



# Colorado Scientific Society

Newsletter of the Society

May 2019

***May meeting, S.F. Emmons Lecture, Tuesday, May 14, 7:30 p.m.***

*Ben H. Parker Student Center, CSM campus*

*A public lecture as part of the USGS-CSM Mineral Resources Forum*

***Synthesis, serendipity, and an open mind: timely approaches to timeless challenges in mineral deposits***

***Dr. Mark Barton***

***University of Arizona***



Mark Barton is Professor of Geosciences and and Co-Director of the Lowell Institute for Mineral Resources at the University of Arizona. Mark earned BS and MS degrees from Virginia Tech (1977, 1978) and a PhD from the University of Chicago (1981). Following a post-doctoral fellowship at the Geophysical Laboratory (Carnegie Institution of Washington), he taught at the University of California, Los Angeles (UCLA) before joining the faculty at the University of Arizona. His research interests and span many aspects of energy and mass transfer in the Earth's lithosphere and their applications to mineral deposits. He co-founded the Lowell Institute for Mineral Resources which is a state-, industry-, and privately-funded interdisciplinary organization that catalyzes and facilitates research and education related to mineral resources spanning science and engineering to public health and policy. In the early 2000s, he collaborated with his former PhD students David Johnson and Eric Jensen in founding Bronco Creek Exploration which is now part of EMX Royalty.

***Abstract:***

Fe-oxide(-Cu-Au) [aka "IOCG"], Carlin-type Au, and other ore system enigmas are intriguing because of the challenges they pose. Surface fluids likely play a larger (and readily testable) role than is widely accepted. Why then are there dramatic differences in interpretation? Too often comfortable answers—geological stories—seem sufficient. Partly too because we have become tool-focused. The last decade, indeed the last century, has seen remarkable advances in the many tools applied to mineral deposits, even though the basic questions and the fundamental applications have largely remained the same. With the newest results it is easy to be facile; yet while state-of-the-art tools are important they are subordinate to critical thinking and, in particular, to being open to and willing to test alternative ideas – Chamberlin's "multiple working hypotheses" – or to confronting the discomfort of Peirce's "irritation of doubt." Luck too plays a central role, but it's a role that speaks best to an open, prepared mind. In this talk, I share how my understanding of these and other fascinating mineral systems continues to evolve in response to new ideas and observations, and to the immense value of past work.

## **CSS Spring Field Trip, Sunday, May 19, 2019**

### **Denver Basin Geology and Its Rich Cultural, Mining, and Industrial History**

Join us for a one-day field trip with stops relating cultural, mining, and industrial exploration and discovery to the geologic and Pleistocene geomorphic evolution of the western margin of the Denver Basin.

**LEADERS:** Mark Mitchel (Paleocultural Research Group), Jason McGraw (General Shale), Donna Anderson (Colorado School of Mines), David Lindsey (U.S. Geological Survey, Emeritus)

**MEETING PLACE:** We will meet at 08:15 at the I-70 Morrison exit in the Woolly Mammoth Park and Ride and car pool from there. Enter at the westernmost entry opposite the EXXON filling station and gather at the Lariat Loop kiosk.

Please bring your own lunch and water.

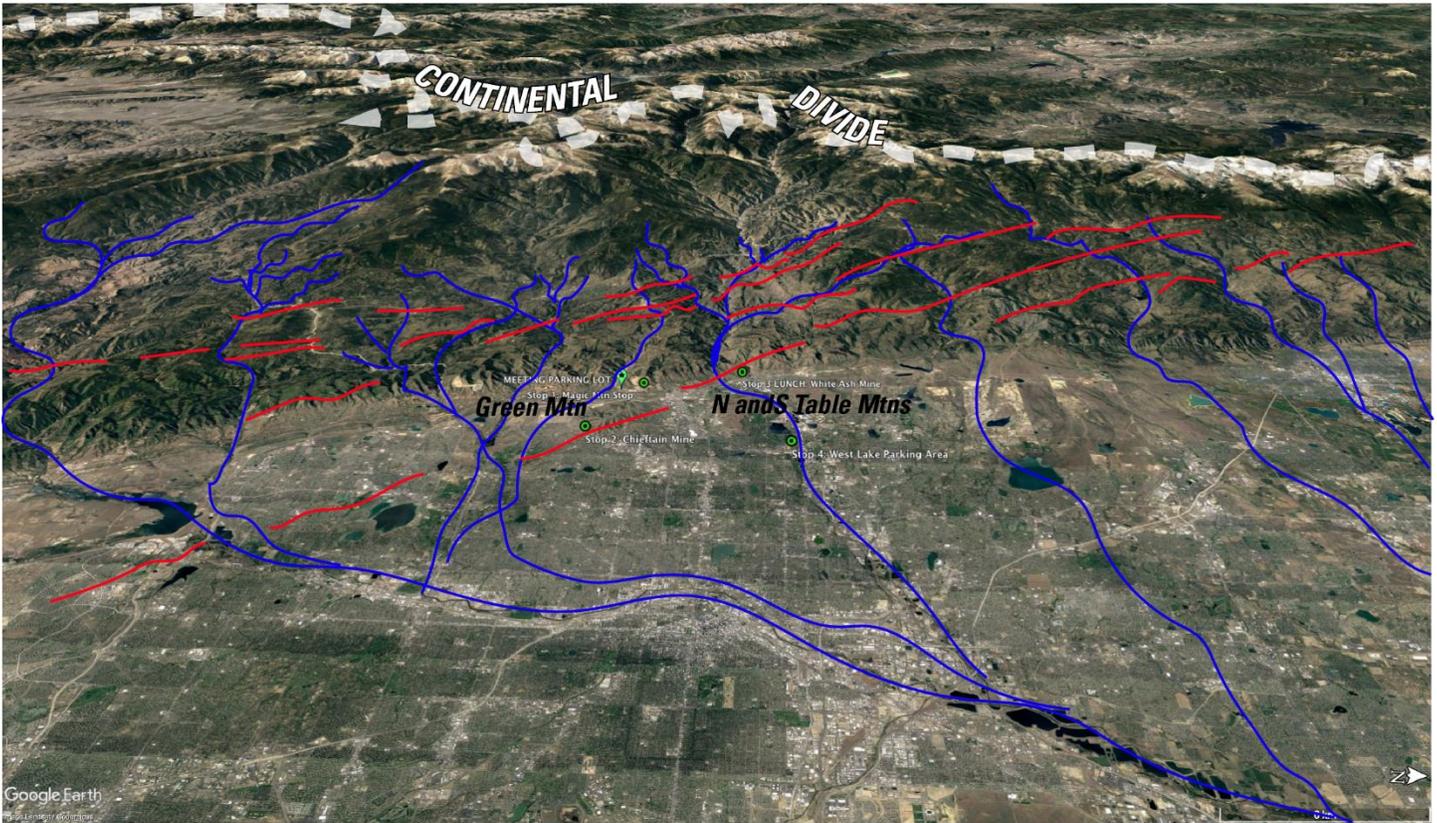
The trip will include visits to:

- **Magic Mountain Paleo Indian archeological site**, Denver Museum of Nature and Science and the Paleocultural Research Group  
This has been in the news because of recent excavations by the Denver Museum of Nature and Science. Mark Mitchell will share his findings of the site's geology, stratigraphy, and Carbon-14 dates, and habitation history.
- **Chieftain mine** (General Shale Brick, formerly Robinson Brick Company) clay pit on West Alameda Parkway; Jason McGraw of General Shale will lead a tour focused on industrial minerals geology. Hard hats are not required but closed-toe shoes are.
- **The White Ash and Loveland Mines**, Golden; discussion led by Donna Anderson, Affiliate faculty, Colorado School of Mines  
This will be the lunch stop. Please bring your own lunch and water.
- **Clear Creek geology and Quaternary geology of the South Platte Basin**; at West Lake parking area on Clear Creek on the east side of Youngfield St., south of 42nd Ave. Dave Lindsey will show and discuss Clear Creek Plio-Pleistocene stratigraphy and geomorphic relationships related to the Quaternary geology of the South Platte basin and incision history of Clear Creek

Join us for this insightful venture, by sending **Cal Ruleman (cruleman@usgs.gov , 303-236-7804)** **your name, email, cell phone number.**

Non-members of CSS are welcome to join us too; there will be a **\$10 field trip fee**, brought to the event, for non-members only. **Students are always FREE.**

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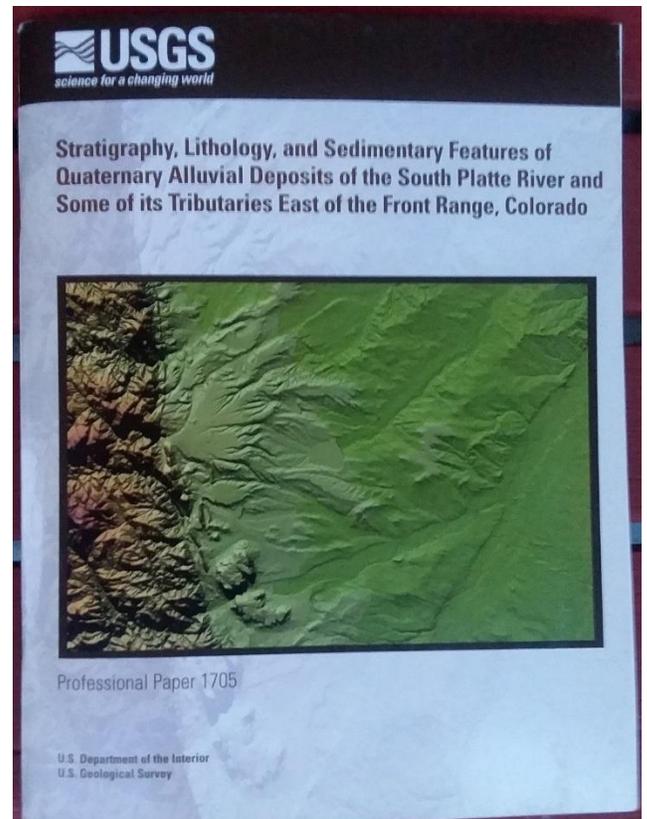


**Schematic Depiction of the Neogene Structural and Pleistocene Fluvial Relationships along the Front Range-Denver Basin margin. Red lines are Neogene extensional fault zones. Image courtesy of GoogleEarth.**

Image from Cal Ruleman

Regarding our May 19 field trip, you may be interested in USGS Professional Paper 1705, published in 2005, “Stratigraphy, Lithology, and Sedimentary Features of Quaternary Alluvial Deposits of the South Platte River and Some of its Tributaries East of the Front Range, Colorado”, by David A. Lindsey, William H. Langer, and Daniel H. Knepper, Jr., 70 p.

This Professional Paper *is* still available in printed copy from the USGS; at latest check, there are some 130 copies in stock. You can order a copy online via the “USGS Store” (USGS does *not* any longer have an over-the-counter actual store from which to purchase maps or publications) at <https://store.usgs.gov/>; look for product #205643. The cost of PP 1705 is \$16, plus there is a single \$5 service charge for the full content of any order. If you have difficulty placing an order online, you may also do so by calling 1-888-ASK-USGS (1-888-275-8747). Orders are delivered by U.S. Mail. --- PJM



***Our upcoming meetings & field trips in 2019:***

**Tuesday, May 14**, Colo. Sci. Soc annual Emmons Lecture and May meeting, to take place in conjunction with a 2.5-day USGS-CSM joint Mineral Resources Forum. The lecture will be a presentation by **Dr. Mark Barton**, Univ. of Arizona, Lowell Institute for Mineral Resources: **Synthesis, serendipity, and an open mind: timely approaches to timeless challenges in mineral deposits**. In the Ben H. Parker Student Center, Colorado School of Mines campus, 7:30 p.m. All are welcome to attend.

**Sunday, May 19**, CSS Spring Field Trip: **“Quaternary Geology of the Denver Basin”**. “A one-day field trip (8:15 a.m. to about 4:30 p.m.) starting at the Golden/Morrison I-70 exit/Woolly Mammoth Park & Ride on US-40 west of the interchanged, with about 4 field stops relating to the Quaternary/Pleistocene geology of the Denver Basin. The trip will include a visit to the Magic Mountain archeological site, which has recently been in the news because of recent new excavations by DMNS.

**CSS Fall Field Trip, Saturday and Sunday, September 14-15, 2019**  
**Geology and Geoheritage of the Florissant-Cañon City-Florence area**

A two-day field trip with an overnight in Cañon City. Visiting: Florissant Fossil Beds National Monument; Skyline Drive by Cañon City; Royal Gorge; the Florence coal, oil, and gas basin; and the Cope-Marsh quarries at Garden Park.

**Fall 2019 CSS planned meeting dates:** Sept. 19, Oct. 17, Nov. 21, Dec. 19. Details to come.

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*Magic Mountain site; Colorado Encyclopedia, <https://coloradoencyclopedia.org/article/magic-mountain-archaeological-site>*

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## **Fred (Pete) Peterson, Memorial Service**

Fred (“Pete”) Peterson, retired USGS geologist and longtime Sci. Soc. member, passed away on March 15, 2019. Pete was well known for his studies of Mesozoic sedimentary rocks of the Colorado Plateau area, particularly the Morrison Formation. He will be sorely missed by his many friends and colleagues. There will be a memorial service for Pete on June 1, 3 p.m., at Three Trees Chapel, 13416 West Arbor Place, Littleton, CO.

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## **CSS Awards at Colorado State Science and Engineering Fair, April 11, 2019**

For the past quite a few years, CSS member Chuck Weisenberg has reviewed the exhibits and selected project to receive the awards that the CSS makes at the fair. This year, we gave Chuck a break, and Jane Dianich [*ed. note—Jane, a retired earth science teacher, is my wife—PJM*] judged the exhibits, with some comments also from me—I was also judging projects, not for CSS but for the regular awards competition in the Senior Earth Science division.] The CSS awards are for “Excellence in Geology”, and for this we are willing to consider projects in any category at the Fair, such as Environmental Science or Energy, not just Earth Science, if the project has a geological component. Here are the projects we chose for the CSS awards:

CSS “Excellence in Geology Awards”:

Senior Division, 1<sup>st</sup> Prize, \$100: “Rock on. Limestone’s Potential to Improve Water Quality in the Alamosa River Drainage. Amber Michel, 12<sup>th</sup> grade, Monte Vista High School; Project 2-07-008, Senior Division Environmental Sciences.

Senior Division, 2<sup>nd</sup> Prize, \$75: “Induced Seismicity: Relationships between Earthquake Frequency and Magnitude to Saltwater Injection in Oklahoma Arbuckle Group”. Skylar Gale, 12<sup>th</sup> grade, Evergreen High School, Project 2-04-002, Senior Division Earth & Space Sciences.

Junior Division, 1<sup>st</sup> Prize, \$75: “Leaky Yellow Boy” [studying acid mine drainage in Summit County, Colorado]. Lily Klapp & Kelsea Hall, 7<sup>th</sup> grade, Lewis Palmer Elementary School, Monument CO, Project 1-07-301, Junior Division Environmental Sciences.

Junior Division, 2<sup>nd</sup> Prize, \$50, “Soil Liquifaction”. Alia Morris, 7<sup>th</sup> grade, Frontier Academy Secondary School, Greeley CO, Project 1-04-007, Junior Division Earth & Space Science.

*P.S., ed. note again—I think we all owe Chuck Weisenberg an extra vote of thanks, for his many past years of judging projects for us at the State Science Fair. Because Chuck has always done this—the Fair is on the CSU campus in Fort Collins—I think I had always assumed that Chuck lived in or near Fort Collins. I learned, that this is not so—he actually lives in Lakewood, so he has always made this trip to CSU, just to judge the projects for our Society. A big thank-you to you, Chuck! (Chuck does expect to judge projects again for us, in coming years.)*

**Colorado Scientific Society dues** are \$25 for regular members, **\$20 if dues renewals are paid before Jan. 31 of each year**, \$10 for corresponding members (outside the Colorado Front Range area) and only \$5 for students. A Lifetime Membership is now available, for \$395.00. Mail a check to the CSS or pay with a credit card using PayPal on the CSS website. Please contact CSS Treasurer Don Sweetkind at 303-236-1828 or dsweetkind@usgs.gov if you are uncertain of your dues or membership status. Extra payments to contribute to our Memorial Funds or Endowment Fund are always most welcome; you’ll see a list of them on the membership form attached to this newsletter, or see our website at <http://coloscisoc.org/membership-payment/>. Or see <http://www.coloscisoc.org>. To pay by mail, send payments to: **Colorado Scientific Society, P.O. Box 150495, Lakewood CO 80215-0495**

## Calendar of Coming Events

**Thurs., May 9,** 7:30 p.m., Friends of Mineralogy, Colorado Chapter, bimonthly meeting: featuring Marty Houhoulis, of Westcliffe, CO, on **“Collecting Garnet in Nevada and Mexico”**. Marty will talk about his longtime experience field collecting garnet crystals, particularly at Garnet Hill, Ely, Nevada, and Cerro El Toro, La Higuera, Sonora, Mexico. FM’s previously scheduled talk, “Rhodochrosite from the Capillitas mine, Argentina” by David Stout, had to be rescheduled to a future date. Meeting in Berthoud Hall, Room 109, Colorado School of Mines campus, Golden. All are welcome.

**Fri., May 10,** 2:00 p.m., Denver Museum of Nature & Science, Earth Sciences Colloquium, [note 2 p.m. start time; a 2<sup>nd</sup> talk follows at 3:00] **“The dinosaur resurrection: Modern birds, and their rise from Chicxulub’s ashes”**; Dan Field, Univ. of Cambridge. VIP Room, DMNS; all are welcome, museum admission is not required. 2<sup>nd</sup> presentation this same day:

3:00 p.m.: **The end-Permian mass extinction from a high southern palaeolatitude perspective**, by Chris Fielding, Univ. of Nebraska.

**Fri.-Sat., May 10-11,** 9 a.m. – 4 p.m., **“Rock and Stone Sale”**, “Minerals, faceting rough; we have acquired too many rocks; fluorite, quartz, halite, petrified wood, topaz, obsidian, faceting rough, aquamarine, and lots more”. By 3 Colorado Springs area collectors; 5309 Flintridge Dr., Colorado Springs 80918; questions, contact fs\_rosenberg@hotmail.com.

**Sat., May 11,** 10 a.m. – 4 p.m., **“Dan’s Used Rocks” Annual Open House and Clearance Sale**, at Dan Unruh’s home, 12296 W. Mississippi Ave., Lakewood. “Eliminating my non-thumbail inventory; hundreds of specimens at 50%-75% off; numerous inexpensive flat lots with quantity discounts”. Email dansrocks@comcast.net, H 303-986-3647, C 303-437-9643.

**Mon., May 13,** 11:30 a.m. – 1:00 p.m., **The Belle Monte Iron Furnace, Marshall, Colo.**, by Beth Simmons and Bill Reich, at the weekly meeting of the Denver Mining Club. All welcome; at the Golden Corral Buffet, 3677 S. Santa Fe Dr., Sheridan (west side of Santa Fe Dr., south of Hampden). Purchase of lunch is required.

**Tues., May 14,** 7:30 p.m., Colorado Scientific Society annual Emmons Lecture, by **Dr. Mark Barton**, Univ. of Arizona, Lowell Institute for Mineral Resources, **Synthesis, serendipity, and an open mind: timely approaches to timeless challenges in mineral deposits**. To be held in the Ben H. Parker Student Center, CSM campus; all are invited to attend. This public presentation will take place in conjunction with a 2.5-day USGS-CSM joint Mineral Resources Forum.

**Wed., May 15,** 3:00 p.m., Denver Museum of Nature & Science, Earth Sciences Colloquium, **“Before there were ankylosaurs there were aetosaurs”**; Andy Heckert, Appalachian State Univ. In Studio 102/103 (not in VIP Room) DMNS; all are welcome, museum admission is not required.

**Sun., May 19, Friends of Mineralogy, Colorado Chapter, Silent (+Vocal) Auction.** Noon to 4 p.m. (setup begins at 11 a.m.), Clements Community Center, 1580 Yarrow St., Lakewood CO. All are welcome to attend.

**Sun., May 19,** 8:15 a.m. – 5:00 p.m., Colorado Scientific Society, Spring Field Trip, **“Denver Basin Geology and Its Rich Cultural, Mining, and Industrial History”**. Stops, all near Golden, will include the Magic Mountain paleo-Indian archeological site; the Chieftain clay mine; the sites of the White Ash and Loveland coal mines; and the Quaternary geology of Clear Creek. Led by Mark Mitchel (Paleocultural Research Group), Jason McGraw (General Shale Brick Co.), Donna Anderson (Colorado School of Mines) and David Lindsey (USGS). Interested non-members are invited to join the CSS for this trip, if they pay a \$10 fee to join the trip. If you wish to come, please contact Cal Ruleman in advance, cruleman@usgs.gov, 303-236-7804; leave your name, email address, and cell phone number. The trip will meet and car pool from the west end of the Woolly Mammoth Rideshare Lot, on the south side of US-40, west of the I-70/US-40/Highway 93 interchange, exit 259 (meet at the Lariat Loop kiosk, at the west parking lot entrance opposite the Exxon gas station). For more info see <http://coloscisoc.org/>.

**Fri.-Sat.-Sun., May 31-June 2, Pikes Peak Gem & Mineral Show**, Norris-Penrose Event Center, 1045 Lower Gold Camp Road, Colorado Springs, CO 80905. Sponsored by the Colorado Springs Mineralogical Society. Hours: noon-7 pm Fri., 10-5 Sat, 10-4 Sun. Adult admission \$5.

**Tues.-Wed.-Thur., June 4-6**, Two rock and mineral + geology classes for educators, with registration and teacher recertification credit through the Colorado School of Mines Teacher Enhancement Program. See <https://te.csm.space.com/register.php>, Summer 2019 courses, for **Rocks & Minerals, June 4-5**, CT-9666-19D, fee \$110, 1.0 credit hour; and **Walking Tour of Building Stones in Denver, June 6**, CT-04131-19D, fee \$80, 0.5 credit hour; plus many other classes available through CSM. One of the other classes is **Dinosaur Ridge Teacher's Workshop, July 9-10**, CT-9206-19M, fee \$125, 1.0 credit hour.

**Wed., June 5**, 3:00 p.m., Denver Museum of Nature & Science, Earth Sciences Colloquium, "**Deciphering dinosaur lives: From microscopes to Madagascar**"; by Kristi Curry Rogers, Macalester College. In Ricketson Auditorium (not in VIP Room) DMNS; all are welcome, museum admission is not required.

**Mon., June 10**, 3:00 p.m., Denver Museum of Nature & Science, Earth Sciences Colloquium, "**Cursed seashells: Deciphering one of the most ubiquitous Paleozoic fossils, Rafinesquina**"; by Ben Dattilo, Purdue University. In Community Room (3<sup>rd</sup> Floor), not in VIP Room, DMNS; all are welcome, museum admission is not required.

**Leonardo da Vinci at the Colorado School of Mines, Arthur Lakes Library**: In addition to the **Leonardo da Vinci: 500 Years of Genius** exhibit now in progress at the Denver Museum of Nature and Science (see <https://secure1.dmns.org/leonardo-da-vinci-500-years-of-genius>), there is another excellent exhibit about his work, currently on display at the Lakes Library on the CSM campus. The **Machines of Change: The Da Vinci Machines** exhibit includes "over 60 authentic reproductions of machines and devices designed by Leonardo DaVinci were created using similar materials, building techniques and tools that Leonardo would have had access to in his time", plus full-size reproductions of Leonardo's most famous paintings. The exhibit, free to all visitors, is spaced around the corridors and reading rooms of the main floor of the library. Library hours are 8 a.m. to 8 p.m. most days, 12 to 6 weekends. They say that the exhibit at CSM will be open until mid-July.

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*For more lecture series during the year see:*

**Colorado Beer Talks** (2<sup>nd</sup> Tuesday, 6-8 p.m.), Windy Saddle Café, 1110 Washington Avenue, Golden, "Golden's grassroots version of TED talks, Expand your mind with a beer in your hand", <http://goldenbeertalks.org/>

**Colorado Café Scientifique in Denver**, monthly lectures on science topics held either at Blake Street Station or Brooklyn's, Denver; open to the public, no charge other than refreshments you may choose to purchase; see <http://cafescicolorado.org/>.

**Colorado Scientific Society** (3<sup>rd</sup> Thursday, 7 p.m.), see <http://coloscisoc.org/>. Meets at Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood CO, except when noted.

**CU Geological Science Colloquium** (Wednesdays, 4 p.m.) see <http://www.colorado.edu/geologicalsciences/colloquium>

**CSU Dept. of Geoscience Seminars** (Fridays, 4 p.m.), see <https://warnercnr.colostate.edu/geosciences/geosciences-seminar-series/>

**Van Tuyl Lecture Series, Colorado School of Mines**, (Thursdays, 4 p.m.): <https://geology.mines.edu/events-calendar/lectures/>

**Denver Mining Club** (Mondays, 11:30), see <http://www.denverminingclub.org/>.

**Denver Museum of Nature and Science, Earth Science Colloquium series**, 3:00-4:00 p.m., VIP Room unless noted, day of the week varies. Museum admission is not required; see <http://www.dmns.org/science/research/earth-sciences/>

**Denver Region Exploration Geologists Society** (DREGS; 1<sup>st</sup> Monday, 7 p.m.), <http://www.dregs.org/index.html>

**Florissant Scientific Society** (FSS); meets monthly in various Front Range locations for a lecture or field trip; meeting locations vary, normally on Sundays at noon; all interested persons are welcome to attend the meetings and trips; see <http://www.fss-co.org/> for details and schedules.

**Nerd Night Denver** is a theater-style evening featuring usually 3 short (20-minute) TED-style talks on science or related topics; held more-or-less monthly at the Oriental Theater, 4335 W. 44<sup>th</sup> Ave., Denver; drinks are available; for ages 18+. Admission is \$6 online in advance, \$10 at the door. See <https://www.nerdnitedenver.com/>.

**Rocky Mountain Map Society** (RMMS; Denver Public Library, Gates Room, 3<sup>rd</sup> Tuesday, 5:30 p.m.), <http://rmmaps.org/>

Western Interior Paleontological Society (WIPS); beginning January 2019, WIPS will meet on the 1<sup>st</sup> Monday of the month, 7 p.m., at Lowry Conference Center, 1061 Akron Way, Denver. See <http://westernpaleo.org/> .

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## ***2019 Colorado Scientific Society Officers, Councilors, and Committee Chairs***

### **Officers**

President..... Tom Casadevall, [tcasadev@gmail.com](mailto:tcasadev@gmail.com), 720-244-7052  
President-elect ..... Jim Paces, [jamespaces@comcast.net](mailto:jamespaces@comcast.net)  
Past President..... Bob Raynolds, [bob.raynolds@dmns.org](mailto:bob.raynolds@dmns.org)  
Secretary..... Lisa Fisher, 303-215-0480, [lisa.fisher@alumni.mines.edu](mailto:lisa.fisher@alumni.mines.edu)  
Treasurer..... Don Sweetkind, 303-236-1828, [dsweetkind@usgs.gov](mailto:dsweetkind@usgs.gov), or  
[dsweetkind@gmail.com](mailto:dsweetkind@gmail.com)

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2017-2019: Jim Reed, [jim@rockware.com](mailto:jim@rockware.com)  
2017-2019: Chris Morrison, [chris-morrison@comcast.net](mailto:chris-morrison@comcast.net)  
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2019-2021: Linda Barton Cronoble, [lbarton1611@gmail.com](mailto:lbarton1611@gmail.com), 720-338-1237  
2019-2021: Yvette Kuiper, [ykuiper@mines.edu](mailto:ykuiper@mines.edu), 303-273-3105

### **Committee Chairs**

Database Manager: Paul Morgan, 303-384-2648, [morgan@mines.edu](mailto:morgan@mines.edu)  
Field Trip Chair: Cal Ruleman, 303-236-7804, [cruleman@usgs.gov](mailto:cruleman@usgs.gov)  
GSA Meeting Co-chairs, Lisa Fisher & Libby Prueher  
History Chair: Beth Simmons, [cloverknoll@comcast.net](mailto:cloverknoll@comcast.net)  
Hospitality Chair: Mary-Margaret Coates, [geotechedit@gmail.com](mailto:geotechedit@gmail.com)  
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The CSS website is [www.coloscisoc.org](http://www.coloscisoc.org). Anyone can also view our facebook page, whether you have a facebook account or not, at <https://www.facebook.com/groups/511533159044226/> . If you use facebook—please go there and “like” the CSS! (Just search there for Colorado Scientific Society.)

***And once more: to pay dues online, please go to:***  
***<http://coloscisoc.org/membership-payment/> Thank you!***