2018

By Gene Maggard, RMFMS Treasurer

TREASURER UPDATES – If you were the treasurer for your organization but are no longer, could you please forward this newsletter to the new treasurer and ask them to contact me with updated treasurer contact information?

DUES DUES DUES

Yes, it is that time, again. Dues from each club/society are due by December 15. December 15 is the magic date because we need to get your club report that accompanies the dues payment by that date in order to include your club information in the RMFMS 20/18-19 Directory. If you are having officer elections in Jan., as some clubs do, please call or email me and we will see what we can do to get your new officer information into the directory.

Dues notices and forms will be sent to each club by email in mid-October where there is an email address available. Notices to other clubs will be by US mail. If you receive the dues notice but are no longer the treasurer or other officer, please forward it to your treasurer as requested in the notice. As explained on the form, we are requesting that you send in the annual reports using email and Word if possible. Otherwise, use USPS. Just follow the directions on the form.

If your club does not receive the dues notice either by email or USPS, please contact me ASAP at 316-742-3746 or gandpmaggard@gmail.com so that we can arrange to get your club information to me by the December 15 deadline. You can also access the dues form on the RMF website.

Dues from each club are determined by multiplying $1.50 times each dues paying member age 12 or older in your club as of October 31, 2018. Clubs having family memberships should count each family member age 12 or older.

Clubs wishing to be covered by the RMFMS arranged liability insurance should include payment as directed on the report form. This insurance is for club general liability coverage. Show, meeting place and field trip activities are covered. If you have a landlord that is wanting an "Additional Insured certificate," one can be provided at no additional charge. Email me to get a copy of the Additional Insured certificate request form.

Please feel free to contact me at the above addresses if you have any questions.

Gene Maggard
Treasurer

RMFMS Treasurer Article – November 2018

By Gene Maggard, RMFMS Treasurer

Annual report, dues and insurance notices were sent to all clubs by email on October 15. If your club did not receive theirs, please let me know and I will resend the notice to you.

Fiscal year 2017-18 end of year preliminary financials have been calculated. Income exceeded expenses by about $3,800. Primary reasons for being increased dues collections due to increased earnings on savings due to higher than expected interest rates, no state directors submitting expenses for travel to visit other clubs, and somewhat less expense than budgeted in other budget catagories.

Total membership was stable for the year, with ending membership in 2017 being 10,577 members and ending membership in 2018 being 10,706 members.

Anyone that would like to see the financial spreadsheet, let me know and I will email you a copy.

Gene Maggard
Treasurer

Having Fun

By Jim Brace-Thompson, AFMS Junior Program Chair

Join the Patricia Egolf Rock Pals Program to Have Fun Exchanging Rocks!

Before our Internet and Facebook era—way, way back when folks like I were mere youngsters—we had this thing called “mail” (minus the “e”). This thing involved pencils or pens and paper and stamps and envelopes that you licked. In that distant time, kids may have partnered with kids from schools in countries far-and-wide to become Pen Pals. Such letter-exchange programs enabled you to reach beyond your day-to-day experience to fly via letters to distant and exotic lands to broaden your horizons as you waited for weeks on end for a response to a letter you mailed in an honest-to-goodness mailbox. The cool stamps on the envelopes were as fun to receive and collect as the message inside! In 2011, Patricia Egolf of the Gem & Mineral Society of Syracuse, New York, suggested a new spin on this for junior rockhounds, namely, a “Rock Pals” program in conjunction with our AFMS Future Rockhounds of America program.

Kids love the different rocks and fossils to be found across our great nation, but they and their parents can’t necessarily afford to buy them nor to travel widely to collect them. How wonderful it would be, Patricia thought, for juniors in a club to band together to collect local samples to trade with juniors in other clubs across the country. With that goal in mind, Pat helped us establish Rock Pals. A club gathers 20-25 or so local specimens in sizes small enough to fit in a medium-size flat-rate box available at the U.S. Post Office and, after making arrangements with another club, each mails a box to the other with samples and labels for what’s inside. This, amazingly enough, is simply not to be accomplished via emails or text-messages!

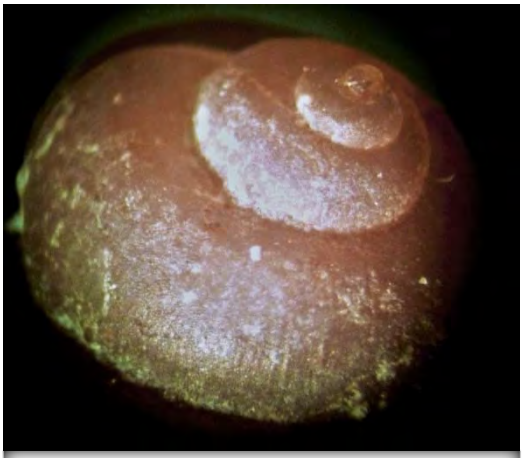
Sadly, Pat passed away all-too-soon in 2012. To honor her memory and spirit, we re-named this effort the "Patricia Egolf Rock Pals Program." Participating clubs and contact persons are listed on the Kids Corner section of the AFMS website, http://amfed.org/fra/rock_pals.htm. To start a trade, email or call a local contact to make sure the club is still actively involved and to see how many kids are in that club and to make suitable arrangements for a rock swap.

In recent years this program has fallen into disuse. After receiving several queries about it, in the summer of 2018 I contacted all clubs affiliated with the AFMS/FRA Badge Program to see which might be interested in continuing our exchange program. I received 30 positive responses which I am using to update our listing on the AFMS website in hopes of refreshing, revitalizing, and renewing this program. AFMS/FRA-affiliated clubs interested in being added to (or removed from) our list should contact the AFMS Juniors Program Chair, Jim Brace-Thompson, jbraceth@roadrunner.com, (805) 659-3577. The renewed list of participating clubs should appear any time now on the AFMS website. Meanwhile, here's to honoring and maintaining Pat's vision of kids all across America trading rocks while having fun!

The Jurassic Snail

By Steven Wade Veatch

The sunrise greets
a winding stream
as rushing sands bury
a Jurassic snail
in a primeval pool.
The start of a fossil,
It lasts to tell its tale.



This Jurassic snail is assigned to the species *Valvata scabrida* and lived in a freshwater pond or lake about 165 million years ago. Microphotograph by S.W.Veatch.

Duria Antiquior: A Nineteenth-Century Forerunner of Paleoart

By Steven Wade Veatch, Colorado Springs Mineralogical Society

In a breath of inspiration in 1830, English geologist Henry De la Beche (1796–1855), while exploring new intellectual territories in the emerging fields of paleontology, painted *Duria Antiquior* (meaning "a more ancient Dorset"), a representation of a prehistoric Dorset coast. De la Beche's work was groundbreaking—his artwork combined science and art in the first artistic rendering of a paleontological scene, while laying bare the secrets of the past. Before 1830, art depicting the prehistoric world did not exist and these realms were unknown to the public (Porter, n.d.). While it is true that scientists made drawings of fossil animals and exchanged them with each other in private letters, the public had no concept of how prehistoric animals looked. This painting opened people's imagination to new visions, thoughts, and beliefs.

Fig. 1. *Duria Antiquior*. A watercolor painted in 1830 by Henry De la Beche who conjured up a vivid picture of an ancient world. *Duria Antiquior* is now in the National Museum of Wales. (Image is public domain).

De la Beche's painting also laid the foundation for a new genre that would later be known as *paleoart*, an artistic genre that reconstructs prehistoric life according to the fossil record, scientific understanding, and artistic imagination. De la Bache's brushstrokes of prehistoric time included (literally) all the information known at that time about ancient life and soon became the first teaching graphic used in the classrooms of the Golden Age of Geology, a period from 1788 to 1840 (Clary R. M., 2003). Today, this graphic would be equivalent to a PowerPoint slide in a classroom.

De la Beche's *Duria Antiquior* brings the viewer face-to-face with creatures that once lived in a coastal sea where these animals fought a deadly battle for survival, a typical theme of nature in the Regency era (McGowan, 2001). The scene is remarkable: a toothy ichthyosaur bites into the long neck of a plesiosaur, while another plesiosaur tries to grab a crocodile on the shore (De la Beche's ichthyosaur is minus the triangular dorsal fin and vertical tail fin that, from later fossils found in Germany, we now know it had). A turtle quietly dives into the water. What would become coprolites (fossil excrement) drop from a terrified plesiosaur (Davis, 2012). Other creatures patrol the deep waters for food, while two pterosaurs dive toward each other in the sky. Belemnites appear like squids. Hollow ammonite shells rest on the bottom of the sea and crinoids (sea lilies) are portrayed in the lower right corner. Groves of palm trees grow on the shore. All of this is rendered through the painter's use of a restrained palette of browns, greens, and blues.

Another striking feature of the painting is how it is divided. The waterline reveals the action above and below the water's surface (Rudwick, 1992). The *Duria Antiquior* is the first example of what is known as the aquarium view that would become a Victorian trend several years later (Clary & Wandersee, 2005). The area above the waterline is further divided into two areas of activity—action on the land and in the sky. De la Beche wanted the viewer to be convinced of his portrayal of a prehistoric scene.

Fig. 2. Portrait of Mary Anning with her dog, Tray. This painting was owned by her brother, Joseph, and given to the Natural History Museum, London in 1935 by Mary's great-great niece, Miss Annette Anning. (Image is public domain).

De La Beche based the *Duria Antiquior* on fossils found by Victorian fossil collector, Mary Anning (1799-1847), along the Dorset coast near the resort town of Lyme Regis (Brewster, 2016). Anning was from a poor family, who frequently found themselves on the far side of desperate. To ease these brutal financial circumstances, the family earned money by collecting and selling fossils. As a child, her father would take Mary Anning and her brother, Joseph, fossil hunting by the fossil-rich cliffs near Lyme Regis. They returned home with fossils and, with superior skill, cleaned and prepared them, and then sold them to tourists as curios. Anning, aged 11, continued the family business after her father died of tuberculosis and heavily in debt.

By 1830, Anning was a celebrity among the leading constellation of British geologists for her knowledge and skill in collecting and preparing fossils (Cadbury, 2000). Anning is credited with finding the first ichthyosaur skeleton to be recognized and the first two

plesiosaur skeletons ever found. Her discovery of these marine reptiles had created a sensation in the scientific community (McGowan, 2001).

Anning frequently found herself in financial straits due to harsh economic times in Britain, and from the unpredictability of finding and selling fossils. Being strapped for money restricted her ability to find fossils. De la Beche wanted to keep her in the field hunting fossils. To that end, he arranged to have prints of *Duria Antiquior* made and then sold the copies for £2 10s (approximately £213 or $279 today) each (Rudwick, 1992). De la Beche gave the profits—with great enthusiasm—to Anning, so she had more time to hunt for fossils and seashells along the seashore. The painting was a smashing success and, to meet the enormous demand for the prints, the *Duria Antiquior* was reprinted and redrawn several times.

The *Duria Antiquior* pushed the boundaries of science and art at the end of the Regency period in Britain. This avant-garde watercolor became the first scene of prehistoric animals interacting with each other in their ancient environment, all based on known science at the time. This was the earliest such art to be widely distributed and helped shape the understanding of prehistoric life on Earth.

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Pollucite, Cesium and the Bunsen Burner

By Mike Nelson, Colorado Springs Mineralogical Society, csrockguy@yahoo.com

Many times, while doing some research on specific minerals and their localities, I stumble across some little serendipitous facts. So, it was for this offering. There are not many minerals in this world that contain significant cesium (Cs) as the cation (positive charge) ---pollucite [(**Cs**,Na)$_2$(Al$_2$Si$_4$O$_{12}$)-2H$_2$O] is the major and best known example. I knew that little tidbit but not much else about this relatively unknown element except cesium is used in oil well drilling muds, atomic clocks and a one radioisotope is important in the treatment of some cancers.

But wait, there is a whole lot more that makes an ole guy like me smile. I suppose many readers of this newsletter remember something about their high school or college chemistry course. Maybe not much, but a little. In fact, if I said what is the first thing that pops into your head when someone shouts out "chemistry class"—what would it be? I took a quick survey of 10 people and 5 said something like "bad grades, tough class, etc.", 1 said "blowing up sodium" but 4 agreed with me and said, "Bunsen burner." Yep, those little gas burners that are sitting on chem tables in virtually every lab in the country (Fig. 1). A small rubber hose connected the burner with a natural gas outlet and a striker was used to light the apparatus although paper matches also worked. All sorts of goodies were heated up in the lab by using those ubiquitous burners (some of the heatees were not listed in the lab book!). If you were like me, I never gave a thought as to the burner's origin. For all I knew they bred and hatched in the storeroom only to be brought out in the open at the beginning of each semester—"Nelson you have burner #24, don't break it."

Figure 1. A "modern Bunsen burner, gas intake on the left, needle valve on the right, and air regulation around base. Public domain photo.

When I escaped chemistry (thank God since I was not going to cut it as a chemist) I moved into geology and those nifty little burners were checked out for mineralogy class. Just remember that back in the early 1960s students did not have access to lots of electronic gizmos and we used fairly straightforward tests to try and identify unknown minerals. One of these simple tests (although the reasoning behind the test is quite complex) was called a *flame test.* So, we had these metal doohickeys that sort of looked like a plastic tooth flosser except the wire was some type of a nickel-chrome alloy (platinum could be used but was more expensive). We ground up the unknown mineral in a clean mortar/pestle, dipped the wire in hydrochloric acid, burned off any crud by holding it in the flame of a Bunsen burner, dipped it in acid again and then into the ground up mineral and then into the fire. Certain elements imparted a color to the flame. I don't remember much except that sodium was an orange color, potassium was pink, and copper was blue-green. But, no questions were ever asked about the origin of Bunsen burners!

Well, now that you might be interested, the University of Heidelberg, in 1851, hired one chemist by the name of Robert Bunsen. Bunsen did not like the current burners in use since they produced much soot and lots of light; burners needed low lumens (brightness) so that colors could be seen in the flame test. So, Bunsen had an idea and took his plans over to a mechanic (Peter Desaga) working for the University—a really good move. Together they "invented" the Bunsen/Desaga burner that had, among other things, adjustments for regulating air intake before combustion. Somehow Desaga's name was dropped over the years and the Bunsen burner was born---but in a mechanic's shop and not the storeroom.

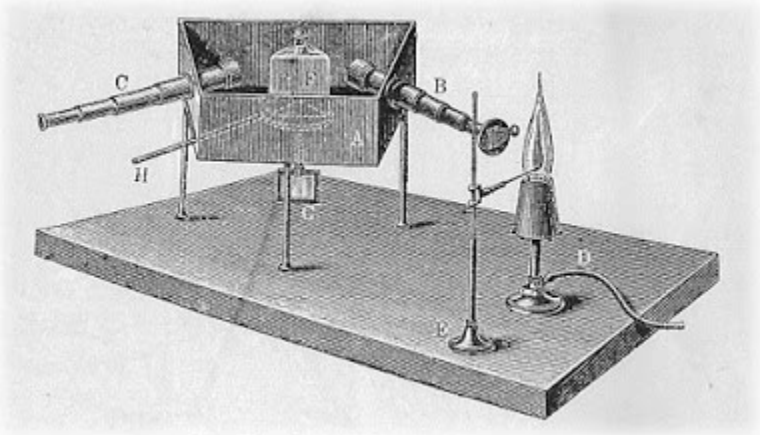

Figure 2. The early spectroscope of Gustav Kirchhoff. Note flame to right, prism in the center and eyepiece on the left. Public domain photo.

Earlier in his career, Bunsen had met a physicist by the name of Gustav Kirchhoff when both were working at the University of Breslau. After taking the professorship at Heidelberg in 1852, Bunsen soon secured a position for his friend Kirchhoff. After seeing the wonders (adjustment of air intake could produce a hot blue flame) of the newly developed Bunsen burner Kirchhoff thought perhaps colors produced by the mineral flame tests could further be refined by looking at emission spectral lines (essentially the colors you see when sunlight is directed through a prism) through a prism (Fig. 2). Each element emits or absorbs a light of a specific wavelength (and colors have wavelengths)---sort of a fingerprint for elements defined by emission spectra (the lines). Short story is that the produced spectra (when examined through the prism) could be used to identify chemical elements and the science of spectrography was hatched (physicists might argue that Sir Isaac Newton published a paper in 1672 in which he described the spectral colors of sunlight when directed through a prism). A year or so later the two lab partners discovered and identified two new elements, cesium and rubidium, as they examined mineralized spa water. For cesium, the blue-colored spectral emission lines (of cesium) did not correspond with lines of any known element (as currently known). So, they named one of their new elements cesium after the Latin word for blue, *caesius.*

That then is the short story of how a little gas burner led to the almost immediate discovery of two new elements and then opened an entirely new field of chemistry (spectrography) that in turn led to the discovery of numerous new elements by various chemists—indium (1863), helium (1868), europium (1896), gallium (1875), and hafnium (1922).

So next time someone asks—what is the one thing you remember about your chemistry class? We all shout Bunsen burners!

So, was there any use for the newly discovered cesium? Not much in the early days but then chemists discovered that cesium easily and readily combines with oxygen. Therefore, the initial major use was to cleanse oxygen and trace gases from vacuum tubes.

Continuing with our chemistry lesson, look at a Periodic Chart of the Elements and locate the element Hydrogen (in the far upper left corner). Directly under the hydrogen are listed the Alkali Metals: lithium (Li), sodium (Na), potassium (K), rubidium (Ru), cesium (Cs) and francium (Fr). These elements are related by being highly reactive, soft, shiny, highly malleable (can pound it into thin sheets), ductile (can form a thin wire), have only one electron in their outer shell, and do not occur freely in nature (always combined with something). Note that some of these alkali metals are important rock formers—sodium and potassium for example, but something like francium is only found in trace amounts in some uranium minerals.

Cesium is sort of a "strange" element, in several ways. For one, it is the softest known element coming in at a whopping 0.2 on the Mohs scale of hardness. In addition, it is one of only five elements (mercury, bromine, cesium, gallium and rubidium) that are liquid at around room temperature (Cesium melts at ~83^{O}F). Cesium is not an element to play with since it ignites spontaneously in "normal" air and "blows up" (like sodium) in reacting with water. It is a waxy silver to gold metal that actually has a number of uses.

Cesium formate (formic acid and cesium salt: $CHCsO_2$) brine is used as a drilling mud in deep oil wells. The mixture is extremely dense and helps "float" rock and mineral chips to the surface during the drilling process. In more shallow wells something like bentonite (a clay) and water are used as the drilling fluid while the very expensive cesium formate is reserved for the deep wells. In fact, the cesium formate drilling fluid returning up hole is filtered and sent to the mud pit. It is so expensive that about 80-85% of the used fluid can be recycled. It is my understanding, after talking to a well site geologist, that the expensive cesium formate brine may be rented from a mud company.

I don't really understand this information so will just quote www.livescience.com:

> *Cesium is incredibly accurate at timekeeping and is used in atomic clocks. The official definition of a second is the time it takes for the cesium atom to vibrate 9,192,631,770 times between energy levels.* www.MinDat.org *states a beam of energy is shined on a very pure sample of cesium-133. The atoms in the cesium are excited by the energy and give off radiation. That radiation vibrates back and forth, the way a violin string vibrates when plucked. Scientists measure the speed of that vibration. The second is officially defined as that speed of vibration multiplied by 9,192,635,770. s. Cesium-based atomic clocks lose one second per 100 million years.*

I could never build an atomic clock and am perfectly happy with my Timex©.

Cesium has only a single naturally occurring stable isotope and that is Cs-133. So, now everyone hark back to the old days of chemistry class. Every atom (didn't the text call them the building blocks of the universe) consists of heavier protons and neutrons in their center (the nucleus) surrounded by a cloud of electrons in the outer shell (the diagrams reminded us of planets orbiting the sun). Each nucleus of atoms in a specific element has the same number of protons and that number is called the atomic number—cesium has 55 protons (the atomic number then) and the number of protons also equals the number of electrons; this assumes an *ordinary* neutral atom. The atomic mass of cesium is ~133 which means that cesium has 78 neutrons (55 + 78=133) in its stable form and therefore I write such as Cs-133.

Although each element has a stable number of protons (and electrons), the number of neutrons may vary, and these forms are called isotopes. Cesium has isotopes ranging from Cs-126 (55 protons plus 71 neutrons) to Cs-139 (55 protons plus 84 neutrons) and perhaps more. In cesium the only naturally occurring form is Cs-133 and all others are "man-made," usually in nuclear power plants or fission-based explosives (perhaps in some planetary explosions but that is above my pay grade).

One artificial and radioactive isotope of cesium, Cs-137, has very important uses in the medical field. Small amounts (a seed and usually with an isotope of iodine) are implanted (brachytherapy) in some forms of "cancer" and begin to emit radiation. The goal is that the radiation will "kill" the surrounding cancerous cells without harming other parts of the body.

One of the more unique uses of Cs-137 is to track "ownership" of crude oil running through common pipelines. Many petroleum producers use a shared pipeline to transport their individual crude to refineries. So, as a new batch of crude is pumped to the conduit a small amount of radioactive Cs-137 is added and the isotope and the total amount of crude can be determined as the crude reaches its final destination (usually the refinery).

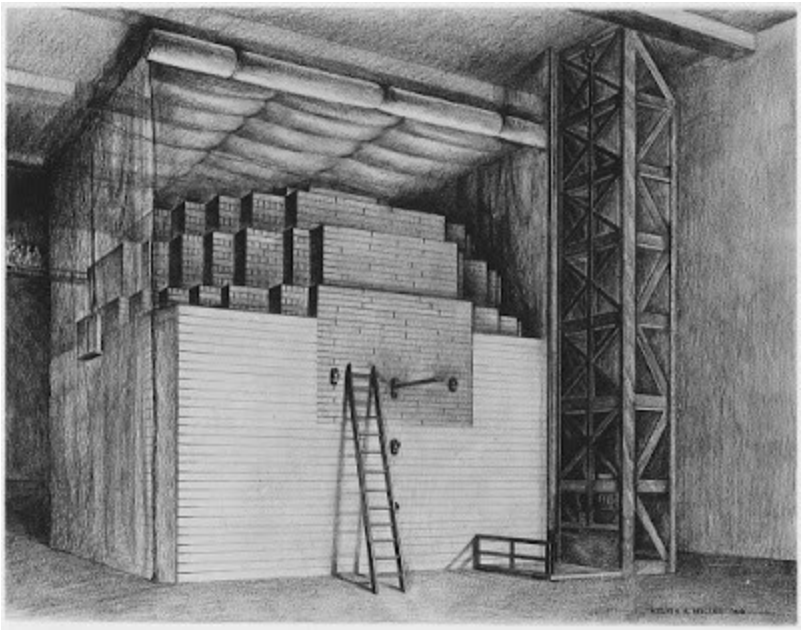

Figure 3. The world's first nuclear reactor, the Chicago Pile-1 constructed under the football stands at the University of Chicago. Public domain photo.

Another little factoid is that radioactive cesium is produced in nuclear power plants (and now captured we hope) but was produced in the atmosphere during the early days of "atomic/hydrogen" bomb testing. The radioactive isotopes settled out of the atmosphere into the soil and today can be located in soil profiles where it may be used to study sediment transport. Scary, but the better news is that Cs-137 half-life (half of the material decays to barite) is ~30 years so decay is fairly rapid. The bad news is that Cs-137 is a major radioactive contaminant at both Chernobyl and Fukushima Daiichi disaster sites. The interesting news is that Cs-137 was not produced on the planet prior to 1942 (the Chicago Pile-1 under the football stadium at the University of Chicago; Fig. 3). Therefore, any containers sealed prior to 1942 would not contain traces of Cs-137. I understand that checking for the presence of Cs-137 is a way to nab counterfeit "antique" wine!

So where does cesium "come from?" MinDat lists 18 valid minerals where cesium is the dominant metal cation. However, pollucite [$(Cs,Na)_2(AlSi_4O_{12})$-$2H_2O$] is the major ore mineral of cesium and may contain 40%+ of the element. Pollucite is a member of a very large group of minerals termed the zeolites that are aluminosilicates containing water. In fact, zeolites can absorb large amount of water and therefore

have hundreds of industrial uses; however, pollucite is much too rare to be used as an absorbent, catalyst or filter. Common zeolites include the ubiquitous apopolite from India---seen at every rock and mineral show-- stilbite, heulandite, and others. Pollucite is also in solid solution with analcime as the sodium replaces the cesium.

Crystalline pollucite looks very similar to the zeolites listed above and often has a vitreous luster but feels waxy or greasy, is fairly hard at ~6.5 (Mohs), is transparent to translucent, mostly colorless, has a white streak, is quite brittle and belongs to the Isometric Crystal System. Unfortunately, these nice transparent masses rarely form cubic crystals. In addition, most pollucite is massive and appears as a nondescript off-white mineral of unknown origin.

Figure 4. Massive pollucite from the Tanco Mine. Width of photo ~3.7 cm.

Most of the world's known reserves, perhaps two thirds, of cesium is in the pollucite found at the Tanco Mine, a tantalum-lithium-cesium, zoned pegmatite in the Lac-du-Bonnet area, northwest of Winnipeg, Manitoba (Fig. 4). Geologists believe reserves of cesium via pollucite from Tanco will last for thousands of years. My Tanco specimen is massive, dirty gray and nondescript, similar if not identical to other specimens described from the mine.

My second specimen, although also nondescript, is a much cleaner white in color and contains large areas of gemmy and clear pollucite intermixed with the "massive" material (Fig. 5). It was collected from a pegmatite known as Uncle Toms Mountain (Emmons Quarry) near Greenwood, Maine.

Figure 5. A mixture of massive crystalline pollucite collected from Uncle Tom Mountain, Oxford pegmatite field. Width of photo ~4.0

The "nicest looking" specimen of pollucite was collected from Shigar Valley, Skardu District, Balistan, Giggit-Balistan, Pakistan, an area of numerous granite pegmatites and some alpine-type deposits (of which I know little). This specimen is a "typical-looking" zeolite (Fig. 6).

Figure 6. A very crystalline pollucite from Pakistan. Typical-looking zeolite. The arrow points to a possible cubic crystal, otherwise the specimen is a mass of non-crystals. Width of photo ~3.4 cm.

Does this story have a moral? Probably not but I learned an awfully lot about Bunsen burners and their contributions to the discovery and understanding of many elements. I also tucked away the information that cesium formate is a very expensive drilling mud. As for the atomic clock, that is way off my learning curve.

"At the moment I am occupied by an investigation with Kirchoff which does not allow us to sleep. Kirchoff has made a totally unexpected discovery, inasmuch as he has found out the cause for the dark lines in the solar spectrum and can produce these lines artificially intensified both in the solar spectrum and in the continuous spectrum of a flame, their position being identical with that of Fraunhofer's lines. Hence the path is opened for the determination of the chemical composition of the Sun and the fixed stars." –Robert Bunsen

The Mystery of Genevieve:
The Golden Dinosaur from the Depths of the London Mine

By Steven Wade Veatch and Teresa L. Stoiber

The legend of "Genevieve," a fossilized dinosaur not only made of stone—but also of gold—began on July 3, 1932. That was the day W. K. Jewett, owner of the London Mine near Alma, Colorado, stopped at the Antlers Hotel in Colorado Springs and made the official announcement of its unearthing. The story was picked up by the news services, and word of the fantastic find spread through the scientific world like a prairie fire.

The golden dinosaur was discovered by William White, 700 feet (213 m) underground—deep in the London Mine (W. K. Jewett, 1932). Curiously, the miners had been using the creature's nose as a lamp holder, not realizing there was a "dinosaur" (if that is what it was) there. White, a hard rock miner, believed at first he was looking at two stumps. In reality, it was a dinosaur lying on its back with its limbs at an angle of 75 degrees. Eager to retrieve it from its rocky tomb, miners blasted it out of rock at the 700-foot level of the London Mine with dynamite. The explosion shattered the specimen. Bits and pieces of the dinosaur were hoisted to the surface, where curious crowds gathered to see the prehistoric monster.

As the story goes, a geology professor at Colorado College, Robert Landon, traveled to Alma so he could examine Genevieve—an extraordinary record of a former world. The measurements he made revealed that the animal was 18 feet (5.4 m) long and 6.5 feet (2 m) high (W. K. Jewett, 1932). The creature had a long neck that supported a small head. It also had a long tail.

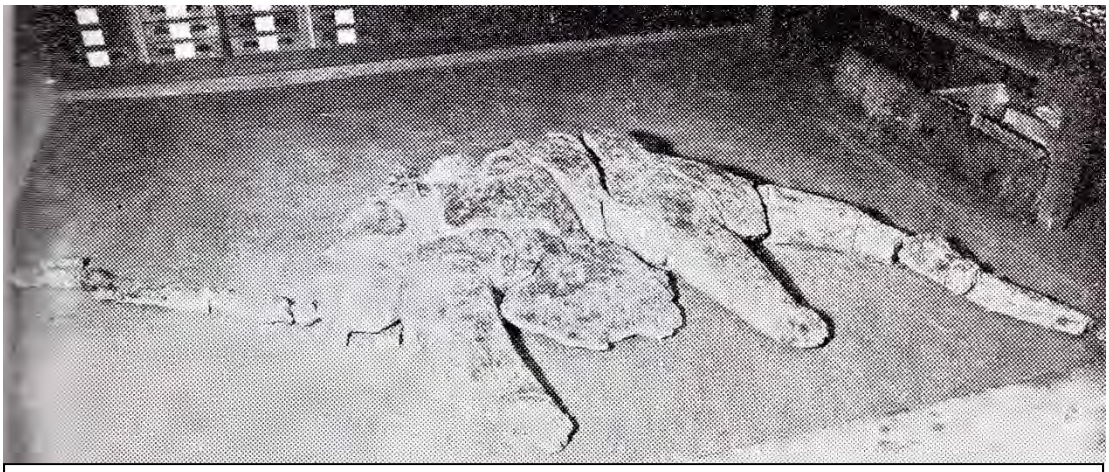

Fig. 1. The only known photo of Genevieve taken in the basement of Cutler Hall, Colorado College. Photo credit: *Colorado College Tiger*, August 12, 1932. Page 3. Courtesy of Colorado College Tutt Library, Special Collections.

Jewett, who gave to the city of Colorado Springs the Patty Jewett golf course, presented the dinosaur to the Colorado College museum (Skeleton of Dinosaur, 1932). The 16-ton (14.5 metric ton) dinosaur reached Colorado College by truck, where a crew of men carefully carried it to the basement of Cutler Hall. College technicians spent countless hours in the basement, where they enthusiastically cemented together what the newspapers hailed as the rarest find ever made in paleontology (Genevieve, Colleges Latest Acquisition Now Ready to Receive Callers, 1932). After the repair of the fossil dinosaur, it was moved to Colorado College's museum and put on display (Will Bring Dinosaur Here Late this Week, 1932).

There is a real mystery that surrounds this dinosaur. In the 1960s, the museum closed and Genevieve's display was removed. No one seems to know what happened to this specimen. Was Genevieve smelted down, put in the basement archives and forgotten, or taken to a professor's house for a private collection? The mystery of her disappearance still stands to this day.

Three critical questions must now be answered: Was Genevieve a dinosaur, where did she go, and was she really made of gold? The past would not easily give up these secrets, including unfortunately, the origin of its lovely name.

An article, from Greely, Colorado's *Tribune-Republican*, dated July 2, 1932, stated the dinosaur remains were made known to Mr. Jesse Figgins, Director of the Colorado Museum of Natural History (noted for work on the famous Folsom archaeological site in New Mexico), who said this unusual dinosaur fossil must be the remains of a marine reptile. Nowhere in the article does it report that Genevieve was made of gold—but it does state that she was shattered when dynamited out of the mine, and that restoration wasn't expected to take long.

When asked about Genevieve, Colorado College archivist Jessy Randall said she had been questioned about her before. The last time was in 2004, when Professor Emeritus Bill Fischer, the former chair of the geology department, was still alive. Fischer gave this response:

> *"The one man who would have had the answers, Professor Bob Landon, died in 1995, and all of the people associated with the college museum are also deceased. . . I never heard of the specimen during my 50-year association with the school, and I suspect that it really was never installed in the museum and that the college newspaper account that 'it was resting on a pedestal in the museum' is totally false. From the photograph, one can see that with 16 tons of matrix and bone it would have taken months if not years to prepare the specimen for display. Now for a few thoughts as to the fossil itself. First of all, it is not a dinosaur and probably not a rhynchocephalian reptile. The photograph is of very poor quality, but my best guess is that it may have been a Phytosaur—but regardless of the correct identification it was a very valuable find, and I am sorry if it ended up in a smelter. . . Good luck in your search and sorry I couldn't be of more assistance". Signed:* Bill Fischer.

Sadly, it looks like Genevieve's case has gone cold. The museum has long been closed, and those associated with the museum are deceased. It is doubtful that she was made of gold—but she was found in a gold mine, the source of a good rumor and the basis for a great story surrounding her mysterious existence and disappearance.

Although Genevieve remains a mystery, this article has dug up and weaves together most of what is known and speculated about her. Although her real story has been buried with the museum workers and gold miners who have passed away, there are still a few miners who, while relaxing at a local saloon, fondly ponder the puzzle of Genevieve. They raise their shot glasses and make this toast to the miners who found Genevieve, the golden dinosaur: "May you always stand on ore and your labors be in vein."

Acknowledgments

The authors thank Danny Alfrey for bringing Genevieve to our attention back in 2011. We also appreciate Ben Elick's help in obtaining the photograph of this mysterious fossil.

References

Find Skeleton of Dinosaur in Ore of London Mine. (1932, July 2). *Colorado Springs Gazette*, p. 2.

Genevieve, Colleges Latest Acquisition Now Ready to Receive Callers. Made Presentable by Profs. (1932, August 12). *Colorado College Tigers*

W. K. Jewett Gives Skeleton of Prehistoric Animal to Colo. College Museum. (1932, July 3). *Colorado Springs Gazette*, p. 2.

Will Bring Dinosaur Here Late this Week. (1932, July 6,). *Colorado Springs Gazette*, p. 5

Upcoming Shows and Events

November 10 – 11, 2018; **Lake Havasu Gem & Mineral Society's 47th Annual Gem and Mineral Show;** Saturday 9am-5pm, and Sunday 9am-4pm; Admission $2, children under 12 free; Lake Havasu Community Center, Rods and Relics Hall, 100 Park Avenue, Lake Havasu City, AZ 86403. Faceted gems, cabochons, fossils, tools, findings, slabs, finished jewelry and gifts offered by vendors. Educational displays, raffle, hourly door prizes, games for children, working demonstrations by professionals, scavenger hunt, and silent auction. For more information, see www.lakehavasugms.org or contact Michelle Smedly at lakehavasugemmineralshow@gmail.com, (510) 872-7070.

November 17 – 18, 2018; **Payson Rimstones Rock Club's 21st Annual Gem & Mineral Show**; Saturday 9am-5pm, and Sunday 10am-4pm; Admission $2 adults, children under 12 free; Payson High School, Longhorn Gymnasium, parking in school parking lot near the corner of West Longhorn Road and South McLane Road. Gems, minerals, fossils, lapidary equipment, jewelry and findings, slabs, rough material, gold prospecting equipment, displays, books, and other educational items. Club hosts a silent auction, an education center with a geologist to answer questions, Spinning Wheel, fluorescent display, beading, Treasure Hunt, and sandstone painting. Contact Becky Bagshaw at LBagsfam@aol.com or (928) 476-3419 for more information.

November 24 – 25, 2018; **Wickenburg Gem and Mineral Show**; (See flyer page 19) Saturday 9am-5pm, and Sunday 10am-4pm; Admission is free; Hassayampa Elementary School, 251 South Tiger Street, Wickenburg, AZ. Over 40 vendors, best rock contest, raffle, door prizes, Kid's area, and silent auction. For more information, see www.wickenburggms.org.

December 7 – 9, 2018; **Flatirons Mineral Club's Rocks & Rails**; (See flyer on page 20) Friday through Sunday 10am-5pm; Admission is $5 for adults, children 12 & under free with paid adult, discount 3-day pass available on Friday; Boulder County Fairgrounds in Longmont, Colorado. The show is in conjunction with the Boulder Model Railroad Club, so you can enjoy lots of rocks, minerals, and fossils, plus model trains in the other half of the building.

December 7 – 9, 2018; **El Paso Mineral & Gem Society's Mineral, Gem, Jewelry & Bead Show**; Friday and Saturday 10am-5pm, Sunday 10am-5pm; Admission is free; El Maida Shrine Auditorium, 6331 Alabama Street, El Paso, Texas 79904. Cabochons, fossils, crystals, jewelry, designers and more.

New Announcments

May 3 – 5, 2019; **McPherson Gem & Mineral Club's Sale and Swap;** Friday and Saturday 9am-6pm, Sunday 10:30am-3pm; Admission is free; 4-H Building and Grounds, 710 West Woodside, McPhearson, Kansas.

Show Flyers


Wickenburg Gem and Mineral Show
Nov. 24 & 25, 2018
Free Admission
Jewelry
Fossils
Minerals
Gems
Over 40 Vendors
Best Rock Contest
Raffle
Door Prizes
Kid's Area
Silent Auction
Hassayampa Elementary School
251 South Tegner Street Wickenburg, AZ
9am - 5pm Saturday • 10am - 4pm Sunday

ROCKS & RAILS

December 7-9 10am – 5pm

Adults $5 ::: Children 12 & Under Free with paid Adult

Discount 3-day admission pass available on Friday

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bouldermodelrailroadclub.org

FREE PARKING!

DOOR PRIZES!

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2018 Annual

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Gem and mineral dealers, exhibits, speakers, grab bags, rocks, children's activities, kids' wheel, dig site, fossils, meteorites, tools jewelry, classes, and more! Bring your treasures for free mineral identification. Demonstrations include polishing rocks using lapidary equipment, gold panning, and silversmithing.

flatironsmineralclub.org

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Webmaster	Jim McGarvey	webmaster@rmfms.org
Finance	Robert Hains (Chair) Wayne Cox	Bobh67218@yahoo.com Waynec3@earthlink.net
Convention Advisory	Dr. Robert Carlson	illegitimusnoncarborundum@inbox.com
Insurance	Gene Maggard	gandpmaggard@gmail.com
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Nominations	Richard Jaeger (Chair) Judy Beck Dr. Robert Carlson	rjgrsci@aol.com lkbeckfam@gmail.com illegitimusnoncarborundum@inbox.com
Fluorescent Technical	Pete Modreski	pmodreski@aol.com
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Programs Contest	Gene Maggard	gandpmaggard@gmail.com
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Website Contest	Jennifer Gerring	jgerring@gmail.com
Boundaries	Bill Smith	beetlebill@kanokla.net
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International Relations	Mike Nelson	csrockguy@yahoo.com

Long Range Planning	Judy Beck (Chair) Dr. Robert Carlson DeLane Cox	lkbeckfam@gmail.com illegitimusnoncarborundum@inbox.com delane3@earthlink.net
Name Badges	Richard Jaeger	rjgrsci@aol.com
Parliamentarian	Gene Maggard	gandpmaggard@gmail.com
Permanent Address/Trophies	Dr. Robert Carlson	illegitimusnoncarborundum@inbox.com
Junior Program	Terri Harris	seeingeagle@comcast.net
Ribbons	Peggy Sue Moore	moorepeggysue@gmail.com
Scholarship	Richard Jaeger	rjgrsci@aol.com
Supplies	Finis Riggs	Lanariggs63@gmail.com
Safety	OPEN	
Credentials	Janet Smith	beetlebill@kanokla.net
Public Relations	DeLane Cox	Delanec3@earthlink.net
Gold Pan Award	Dr. Robert Carlson (Chair) Richard Jaeger	illegitimusnoncarborundum@inbox.com rjgrsci@aol.com lkbeckfam@gmail.com
Public Land Advisory (PLA) Colorado/Nebraska/North Dakota	Mike Nelson (Chair)	csrockguy@yahoo.com
PLA Arizona	Dr. Alex Schauss	Alex@aibmr.com
PLA Kansas	Jared Kyner	Jskyner79@gmail.com
PLA New Mexico/Texas	Mel Stairs	mels@swcp.com
PLA Oklahoma/Arkansas	Stan Nowak	Snowak48@yahoo.com
PLA South Dakota	Brandon Nelson	Nelson.bc80@gmail.com
PLA Utah/Nevada	Jack Johnson	J4x4jj@comcast.net
PLA Wyoming	Richard Gerow	rgwizzard@wyoming.com
Uniform Rules	Lee Whitebay (Chair) Jay Bowman Roger Burkhalter Dr. Robert Carlson Paul Otto	lwhitebay@poncacity.net bjb@wildblue.net bjb@wildblue.net illegitimusnoncarborundum@inbox.com mineralspecimens@hotmail.com

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Directory	Kay Waterman	kay.waterman@cox.net
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Flourescent Technical	Pete Modreski	pmodreski@aol.com
Fossil Technical	Roger Burkhalter	rjb@ou.edu
Gold Pan Award	Judy Beck	lkbeckfam@gmail.com
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International Relations	Mike Nelson	csrockguy@yahoo.com
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Long-Range Planning	Richard Jaeger	rjgrsci@aol.com
Long-Range Planning	Bill Smith	beetlebill@kanokla.net
Long-Range Planning (chair)	Judy Beck	lkbeckfam@gmail.com
Mineralogy Technical	Pete Modreski	pmodreski@aol.com
Name Badges	Richard Jaeger	rjgrsci@aol.com
Nominations	Judy Beck	lkbeckfam@gmail.com

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Nominations	Diane Wier	
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Supplies	Finis Riggs	Lanariggs63@yahoo.com
Trophies	Robert Carlson	illegitimusnoncarborundum@inbox.com
Webmaster	Jim McGarvey	Mackinaw13@gmail.com
Webmaster Contest	Jennifer Gerring	jgerring@gmail.com
PLAC Arizona	Dr. Alex Schauss	Aschauss@email.arizona.edu
PLAC Colorado/Nebraska/ North Dakota	Mike Nelson	csrockguy@yahoo.com
PLAC Kansas	Jared Kyner	Jskyner79@gmail.com
PLAC New Mexico/Texas	Mel Stairs	mels@swcp.com
PLAC North Dakota	Mike Nelson	csrockguy@yahoo.com
PLAC Oklahoma/Arkansas	Stan Nowak	Snowak48@yahoo.com
PLAC South Dakota	Brandon Nelson	Nelson.bc80@gmail.com
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