



THE BULLETIN OF THE COLORADO SPRINGS MINERALOGICAL SOCIETY Published Since 1960

Colorado Springs
Mineralogical Society
Founded in 1936
Lazard Cahn
Honorary President
December 2016
PICK&PACK

Vol 56.... Number 10

CSMS General Assembly

Thursday, December 15, 2016, 7:00 PM

******Christmas Party-Potluck-Gift Exchange-Silent Auction-Officer Vote******

Please bring a dessert or hors d'oeuvres / main dish to share

Last name begins with A-L —dessert

Last name begins with M-Z —hors d'oeuvres/Main Dish

Gift Exchange—If you would like to participate in the gift exchange, please bring a wrapped gift (hobby-related, \$10 minimum value). Tables will be set up at the front of the room where you can drop off your gift and pick up a number for your gift exchange.

****In case of Inclement Weather, please call the Senior Center at 719-955-3400 to make sure it's open.****

Silent Auction—If you are able to donate to the silent auction, please bring a mineral related specimen (mineral, gem, fossil, jewelry, etc.) Tables will be set up near the meeting room entrance where you can drop off your donation to the auction coordinator.

2017 Membership Applications inside...\$5 discount for applications received before Jan. 31

There are still vacant board positions, please consider volunteering!!

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COLORADO SPRINGS MINERALOGICAL SOCIETY PO BOX 2 COLORADO SPRINGS, COLORADO 80901-0002

CSMS Calendar

December 2016 & January 2017

Please note some groups will not meet until January

Tue., **Dec 6 & Jan 3**—**Fossil Group**, 7 pm, Senior Center. Jerry Suchan 303 648-3410

Thu., **Dec 1 & Jan 5**—**Board Meeting**, 7 pm, Zios in December, Senior Center in January

Tue., **No Meeting until January 10**—**Micromounts**, 7 p.m., Senior Center. Dave Olsen, 719-495-8720

Thu., **No Meeting until January 12**—**Faceting Group**, 7 pm, Senior Center. Doreen Schmidt, 719-577-4165

Thu., **Dec 15 & Jan 19**—**Pebble Pups & Juniors**, 5:30 pm Senior Center. Steven Veatch, 719 -748-5010

Thu., **Dec 15 & Jan 19** — **General Assembly**, 7 p.m., Senior Center 719-955-3400 for Weather Closings

Thu., **No Meetings until January 26**—**Crystal Group**, 7 p.m., Senior Center. Kevin Witte, 719-638-7919

Appointment Only—**Jewelry Group**, Bill Arnson, 719 337-8070

Appointment Only—**Lapidary Group**, Sharon Holte, 719 217-5683

The Senior Center is located at **1514 North Hancock** in Colorado Springs. For more information on any of the sub-groups, meetings, and other CSMS valuable information, go to our website, csms-web.org

****In Case of Inclement weather call the Senior Center 719-955-3400 to make sure it's open.****

Upcoming Events of Interest to CSMS Members

Submitted by Pete Modreski

Thurs., Dec. 1, 6:30 p.m., in Cañon City, Mike Triebold will discuss the **Foibles and Human Experiences of Fossil Collecting**, At Pueblo Community College - Fremont Campus, 51320 Highway 50, Cañon City. Doors open at 5:30 with a display table. Contact cindysmithrocks@me.com for more information.

Thurs., Dec. 1, 7:00 p.m., Friends of the Colorado School of Mines Geology Museum, "First **Thursday**" lecture, **Strategies for Uranium Exploration & Development in Uravan Mineral Belt, Montrose County, Colorado - Nuvemco LLC**" by guest speaker Tom Cavanaugh, Geologist, C.P.G, P.G. On the CSM campus in the Ben H. Parker Student Center, Ballroom 'E', Maple Street, Golden. Socializing **begins at 6:30 p.m. and the talk will start at 7:00**. Admission is free and all are welcome.

Mon., Dec. 5, 7:00 p.m. (social hour at 6:00), DREGS 2016 Distinguished Lecture, Dr. Murray W. Hitzman, "Mud, Malaria and Mining: 18 Years of Geological Research in the Central African Copperbelt". At Colorado School of Mines, Berthoud Hall room 241. All are welcome.

Tues., Dec. 6, 3:00 p.m., Earth Sciences Colloquium at the Denver Museum of Nature & Science, Pterosaur paleobiology: Insights from photogrammetric Ichnology, by Brent Breithaupt and Neffra Matthews, BLM.. In the VIP Room. All are welcome, museum admission is not required.

Wed., Dec. 7, 4:00 p.m., CU Geology Colloquium, Colorado's geothermal resources and thermal springs: a simple groundwater flow model, by Paul Morgan, Colorado Geological Survey. Benson Earth Sciences Building, Auditorium (Room 180), CU Boulder campus. All are welcome; refreshments at 3:30 on the 3rd floor.

See <http://www.colorado.edu/geolsci/colloquium.htm> for the full colloquium schedule.

Fri-Sun., Dec. 9-11, Gem and Mineral Show/"Rocks and Rails", sponsored by the Flatirons Gem and Mineral Club; together with the Boulder Model Railroad Club; at the Boulder County Fairgrounds, Main Exhibit Building, 9595 Nelson Rd., Longmont, CO. 10 a.m. – 5 p.m. daily.

Sat., Dec. 10, 4 p.m., Western Interior Paleontological Society – Holiday Auction (Silent and Verbal). At Lutheran Church of the Master, 14099 West. Jewell Avenue, Lakewood. "The auction is a fundraiser for WIPS grants and scholarships. All are welcome to come and bid on auction items or donate items for the auction. You must be a WIPS member to sell (50% of proceeds benefit WIPS/50% to seller). More information will be available at www.westernpaleo.org. All are welcome to attend.

Wed., Dec. 21, 7 p.m., **Colorado Scientific Society, Potluck dinner, Annual Meeting, and Presidents' Address**. Outgoing President Peter Barkmann, Colorado Geological Survey, will give a presentation on "**New Studies on the Geology of South Park**". All are invited; you may come just for the talk, which will begin at approximately 7 p.m., or join us ahead of time to share in a potluck dinner (with locally brewed beer, provided!). At the Arbor House, in Maple Grove Park, 14600 W. 32nd Ave., Golden (Applewood area). For more information see <http://coloscisoc.org>. Please note—this meeting had originally been scheduled for Dec. 15; the date and location have been changed.

THE CSMS RESEARCH GRANT PROGRAM FOR UNDERGRADUATE GEOLOGY STUDENTS

Mike Nelson csrockguy@yahoo.com

For the last three years, the Colorado Springs Mineralogical Society (CSMS) has managed a very successful program, the competitive Student Research Scholarship that promotes and supports original research on Colorado geology by undergraduate students. The grant program does not seek to cover all field and laboratory expenses but instead is viewed as a professional endorsement of the research endeavor. Requests for grants are judged on how the proposed research will advance the science of geology and its related branches within the State of Colorado. Undergraduate students seeking awards must be currently enrolled in a degree-granting institution and their research must be part of a degree program (an academic course granting credit and a grade). CSMS also strongly encourages women, minorities, and people with disabilities to participate fully in this scholarship program.

Sometime after the first of each calendar year a call goes out for applications from qualified students. That call is made in two ways: 1) a notice is put on the CSMS web site; and 2) a personal letter is sent to each department chair and/or other faculty members at every geology degree-granting baccalaureate institution in Colorado. Receipt of applications is usually due around the first of April although the Committee Chair often has conversations and mail exchanges with interested students. The applications are received electronically and are evaluated on the feasibility and scientific merit of the project, the abilities of the researcher, and the reasonableness of the budget.

Successful grants must be used for expenses directly associated with the research proposal. For example, research funds may be used for field expenses (travel, some meals, lodging), and materials and supplies (sample bags, base maps, air photos, film and developing costs, etc.). In addition, on a cost-sharing basis funds may be used to provide such services as computer time, construction of thin-sections, and chemical and isotopic analyses. The latter is often calibrated as "machine time" and CSMS encourages researchers to participate personally in this fantastic learning experience.

Within one year of receiving the award the student must submit a written article documenting results of their work along with an explanation of monetary expenditures. Often the report is in the form of a Senior Thesis although lower division students certainly are encouraged to apply. In addition, grant recipients are encouraged to present results of their work at professional meetings and/or campus student research days. The Committee Chair tries to keep in contact with each recipient during his/her field season and the following "evaluation and writing season." Since inception of the program I have served as the Chair and CSMS contact.

In past years grants have ranged from \$300 to \$1250. The award range is due to the number of qualified applicants and the evaluation of the proposals. The number of proposals received each year has ranged from 10 to one (qualified).

In 2015 three proposals were funded and the necessary final reports received in April of 2016. In past years, I have often read preliminary reports in detail and have made suggestions as to geological interpretations, grammar, and syntax (something that I enjoy).

2015-16 AWARDS An Investigation of the Petrology and Magma Genesis of the Specie Mesa Basalt, San Miguel County, Colorado

ETHAN COPPAGE

An extensive history of Cenozoic magmatic events is recorded in the western San Juan Mountains. These events span the past 75 Ma and are dominated by felsic to intermediate plutonic and volcanic rocks.

Mafic rocks make up a smaller proportion of the Cenozoic record with pulses of mantle magmatism documented from 26 to 20 Ma, and 8 to 4 Ma. The latest magmatic event in the western San Juan Mountains was the eruption of basaltic lava flows near Placerville (Specie Mesa). Only a small area of the flow is preserved, but the

(Continued on page 4)

presence of these rocks in the geologic record represented an important, but poorly documented, part of the geologic record. Previous workers mapped the Specie Mesa basalt flow and provided brief descriptions of these rocks. Coppage implemented a research program that would provide petrographic, geochemical, and Ar-Ar age data to provide constraints on the genesis and timing of the Specie Mesa flow. In addition, his research provided additional evidence for mantle magnetism related to incipient rifting in the western San Juan Mountains.

After graduation Coppage presented results of his research at the Rocky Mountain Section of the Geological Society of America meeting in Moscow, Idaho. His presentation resulted in an offer for a position in Montana where he is currently mapping and studying the geology of the Bison Mountain Quadrangle. Upon completion of the mapping he will matriculate in the graduate program at Montana Tech of the University of Montana in Butte.

Insight into the Magmatic History of the Jackson Mountain Pluton from Feldspar Petrology and Geochemistry

Michael Vandervert

The Jackson Mountain Pluton is an intrusive igneous feature located near the town of Pagosa Springs in the San Juan Mountains of southwestern Colorado. The intrusion is composed of high content silica with rock types ranging from quartz monzonite to syenite. U-Pb dating of zircon crystals indicated an age of latest Oligocene, ~25.1 Ma. The rocks of the pluton contain a fine-grained groundmass with distinct megacrysts up to 5 cm. in length.

Vandervert studied the two-feldspar megacrysts by Electron Microprobe Geochemistry and determined their composition as orthoclase and albite. In addition, he formed a sequence of crystallization and related the megacryst development to both temperature and vapor pressure: high initial water vapor pressure favors the formation of two feldspars while a decrease in water vapor pressure favors the formation of a single feldspar (usually orthoclase).

Vandervert graduated in Spring 2016 and secured a position as a field/lab technician for Durango-based geo-engineering firm, Trautner GeoTech LLC.

Age, Petrology, and Clast Analysis of Volcanic Detritus in the Telluride Conglomerate, Southwestern Colorado

Joshua D. Mudge

The Telluride Conglomerate (~29 Ma) of southwestern Colorado contains numerous clasts of intermediate to felsic volcanic material within its matrix. Previous studies assumed this material originated from the San Juan caldera (~28.4 Ma) or the Silverton caldera (~27.6 Ma). Mudge's study (field work, U-Pb zircon age dating, thin section analyses, whole rock geochemical data), conducted on the Telluride Conglomerate exposed north of Telluride, Colorado, determined the age of the volcanic clasts to be ~66 Ma, the overall petrology of the clasts to be highly altered andesite to dacite, and a relative proportion of volcanic clasts to the total clast population of 35%. This data excludes the San Juan caldera or Silverton caldera as the source of the material, and uncovers a previously unknown volcanic event of early Laramide age within the western San Juan Mountains. Based on the erosional patterns of the Telluride Conglomerate, the presence of exposed quartzite near Ouray, and other intrusive rocks of similar age in the area, the volcanic event is hypothesized to have existed to the north-east near Ouray, Colorado. Mudge's work indicates the volcanic record of the western San Juan Mountains is older than previously thought, and at least one volcanic center was present in southwestern Colorado during the early Laramide.

After graduation Mudge secured a very prestigious fellowship in the National Association of Geology Teachers—United States Geological Survey Cooperative Summer Field Training Program. Currently he is in Minnesota working on a project entitled *Minnesota arsenic in Minnesota groundwater: occurrence and relation to hydrogeologic and geochemical factors*.

All three of the 2015-16 recipients have made significant inroads in starting a successful career in the geological sciences. My correspondence with the graduates indicate that scholarships provided by the Colorado Springs Mineralogical Society were an integral part of their successful research.

Casey Stewart from Fort Lewis College in Durango, Colorado, was selected as the single grantee in the 2016-17 competition with his proposal: **Constraint on the age of Precambrian basement rocks beneath Pagosa Springs, Colorado**. Stewart will use rock samples, obtained from a drill core supplied by Pagosa Verde LLC, to construct thin sections and complete a lithologic analysis using a petrographic microscope. In addition, he will travel to Tucson, Arizona, to obtain a U-Pb zircon age at the Arizona LaserChron laboratory. The study will provide age and compositional information about these unstudied Precambrian basement rocks.

In conclusion, the CSMS Scholarship program that uses monetary resources to fund research projects by undergraduate geology students is a model program that has gained national attention. The Council on Undergraduate Research, an international association headquartered in Washington D.C., is aware of the CSMS program and has publicly noted its success. In addition, I have supplied information about our program to other rock and mineral clubs and will provide help and comments for any other interested entity.

GENERAL ASSEMBLY MEETING MINUTES 11/17/2016
Submitted by Norma Rhodes

2016 CSMS Officers Present at Meeting

Jean Luce, President	X
Lisa Kinder, Vice President	X
Ronald "Yam" Yamiolkoski, Secretary	
Ann Proctor, Treasurer	
Norma Rhodes, Editor	X
Sharon Holte, Membership Secretary	X
Doreen Schmidt, Member-at-Large	X
Ariel Dickens, Member-at-Large	
Mark Lemesany, Past President	X!

2016 CSMS Chairpersons

Kim & Bodie Packham, Show Chairs
Sharon Holte, Field Trip Director
Ronald "Yam" Yamiolkoski-Club Claim Agent
Frank Rosenberg- Club Claim Agent
Frank & Ellie Rosenberg, Librarians
TBD, Social Committee Chair
Ann Proctor, Store Keeper
Jackson Peirce, Webmaster

The meeting was officially called to order by Jean Luce, President, at 7:04 PM. Six of the nine officers were present.

Jean announced November is CSMS 80th Anniversary. We are the second oldest Mineralogical club in the United States. There will be cake and ice cream after the presentation.

Jean introduced Steve Veatch, who gave a fantastic presentation on the Pebble Pups and Earth Scholars current activities and tied his presentation to "Christmas Past, Present, and Future". With Pebble Pups being CSMS's Future.

After the intermission, New members and Guests were asked to introduce themselves. There were no guests, however Jean recognized Roy Wilson, who is a lifetime member and thanked him for his longtime support to CSMS. Member Mike Webb introduced himself and indicated an interest in the field trip coordinator position.

The BLACK ROSE ACOUSTIC SOCIETY Adult Guitar Jam Session group gave a surprise visit and played "Happy Birthday" to the club. After which they were thanked and invited to have cake and ice cream.

Jean asked if anyone had corrections to the October General Assembly minutes published in the Pick and Pack. A motion was made, seconded, and a unanimous vote approved the minutes.

Jean introduced our various subgroups and their chairs or representatives: Dave Olsen (Micro-mounts Group) announced there will not be a meeting in December. He did bring an item to the meeting that a past member needed to sell. It's an older Soviet Union microscope. Interested parties can contact him. Kevin Witte (Crystal Study Group) was not present but had already announced no meetings until January, Sharon Holte (Lapidary Group) has equipment at her house and anyone can call her to set up an appointment to learn/use the equipment. Doreen Schmidt (Faceting Group) announced there will not be a meeting until January. She has other commitments but will stay on for a couple months while a replacement is arranged. It was also brought up that there is a faceting class starting in January and interested students should check with the Senior Center. Jerry Suchan (Fossil Group) will meet December 06 at the Senior Center. **SEE PICK & PACK FOR MORE INFORMATION ON CSMS GROUPS.**

December's General Meeting will be the Christmas Potluck. Members with last names beginning A-L will bring dessert, and M-Z will bring entrees and hors d'oeuvres. If the weather is questionable, members should call the Senior Center at 719-955-3400, this will apply to group meetings as well.

Lisa Kinder, Vice President and Nominee Chairperson, spoke about the need for members to step up and volunteer for the vacant positions and current officer positions. The first volunteer position that needs filling is the position of Social Chair. Renee Swanson agreed to take over the position but would need help with the "storage" of the club bins. The second volunteer position is that of Field Trip Chair. Mike Webb agreed to talk with Sharon Holte to take over that position. Lisa then discussed the nomination of officers for 2017.

This is where we currently stand. President: Ernie Hanlon stood up to be nominated. He told the group he served as President many years ago. No other potential nominees volunteered. Vice President: Lisa Kinder said if anyone is interested she would be happy to co-chair, or relinquish the position. Treasurer: Ann Proctor will remain if needed. Secretary: Norma Rhodes agreed to be Secretary unless someone else wanted the position. Membership Chair: There were a couple of interested members, however computer knowledge and Excel experience is a necessary requirement to keep records going so the position is still vacant. Member-at-Large: Doreen Schmidt will remain if needed. Member-at-Large: Ariel Dickens will remain if needed. Editor of the Pick & Pack: Larry Jones has volunteered to be the editor for 2017 and was nominated by Norma Rhodes. Past President: Jean Luce. Lisa then concluded that official voting will take place at the December General Assembly.

Mike Nelson announced information regarding the CSMS Undergraduate Research Grant Program will be in December's Pick and Pack. This program has received national attention and he encouraged everyone to read the submission. He also wanted to take the time to thank Norma for her time and efforts this year as Editor of the Pick and Pack.

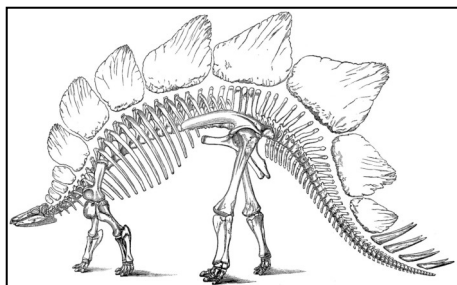
The meeting was adjourned at 8:50 PM.

Stegosaurus: Colorado's State Fossil

By Destin Bogart

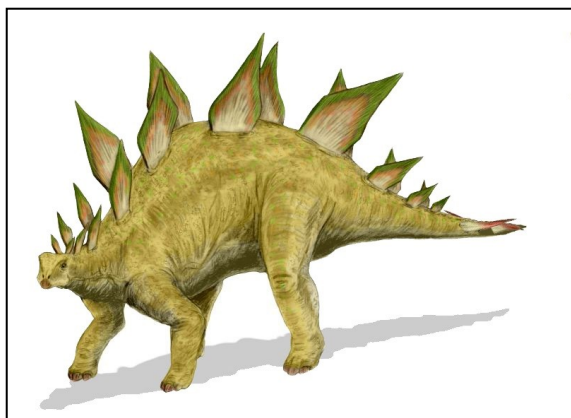
As the state dinosaur of Colorado and one of the most iconic members of Dinosauria, *Stegosaurus* has earned this spot due to its fascinating history and its large number of fossil remains that allow paleontologists to understand more about *Stegosaurus* than other dinosaur genera that have a more fragmentary fossil record.

The first remains of *Stegosaurus* were uncovered during a period in the late 1870s known as, "The Bone Wars," which intensified the collection efforts between two rival paleontologists—Othniel Charles Marsh and Edward Drinker Cope. Marsh initially discovered *Stegosaurus* in 1877 near Morrison, Colorado. Marsh first thought those remains belonged to a turtle-like animal, but soon revised this finding as more *Stegosaurus* fossils were unearthed.



O.C. Marsh's 1891 illustration of *Stegosaurus ungulatus*. Paleontologists now place the arrangement of the back plates in two alternating rows and oriented vertically. Copyright: public domain

The largest *Stegosaurus* could stand four meters (12 feet) high at the tallest back plate and could reach lengths of up to nine meters (~30 feet). But the size alone is not what sets *Stegosaurus* apart from the other animals it shared its ecosystem with; rather the plates that line the spine of *Stegosaurus* make this dinosaur recognizable to everyone. Yet the plates remain an enigma; paleontologists have put forth many theories regarding how the plates are positioned. When Othniel Marsh first found the remains, he thought the plates lay flat against the body like the armor of a Pangolin (looks like a scaly anteater). Through the years, paleontologists have refined the theory regarding the exact configuration of these plates, which went from two lines of identical plates on the back, to one row of plates that alternate. Scientists now place the arrangement of the back plates in two alternating rows and oriented vertically.



Stegosaurus stenops, from the Late Jurassic of North America, pencil drawing by Nobu Tamura. Copyright: Image license through the courtesy of Creative Commons.

PEBBLE PUPS CORNER



CSMS Pebble Pups & Junior Group

The Junior Group & Pebble Pups meet at the Senior Center every third Thursday at 5:30 PM until 6:15 PM or so. We only meet during the academic year, and we include January. So, it is Sept through May. Special announcements and field trips are noted on our blog <http://pebblepups.blogspot.com> and through the CSMS website.

Congratulations to Pebble Pups Winners in the American Federation Mineralogical Society (AFMS) 2015 Bulletin Contest: Steven Marquez 6th Place-Junior Articles 12-17; Guide to Minerals: Amazonite and Jack Shimon 6th Place-Junior Articles Under 12; Radio Wave Powered Crystal Radio!!

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What these plates were used for is still up for debate and has remained so since the animal's discovery. Robert Bakker, a world-renowned paleontologist and curator of the Houston Museum of Nature and Science, speculates the plates of *Stegosaurus* were the inside, or core, of a bigger plate made of keratinous material. Bakker also suggests these plates were semi-movable and the animal used them as a defense, splaying them out to the sides to deter predators from coming too close. Other scientists have claimed the back plates were used to attract a mate or to control body temperature.

Even if the plates of *Stegosaurus* were not used for defense, *Stegosaurus* carried with it four spike-like osteoderms (bone embedded in the skin) on the end of its tail. These spikes (informally called thagomizers) bent out to the sides and backward and were likely an incredible defense against many large predators of the Morrison Formation.

In 2014, Robert Bakker found a large open hole in the lower-front portion of the pelvis of a mounted *Allosaurus* skeleton at the Glenrock Paleontological Museum. The hole fits the tail spike of a *Stegosaurus*. This is evidence of just how formidable the tail of a *Stegosaurus* was as a defensive weapon when it struck the crotch of an *Allosaurus*. Evidence suggests bacteria, broken bone, and other debris remained in the wound, causing an infection that eventually killed the animal. According to Robert Bakker, "A massive infection ate away a baseball-sized sector of the bone, probably this infection spread upwards into the soft tissue attached here, the thigh muscles and adjacent intestines and reproductive organs."

The brain of *Stegosaurus*, although not quite walnut-sized, was unusually small compared to its body mass. So far, *Stegosaurus* claims the smallest brain size to body mass of any other dinosaur. This small brain presented a problem—how could it survive without more intelligence? It seems the large plates on its back and the spikes of its thagomizer were keys to its survival against predators. Also, *Stegosaurus* behavior played a role. Paleontologist Matthew Mossbrucker discovered in 2007, footprints of adult, juvenile, and hatchling specimens in the Morrison Formation that suggest *Stegosaurus* stayed together in small groups, most likely for protection against predators.

Stegosaurus is the rhinoceros of the Late Jurassic as it was both an herbivore and highly dangerous to anything it perceived as a threat. *Stegosaurus* died out near the end of the Jurassic, leaving only fossils and footprints as a reminder of its existence. However, paleontologists can, using fossils and a little bit of educated guesswork, begin to understand how this animal behaved, how it lived, and how it died.

Author's Bio: Destin Bogart is 16 years old and ever since he can remember he has had a passion for paleontology. He is an Earth Science Scholar with the Colorado Springs Mineralogical Society and is a junior IB World Student at Pueblo West High School. Destin is planning a career in vertebrate paleobiology.



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GREENOCKITE, CHRISTMAS GIFTS AND BATTERIES

Mike Nelson csrockguy@yahoo.com

Among others things, the Christmas and holiday season is a time of giving and receiving gifts. In many instances when I think about gifts the first thing that pops into my head---batteries, and more batteries!

I once bought my kids a set of batteries for Christmas with a note on them saying "toys not included". Bernard Manning

So, the other day in one of my periods of shallow thought, some would call it daydreaming, I was thinking about Ni-Cad batteries, you know the rechargeable kind. OK, I know where nickel is mined and produced but what about cadmium? Is cadmium found naturally, and mined, or is it a by-product of some other mineable metal? Beats me but I don't think cadmium is a mineral found *au natural*. However, I do remember that I have an obscure cadmium mineral tucked away in my collection.

By this time my curiosity was piqued so off I went to try and find answers.

The Ni-Cad batteries were just about the first rechargeable batteries on the market: they are charged, store the energy, discharged in a load, and then recharged. The Ni-Cad batteries use a nickel oxide-hydroxide as a positive electrode and metallic cadmium as the negative electrode. These rechargeable batteries allow for a chemical reaction as they discharge when a load is detected. At the positive electrode, the reaction is $2\text{NiO}(\text{OH}) + 2\text{H}_2\text{O} + 2\text{e}^- \longrightarrow 2\text{Ni}(\text{OH})_2 + 2\text{OH}^-$ and potassium hydroxide is used as the alkaline electrolyte. At the negative electrode, the reaction is $\text{Cd} + 2\text{OH}^- \longrightarrow \text{Cd}(\text{OH})_2 + 2\text{e}^-$. So in the total reaction nickel oxide hydroxide and cadmium and water form a nickel hydroxide and cadmium hydroxide. When recharging takes place, the total reaction is just the opposite and the nickel and cadmium hydroxides break down into the free cadmium and water and nickel hydroxide. Currently these one-time ubiquitous Ni-Cad batteries seem to be on their way out as more efficient rechargeable batteries such as nickel metal hydride (NiMH), lithium ion polymer (Li-ion polymer), and lithium ion (Li-ion) are coming in as replacements. These newer batteries have bounded into use for a couple of reasons: 1) they are less costly to manufacture than Ni-Cad batteries; and 2) cadmium is toxic to living organisms and quite toxic in the environment.

As for cadmium, my initial thought about the element occurring "naturally" as a mineral was wrong (certainly not the first time). Webmineral.com noted that cadmium was "found in the heavy non-magnetic fraction of a mechanical concentrate from a gabbro intrusion...from the Ust'-Khannin intrusive, Vilyui River basin, eastern Siberian platform." MinDat listed the Goldstrike Mine in Eureka County, Nevada, as producing native cadmium. However, both occurrences are very minor and more of a curiosity than a source of the metal.

So, if native cadmium is extremely rare and almost non-existent, where does cadmium needed in industry "come from?" Perhaps from minerals containing cadmium? What are these minerals?

For starters, all cadmium-bearing minerals are quite rare and only greenockite, a sulfide [CdS ; Hexagonal], is well known (and some of that may be hawleytite. Niedermayrite [$\text{Cu}_4\text{Cd}(\text{SO}_4)_2(\text{OH})_6 \cdot 4\text{H}_2\text{O}$] is a hydrated copper cadmium sulfate hydroxide; otavite [CdCO_3] is a cadmium carbonate; cadmoindite [CdIn_2S_4] is cadmium indium sulfide while cadmoselite [CdSe] is a cadmium selenide; hawleyite [CdS] is a sulfide crystalizing in the Isometric Crystal System and is a dimorph (same chemical formula) of greenockite that is Hexagonal; the arsenate in the group is keyite [$\text{Cu}_3\text{Zn}_4\text{Cd}_2(\text{AsO}_4)_6 \cdot 2\text{H}_2\text{O}$]. There may be others?

So, cadmium is produced as a byproduct during the refining of zinc (primarily), copper and lead ores. It appears that ores such as native copper, galena, sphalerite and smithsonite have trace amounts of cadmium present. I also found a note that stated cadmium is produced in countries that **refine** these ores as **opposed** to countries that **mine** the ore! In some cases, these countries are the same as the mines and refineries are together.

Within those rare minerals listed above I only have a single small specimen of greenockite. In fact, if an "ordinary rockhound" has a cadmium mineral in their collection it is usually greenockite, or at least labeled as such since it is sometimes confused with hawleyite.

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Greenockite (CdS) is a sulfide mineral that contains the negative anion sulfur (S) plus the positive cation cadmium (Cd). The most spectacular specimens have six-sided (hexagonal) crystals that are hemimorphic (are terminated in different manners at each end of the C axis) and are red to red-brown in color. Other specimens are massive in nature and tend to orange to orange-yellow to yellow in color (Figs. 1,2). The streak is red to red orange to brown. The crystals are usually vitreous while the crusting form is earthy to resinous. Greenockite is fairly soft at 3.0 to 3.5 (Mohs) and crystals are more transparent/translucent while encrustations are usually opaque. Crystals tend to break with a conchoidal fracture.



Fig. 1. Photomicrographs of greenockite occurring as honey orange encrustations with a couple of red poorly formed crystals. Width ~1.1 cm. Dark metallic mineral is most likely arsenopyrite.

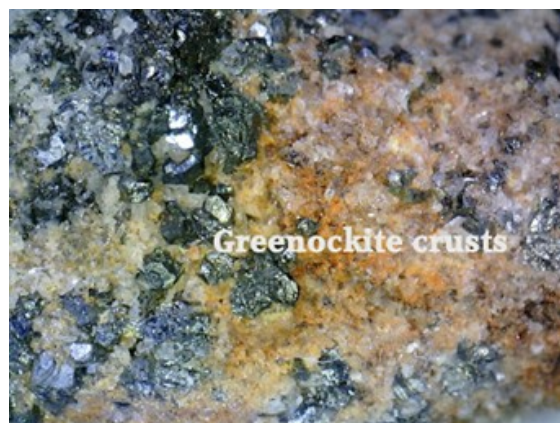


Fig. 2. Photomicrographs of greenockite occurring as honey orange encrustations. Width ~6 mm.

Greenockite is a secondary mineral and occurs in a variety of environments. For example, at Patterson, New Jersey, vugs in the basalt produce greenockite along with prehnite and zeolites. In the old zinc mines near Franklin, New Jersey, greenockite is found as earthy coatings on sphalerite. In some of the Tri-State (Missouri, Kansas, and Oklahoma) lead and zinc mines greenockite is found as an earthy crust on smithsonite and sphalerite. In addition, greenockite has been found in some slags where smithsonite was smelted. It is never a common mineral and tough to identify when the habit is encrusting rather than crystalline. It is a dimorph of hawleyite (CdS) and quite similar in appearance; however, hawleyite has not been reported from the Bolivia mines so I am sticking with greenockite.

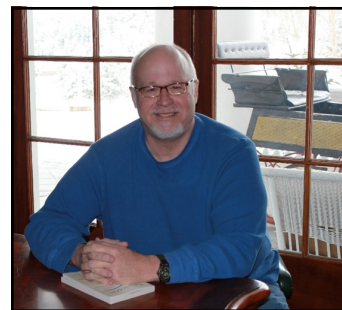
My specimen came from the tin (cassiterite) mines, specifically the Siglo XX Mine (Siglo Veinte Mine), Llallagua, Rafael Bustillo Province, Potosi Department, Bolivia.

An interesting tidbit or two about toxic cadmium: cigarette smoke contains cadmium as does coal--where the element ends up as part of the flue dust. Many phosphate fertilizers contain cadmium which is then transferred to agricultural soil (and maybe to the water supply?). Vincent Van Gogh was a big fan of cadmium based pigments for his paintings. And so, it goes.

Instead of trying to reproduce exactly what I see before me, I make more arbitrary use of colour to express myself more forcefully ... To express the love of two lovers by the marriage of two complementary colours ... To express the thought of a brow by the radiance of a light tone against a dark background. To express hope by some star. Someone's passion by the radiance of the setting sun.

Vincent van Gogh, 1888.

Photos from 2016. Submitted by Frank Rosenberg unless otherwise noted....



LONGTIME CSMS MEMBER INDUCTED INTO THE NATIONAL ROCKHOUD AND LAPIDARY HALL OF FAME. Photo submitted by Steve Veatch



Photo Submitted by Lisa Kinder

Best Wishes for a Wonderful New Year to come. May 2017 Bring Much Happiness, Joy, and many new found treasures!!!

Thank you for a marvelous experience as 2016 Pick and Pack Editor. Norma



Jenna Salvat at the regional science fair. Photo by Steven Wade Veatch.



Colorado Springs Mineralogical Society

Post Office Box 2, Colorado Springs, CO 80901

www.csms.us

APPLICATION FOR MEMBERSHIP

- Membership to CSMS is annual, from January 1st to December 31st. Membership dues **MUST** accompany this application, which **MUST** be filled out each year.
- Members must abide by the CSMS Constitution and By-Laws, located on the web at: http://www.csms.us//Constitution_and_By_Laws.pdf
- Members in good standing receive the following benefits: 10 electronic issues of the CSMS *Pick&Pack* newsletter, right to participate in all field trips (additional fees may be required on some field trips and members are responsible for all transportation to and from), participation in one or all Satellite Groups (some groups may request additional fees to help cover resource costs), free admission to the Western Museum of Mining and Industry, a year of learning and enjoyment, plus a lifetime of memories. The Pebble Pup program is a satellite program.
- Continuing memberships must pay full-year dues; a \$5 discount can be applied to renewals on or before January 31st. Anyone who has previously been a member **MUST** pay the full rate each year **REGARDLESS** of the time of the year they pay their dues.
- A person, family, or corporation joining the CSMS as a new member after June 30th shall pay half the yearly membership rate. A person joining CSMS as a new member after October 1st receives the rest of the current year plus the next year's membership. The partial year membership shall not apply toward the 25 year Lifetime Membership.
- Members who have paid their dues for 25 years will be awarded a Lifetime Membership on their 26th year. Lifetime Members receive all of the CSMS benefits and no longer have to pay the annual dues. Individual Memberships provided by Corporate Membership are excluded from Lifetime Status.
- Corporate membership grants up to 5 individual memberships and one yearly (10 issues) 3.5" x 2" advertisement in the CSMS *Pick & Pack*.

LAST	<input type="text"/>	FIRST	<input type="text"/>	MIDDLE	<input type="text"/>
SPOUSE	<input type="text"/>	Child (Name):	<input type="text"/>	Age:	<input type="text"/>
		Child (Name):	<input type="text"/>	Age:	<input type="text"/>
STREET	<input type="text"/>		CITY	<input type="text"/>	
STATE	<input type="text"/>	ZIP	<input type="text"/>	EMAIL	<input type="text"/>
CELL	<input type="text"/>		HOME	<input type="text"/>	

Have you previously been a member of the CSMS? **YES** **NO** WHEN **OVER: for Release**

Do you want your name published in the CSMS Membership Directory, only available to members? **YES** **NO**

Are you able to receive the Newsletter via email? **YES** **NO**

	New / Continuing Members		New Members Only	
	Before Jan 31	After Jan 31	After June 30	Oct 1 – Jan 31 following year
<input type="checkbox"/> Pebble Pup Membership (4 – 12 years old and parent is not a member)				
<input type="checkbox"/> Junior (Membership (12 – 17 year old and parent is not a member)	<input type="checkbox"/> \$10.00	<input type="checkbox"/> \$15.00	<input type="checkbox"/> \$ 7.50	<input type="checkbox"/> \$10.00
<input type="checkbox"/> Individual Membership (18 and over)	<input type="checkbox"/> \$25.00	<input type="checkbox"/> \$30.00	<input type="checkbox"/> \$15.00	<input type="checkbox"/> \$25.00
<input type="checkbox"/> Family Membership (2 adults & dependents under 18)	<input type="checkbox"/> \$35.00	<input type="checkbox"/> \$40.00	<input type="checkbox"/> \$20.00	<input type="checkbox"/> \$35.00
<input type="checkbox"/> Corporate Membership (entitles up to five (5) Individual Memberships)	<input type="checkbox"/> \$95.00	<input type="checkbox"/> \$100.00	<input type="checkbox"/> \$50.00	<input type="checkbox"/> \$95.00

SATELLITE GROUPS Please check ALL YOU MAY BE INTERESTED IN JOINING Fill out each year, please!!!		
PEBBLE PUBS <input type="checkbox"/>	FACETING <input type="checkbox"/>	LAPIDARY <input type="checkbox"/>
JUNIORS <input type="checkbox"/>	FOSSILS <input type="checkbox"/>	PHOTOGRAPHY <input type="checkbox"/>
CRYSTAL <input type="checkbox"/>	JEWELRY <input type="checkbox"/>	OTHER <input type="checkbox"/>
Other: _____		
VOLUNTEER OPPORTUNITIES ! VOLUNTEERS ARE WHAT MAKE OUR CLUB! Fill out each year!!!		
GUEST SPEAKER <input type="checkbox"/>	FIELD TRIPS <input type="checkbox"/>	EDITOR/WRITING <input type="checkbox"/>
CLUB OFFICER <input type="checkbox"/>	LOCAL ROCK SHOWS <input type="checkbox"/>	LIBRARY <input type="checkbox"/>
HISTORIAN <input type="checkbox"/>	ARTIST/MEDIA <input type="checkbox"/>	REFRESHMENTS <input type="checkbox"/>
List any other things you may be willing to do:		

I hereby agree to abide by the Constitution and By-Laws of the Colorado Springs Mineralogical Society.
CSMS Constitution and By-Laws are available at our website: www.csms.us

OVER: for Release

Signature of Primary Applicant or Guardian if Minor

Application Date:

Mail this form and your payment to: Colorado Springs Mineralogical Society PO Box 2 / Colorado Springs, CO 80901
Membership Chair: Rev: 11/26/16

**Release by Participants from Claims Arising By Virtue of Mineral Collecting
Led By Field Trip Leader of the Colorado Springs Mineralogical Society,
A Non-Profit Corporation – Member: Rocky Mountain Federation of Mineralogical Societies**

I/we, the undersigned, hereby request permission to participate in mineral collecting led by the Field Trip Leader of the Colorado Springs Mineralogical Society, a non-profit corporation.

I/we know the risks and danger involved in such activities and that unanticipated and unexpected dangers may arise during such activities, and I/we assume all risks of injury to my / our persons and properties that may be sustained in connection with the stated and associated activities in and around the premises.

In consideration of the permission granted to me/our participation in the stated activities, I/we hereby for myself, my heirs, administrators, and assigns release to the Colorado Springs Mineralogical Society and the Rocky Mountain Federation of Mineralogical Societies, and their representatives, servants, agents, officers and officials and all other participants in the stated activities of and from all claims, demands actions and causes of actions of any sort, for injuries sustained to my/our person and/or property during my presence on the premises and participation in the stated activities due to negligence or any other fault.

I represent that my/our true age is at least eighteen years of age, and if I am under the age of eighteen years, I represent and certify that I have the permission of my parents and/or guardians to participate in the stated activities, and that they have full knowledge thereof.

I certify that my attendance and participation in the stated activities is voluntary.

New: My photo may be used in the CSMS Publication "The Pick & Pack" YES or NO.

Effective from date: January 1, 20 through December 31, 20

I HAVE READ AND UNDERSTAND THE FOREGOING REQUEST AND RELEASE.				
Date	Name (Printed)	Signature	Hours Worked (when necessary)	Photo Release
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO
				Circle one YES or NO

Membership Form: Rev. 11-26-16

Classifieds



Our Staff... Norma Rhodes—Editor

We encourage everyone to submit articles, photos, illustrations or observations.

Share your experiences, your new finds, or simply your experience at our last field trip.

Handwrite it, type it, or email it. Format does not matter. All submissions are welcomed. The DEADLINE for items to be included in the next Pick & Pack, is the **21st of the month**

To submit an item:
For hardcopy photos or articles, mail to the address below or bring them to the General Meeting. All hardcopy photos remain the property of the submitter and will be returned. Electronic photos should be submitted at resolutions above 200 dpi in TIF, BMP, JPG, or PIC format. Articles are preferred in word. Editors will correct font.

E-Mail to:
csmseditor@hotmail.com

Mail to:
Pick & Pack Editor
PO Box 2
Colorado Springs, CO 80901

The PICK&PACK is published ten (10) times per year (no issues in January or August). Unless otherwise marked, materials from this publication may be reprinted. Please give credit to the author and CSMS PICK&PACK.



CSMS

T-Shirts, Badges, and Pins
are available for sale.

If you celebrated a CSMS anniversary in 2014 or 2015, you are eligible for your one year pin award

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Jeffrey L Otten, Colo. PLS 33199
Divide, CO 719-505-3576
jeffotten@highcountrylandservices.com
HighCountryLandServices.com

Brian Paterson was contacted by School Districts 11 and 20 regarding the minerals and crystals that have been donated to them over the past 10 years. With the retirement of the teacher that had handled getting the materials to the science teachers, SD11 and SD20 asked Brian to continue helping out teachers with assorted minerals. The crystals do not need to be whole, cleaned or have multiple types on one sample (e.g. smokies and Amazonite). The kids range in age from Grade 3 through Grade 11. Yes you can include just about anything. Have extra fossils? Micro-mounts? Gypsum? Tumbled? Kindly label the bag/box/whatever with what it contains. You can contact Brian by phone, email or at the regular meetings. (719) 359-6238, patersonbrian22@yahoo.com

ROCKS & RAILS

December 9-11

10am – 5pm Each Day

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

Boulder Model Railroad Club
39th Annual

Model Railroad Exposition

Come one, come all, and enjoy the Boulder Model Railroad Club (BMRC) train show where you can see many different Scale and Toy Train Layouts for the young and old alike. The show will also have many displays of Model Train related items to both teach and entertain everyone. This includes many vendor tables where you can purchase railroad-related items just in time for the Holidays.



bouldermodellrailroadclub.org

Flatirons Mineral Club
2016 Annual

Rock & Mineral Show

Gem and mineral dealers, exhibits
speakers, classes, grab bags
rocks, children's activities
kids' wheel, dig site
fossils, meteorites, tools
jewelry and more!

Bring your treasures for free
mineral identification.
Demonstrations include
polishing rocks using lapidary
equipment and silversmithing.



flatironsmineralclub.org

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PICK&PACK

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CSMS is an incorporated nonprofit organization with these goals:

To promote and disseminate knowledge of the earth sciences, especially as they relate to mineralogy, lapidary, and fossils.

To encourage study, collection, and fashioning of minerals.

To accomplish the same through social meetings, lectures, programs, displays, shows, and field trips.

The Pick & Pack is published 10 times each year to assist and promote the above.

Joining the Colorado Springs Mineralogical Society (CSMS):

Meetings are held the **third (3rd) Thursday of each month**, except January & August, **7:00 p.m.** at the Colorado Springs Senior Center, 1514 North Hancock Ave., Colorado Springs, CO. **Visitors are always welcome.**

CSMS also offers Satellite Group meetings that allow more focused attention in specific areas of our members' interests. Our current Satellite Groups consist of the following: Crystal Study Group, Faceting Group, Fossil Group, Jewelry Group, Lapidary Group, Micromounts Group, and Pebble Pups/Juniors. For details on Satellite Group meetings, check out the calendars on page 2 and the web site.

Yearly dues include 10 issues of the *PICK&PACK*, all field trips (additional fees may be required on some field trips, and members are responsible for all transportation to and from), participation in all Satellite Groups (some groups may request additional fees to help cover resource costs), free admission to the *Western Museum of Mining & Industry*, a year of learning and enjoyment, plus a lifetime of memories.

Individuals—\$30, Family—\$40, Juniors—\$15, Corporate—\$100, *****Application is on the web site.

If you are interested in joining CSMS or would like more information, we encourage you to attend our next General Meeting or visit our web site: www.csms.us.

CSMS is a Member of the following organizations:

American Federation of Mineralogical Societies (AFMS)

www.amfed.org

Rocky Mountain Federation of Mineralogical Societies (RMFMS)

www.rmfmts.org