

Colorado Scientific Society

*The objective of the Society is to promote
the knowledge and understanding of Earth science,
and its application to human needs*

What's New in the Cambrian? *Two presentations by James "Whitey" Hagadorn, Denver Museum of Nature and Science*



NOT →
Thursday!!

Wednesday, April 18, 2012

Shepherd of the Hills Presbyterian Church

20th Ave. at Simms St., Lakewood

Social half-hour—6:30 p.m. Meeting time—7:00 p.m.

← SAME
LOCATION!!

What's New in the Cambrian?

Two presentations by James “Whitey” Hagadorn,
Denver Museum of Nature and Science

(1) Death of a Megapredator

Anomalocaridids were the first large predators, and are thought to have been ferocious consumers of trilobites and other prey that inhabited early oceans. Like *Tyrannosaurus rex*, sabre-toothed cats, and similar apex predators, they first became known from a famous deposit—the Cambrian-age (510-million-year-old) Burgess Shale. Aside from their iconic status, anomalocaridids also play an important role in our understanding of Earth history and evolution because they are keystone organisms. They are keystones because our interpretations of their biology and ecology, based on the morphology of fossils, anchor our understanding of how entire marine ecosystems functioned. Yet new finite element modeling, taphonomic, and mineralogic analyses of these extinct creatures seems to contradict the longstanding interpretation of the biology and ecology of these animals, suggesting rather that they may have been small, that their mouths were soft, that they could not close their mouth, and that they could not have possibly eaten trilobites. Similarly, analyses of malformed or “bitten” trilobites interpreted to be prey suggests that they could not have been deformed by the mouth or appendages of any known anomalocaridid. Analysis of putative anomalocaridid coprolites (i.e., fossilized feces) from the same deposits suggests that coprolites were produced by other animals or inorganic processes. Based on this new work, it is unclear if these iconic predators were really just small worm-suckers or whether they were early plankton combers; regardless, this new data substantially changes the way we interpret the complexity of ancient ecosystems, the evolution of large arthropods and their kin, and biogeochemical feedback loops in organic-rich muddy settings.

(2) Surfing Cambrian Coasts: First Animals on Land

Why did animals crawl out of the ocean and onto land? How did they do it, and who first succeeded? What was “land” like? An understanding of early animal-influenced coastal systems is emerging from Cambrian strata of North America and Arabia, where it is possible to tie animal activities directly to environments by linking fossils to facies. For example, eolian foresets of the Furongian (“Late” Cambrian) Gunter and Lamotte Sandstones of Missouri, and the Series 2 (“Middle” Cambrian) Keeseville Member of the Potsdam Group of New York have arthropod trackways that were produced subaerially, by euthycarcinoid-like animals crawling on coastal dune slip faces. These fossils represent some of the first evidence of successful land-going animals. However, in order to get to these dunes, animals must first have crawled across other intermittently wet coastal landforms, such as tide- and sand-flats and beaches. It is in these settings where they first experienced the vicissitudes of crossing the subaqueous-subaerial divide—learning to withstand loss of buoyancy and aqueous respiration, and the hazards of increased desiccation, ultraviolet radiation and temperature variation. Evidence of these pioneering forays comes from Series 2 (“Early” Cambrian) to Series 3 intertidal-supratidal lithofacies of the Elk Mound Group of Wisconsin. There, a low diversity community of large euthycarcinoid-like arthropods, soft-bodied or weakly sclerotized molluscs, and ?annelids? crawled across exposed sand flats during and between episodes of subaerial exposure. Although the arthropods are represented by both body and trace fossils, most of this community is only known from its trackways or body impressions. The trackways link the timing of animal activity to specific depositional events, including individual episodes of subaerial exposure. Coeval strata of the Arabian Peninsula, which effectively represent a Gondwanan tectonic regime, contain similar information about the colonization of land—but Terreneuvian (i.e., “Early” Cambrian) strata also contain evidence for arthropods crawling up actively flowing rivers. Given that freshwater environments were not colonized by animals until tens of millions of years later, it is possible that such fossils represent ?unsuccessful? exploratory ventures or other behaviors.

James “Whitey” Hagadorn is currently the Tim and Kathryn Ryan Curator of Geology at the Denver Museum of Nature & Science. There, he curates the mineral, rock, meteorite, and invertebrate fossil collections. Although originally from San Diego, California he has been fortunate to have also lived in Pennsylvania, Montana, Massachusetts, and Texas. Everything about “deep time” fascinates him, and he has been lucky to have spent the last 20 years studying modern and ancient environments all over the world. Much of his research has focused on the latest part of the Precambrian (700–542 million years ago) and the early parts of the Paleozoic (542–450 million years ago), intervals of time that witnessed some of the most profound changes in environments and biota in all of Earth history. Through fieldwork, labwork, and collaboration with academic and citizen scientists, he has published papers focused on interpreting ancient sedimentary environments, tectonics, ocean chemistry, fossils, microbial structures, and a variety of enigmatic ‘whatsits’. Although all of this work contributes to improving our understanding of ancient Earth systems, Hagadorn is cognizant of the need to leverage our understanding of ancient Earth systems to better understand how our Earth will change in the future—as a result of human activities.

President's Message, by Pete Modreski



Greetings everyone! Please remember, that our April meeting will be on **WEDNESDAY, April 18**, rather than the third Thursday of the month. It will be at our regular meeting place for the year (special meetings excepted), Shepherd of the Hills Church (see map below). I think all will enjoy the trip to the Cambrian that Whitey Hagadorn has planned for us that evening. (For those on the CSS Council, we will try to hold a short Council meeting beginning at 5:30 p.m. before the start of the meeting.)

About field trips and such: we've designated the evening of Saturday, April 28, as a CSS Family Night, to meet at Chamberlin Observatory for their monthly open house-star (and planet and moon) viewing, hosted by the Denver Astronomical Society. The start time for Open Houses varies with changes in the seasons. In the Spring and Fall, 6:30 or 7:00 p.m. is about right, so we are planning to meet at the observatory at 7 p.m. If you arrive early, you can watch DAS members set up their telescopes and other equipment for the night's observing. [Sunset on April 28 will be at 7:52 MDT] See page 5 in this newsletter for more info. And finally, our allotted number of spaces reserved for CSS on the Cumbres & Toltec Scenic Railroad, June 24 Geology Train Excursion have been filled. But, it may still be possible for interested persons to book reservations on this train via the train Web site:

<http://www.cumbrestoltec.com/geologytrainexcursion>

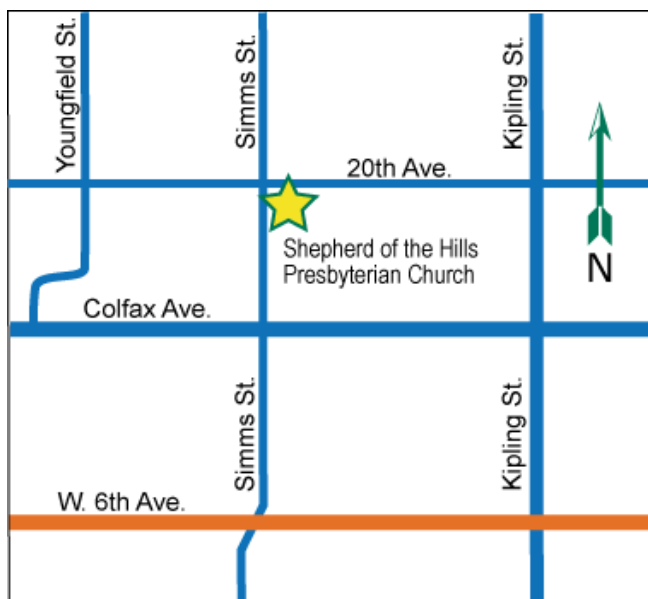
You'll read in this newsletter about the closing of the CU Dinosaur Tracks Museum on the Auraria Campus, after May 10. For those CSS members who can make it, I'd like to designate a date and time of Noon, Thursday, May 3, to meet informally to tour the Tracks Museum and see their displays of dinosaur and other fossil tracks and trackways. The museum is located in the St. Cajetans Building, at the end of Lawrence Way on the Auraria Campus; see <http://www.ahec.edu/campusmaps/ahec3d.pdf> for an Auraria campus map showing parking lots; St. Cajetans is building #16 at the center of the map.

Best regards to all, Pete Modreski

Map to the CSS meeting on Wednesday, April 18

**Shepherd of the Hills Presbyterian Church
11500 West 20th Avenue
Lakewood, Colorado 80215**

**Your taxes are DONE,
so come hang out with us!**



Short Course in Mineral Deposits at Metro State College, Denver

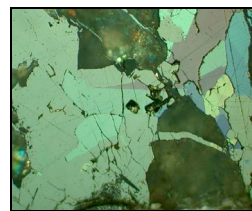
Instructor: Dr. John L. Lufkin contact: lufk3@comcast.net, or 303-593-0975
Ph.D., Stanford University

Aug 6-11, 2012 Geology of Ore Deposits

Aug 13-17, 2012 Ore Mineralogy & Microscopy

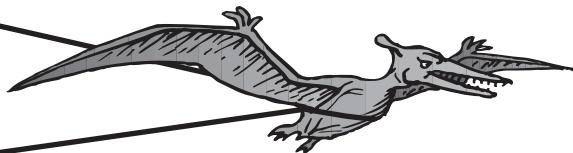
Courses are limited to 10 participants.

Registration: \$500 per course if registered before July 1; after that date, \$750.



WELCOME NEW MEMBERS!!

*Scott Larson, Fred Olsen,
Nathan Rogers, Lauren McIver,
and Marieke Dechesne*



SPRING MEGA SALE at the USGS STORE: Over 60,000 selected items for only \$1 !!!

NOW through May 7th. Buy selected USGS Maps and Products at wholesale prices.

Have questions?

Please call 1-888-ASK-USGS (1-888-275-8747) Select Option 1, or email us at: usgsstore@usgs.gov.

Additional Information:

Standard shipping cost estimations for \$1 sale items:

* \$5 Handling charge on all orders.

• 1–25 maps -> \$5.00

* Shipping charges apply.

• 26–50 maps -> \$7.50 • 51 + maps -> \$10.00

*All sales are final. *While quantities last.

Use the online search tool at:

[http://store.usgs.gov/b2c_usgs/usgs/zInvReductionSearchStart/\(xcm=r3standardpitrex_prd&layout=6_1_61_55&uiarea=0&ctype=areaDetails&care=0000000150&cit=00000001500000002787\)/.do](http://store.usgs.gov/b2c_usgs/usgs/zInvReductionSearchStart/(xcm=r3standardpitrex_prd&layout=6_1_61_55&uiarea=0&ctype=areaDetails&care=0000000150&cit=00000001500000002787)/.do)

Dinosaur Tracks Museum to **CLOSE!!**

The CU-Denver Dinosaur Tracks Museum is going to close permanently at the end of May. For the remainder of the spring semester, through May 10, the museum will be open to the public from noon to 5:00 p.m., Mon.–Thurs. or by special appointment. After the end of the spring semester (May 14–31), it will be open only by special appointment. The museum holds the largest collection of fossil footprints anywhere. It is located in the basement of St. Cajetan's Church on the Auraria Campus. Admission is free. For more information, or to schedule an appointment, contact the museum office at 303-556-5261 or email: dinotracksmuseum@ucdenver.edu (Informal meet-up with Pete Modreski: Noon, Thursday, May 3, to meet informally to tour the Tracks Museum)

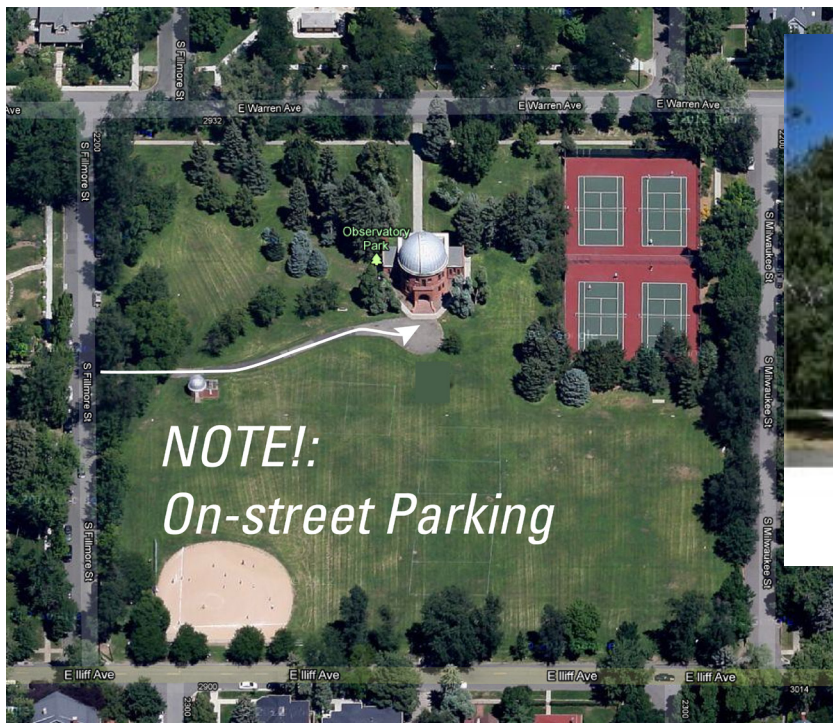




CSS Family Event on Saturday, April 28, 7 p.m.

A Night Out at the Chamberlin Observatory Open House hosted by the Denver-Astronomical Society (DAS) (meet at the South entrance)

Guests can view the heavens through the observatory's famous 20-inch aperture Alvan Clark-Saegmuller refractor for a \$1 per-person fee. An added bonus on Open House nights is that DAS members set up their telescopes on the observatory grounds (Observatory Park) to share with anyone and everyone interested in the wonders of the universe—stars, planets, galaxies, nebulae, star clusters and more! If you have a telescope and can't figure out how it works, bring it and someone will help you! For more information about the observatory, go to: <http://www.denverastro.org/openhouses.html>



The University of Denver's
historic Chamberlin Observatory

Chamberlin Observatory
2930 East Warren Avenue
Denver, Colorado 80210
Information line: 303-871-5172



Interesting Web Pages (thank you C. Thurner):

Volcanic Plumbing Provides Clues On Eruptions and Earthquakes

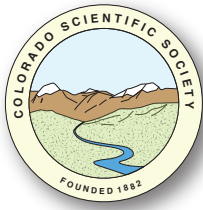
http://www.sciencedaily.com/releases/2012/04/120412182330.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily+%28ScienceDaily%3A+Latest+Science+News%29

Titanium Paternity Test Fingers Earth as Moon's Sole Parent

http://www.sciencedaily.com/releases/2012/03/120329124722.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily+%28ScienceDaily%3A+Latest+Science+News%29

Copper Chains: Earth's Deep-Seated Hold On Copper Revealed

http://www.sciencedaily.com/releases/2012/04/120405152929.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily+%28ScienceDaily%3A+Latest+Science+News%29



THANK YOU to everyone who paid their 2012 CSS Dues!!

Still need to re-up?? You can download the membership form from the CSS website:
www.coloscisoc.org/membership/dues.html

Dues payments are \$20 for regular members; \$10 for corresponding members (outside the Colorado Front Range area), and \$5 for students. You may pay your dues by mailing a check to the CSS, or pay with a credit card using PayPal on the CSS website. If you are uncertain if you owe dues or of your member status, contact CSS Treasurer Don Sweetkind by phone at 303-236-1828 or by e-mail at dsweetkind@usgs.gov.

Apologies to those of you who have renewed but are still not updated in our database. 2012 has been a busy year and we're all playing catch-up. Please be patient while we get our acts together.

Thank you!!

WANTED: *Volunteers for the new Rocks & Minerals cart at the Denver Museum of Nature & Science.* Enjoy a great opportunity to captivate visitors with hands-on experiences with rocks and minerals. No docent experience necessary—we will have a training session on June 20th. To learn more about the position, go to:
<http://www.dmns.org/join/volunteering/rocks-minerals-cart-facilitator/>

To apply, please go to: <http://www.dmns.org/media/199461/adult-volunteer-application-8-3-10-v2.pdf>

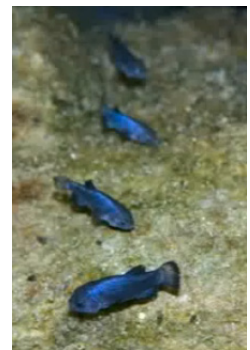
If you have additional questions, please contact Whitey Hagadorn at jwhagadorn@dmns.org



Check out our Web site at: <http://www.dmns.org/>

Thank you to Marith Reheis for submitting this link to a video of the Oaxaca, Mexico quake, P- and S-waves arriving at Devils Hole, a water-filled subterranean cave on the Nevada side of Death Valley National Park. Surf's Up Pupfish!!

http://www.kcet.org/updaily/the_back_forty/earthquake/mexico-earthquake-shakes-death-valley-video-captures-moment-at-devils-hole.html



Earth Day Geology and Nature Hike on Green Mountain, Lakewood, CO—Sun., April 22, 9 a.m.

April 22 is the 43rd annual Earth Day. The hike will be led by U.S. Geological Survey geologist Dr. Pete Modreski; all are welcome, no charge. Meet at the Hayden Green Mountain Park trailhead parking lot on Rooney Road, about 1/2 mile north of Alameda Parkway. Reservations are not necessary, but in case of questionable weather or for more info., call 303-202-4766 or email pmodreski@usgs.gov. Be prepared for an easy-paced, approx. 4-mile round trip hike, climbing about 600 feet to the summit, walking trails on top of the mountain, and return by about 1 p.m. We will view and discuss the geologic formations and how the present landscape developed, petrified wood, rocks and minerals, and the local wildflowers, plants, and ecology.





Earth Science Meetings and Talks

Newsletter items must be received by the 25th of each month.

Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the Shepherd of the Hills Presbyterian Church, 11500 West 20th Ave., Lakewood, CO (unless otherwise advertised).

Social time begins at 6:30 p.m. and talks start at 7:00 p.m.

For more information, contact Pete Modreski, at 303-202-4766, pmodreski@aol.com



Café Scientifique 2 Wed., **Apr. 25** Paula Cushing, Ph.D., Denver Museum of Nature & Science, "On Silken Thread: Arch-nid facts and fancy." Meets at the Brooklyn's at the Pepsi Center, 901 Auraria Parkway, Denver, evening science talks at 6:30. Free, except for beer. <http://www.cafescicolorado.org/CafeSci2home.htm>

CO-AIPG Apr. 17 James J. Graham, *NFC Consulting LLC*, "A clear picture where the renaissance of nuclear energy is one year after Fukushima." Noon lunch & talk at 12:30 p.m. Wynkoop Brewing Company, 1634 18th Street, Morey/Brown Room, Denver. Price: \$30 per person with advance reservation, \$35 at the door, \$5 walk-ins for talk only. Reservations: Contact Steve Sonnenberg, 303-895-7663 or sasonnenbg@aol.com by Noon on April 13.

Colorado School of Mines, Van Tuyl Lectures Thursdays from 4–5 p.m. in Berthoud Hall room 241. **Apr. 19** Dr. Carol Cleland, *Dept. of Philosophy, Center for Astrobiology, Univ. of Colorado (Boulder)*, "Common cause explanation and the search for a smoking gun." **Apr. 26** "TBA." http://geology.mines.edu/calendar/Van_Tuyl.html

Colorado State University, Dept of Geosciences, Rm 320 Warner College of Natural Resources Bldg., Mondays, 4:00 pm. 970-491-5661. **Apr. 23** Dr. Scott Miller, University of Wyoming, "TBA." **Apr. 30** Dr. Lisa Morgan, USGS, "TBA." <http://warnercnr.colostate.edu/geo-news-and-events/departments-seminars>

Denver Mining Club Apr. 16 Sharon Schonhaut, *Manager, Minerals Education Coalition, SMEF*, "SME's Newly Created Minerals Education Coalition." **Apr. 23** Guy DiTorrice, *Amateur Collector*, "Fossil Hide & Seek on the Oregon Coast." **Apr. 30** Paul Jones, *Sovereign Management Group*, and Hugh Miller, *Professor of Mining Engineering, Colorado School of Mines*, "The CSM Senior Mining Student Design Presentation." The DMC meets on Mondays at the Englewood Country Buffet near Hampden & Cherokee (east of old Cinderella City shopping center) 11:30–1:00. Purchase of lunch required. Visitors always welcome! <http://www.denverminingclub.org> Dick Beach, Secretary, 303-986-6535

Rocky Mountain Association of Geologists (RMAG) May 2 (2012 Rock Pick Awards) Pete Stark, *IHS CERA*, "Anatomy of the revolution in U.S. oil and gas supplies." Program begins at 4:00 p.m. Reservations by recording at 303-573-8621 ext. 1, until 10:30 a.m., prior Mon. Luncheon \$30. Talk only (no res.)—\$5. Location: Denver Marriott City Ctr., 17th & California. <http://www.rmag.org/i4a/pages/index.cfm?pageid=3286>.

Rocky Mountain SEPM Apr. 24 Ian Miller, *DMNS*, "The Snowmastodon Project: A preserved ice age fossil ecosystem." Reception at 11:30 p.m., lunch at 11:45 p.m., speaker at 12:15 p.m. Reservations: luncheons@rmssepm.org, before noon of preceding Friday or call Peter Bucknam, 303-895-4698. \$20.00 lunch, \$5 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. <http://www.rmssepm.org/luncheons.shtml>

SME Colorado Section Apr. 26–28 62nd Annual Mineral Processing Division Meeting (MPD) at the Broadmoor, Colorado Springs, CO, "Does size matter (is bigger always better)? New Projects, Plants, Processes or Equipment. For further details contact: Gill Porter, 303-629-8788 or gporter@knightpiesold.com, Jenny Pergola, 303-451-7677 or jenny@pump-plusinc.com. <http://www.smenet.org/meetings/details/?meeting=Mineral%20Processing%20Division%20Meeting%20%28MPD%29>

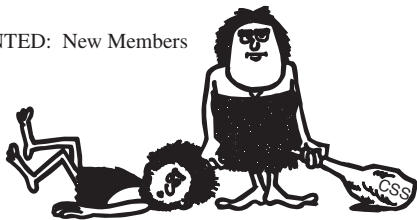
USGS Rocky Mountain Area Seminar Series Apr. 24 Jeff Pigati, *USGS*, "Discovery, science, and interpretation at the Snowmastodon site, Snowmass Village, CO." **May 8** Jason Saleeby, *Caltech*, "Epeirogenic transients related to mantle lithosphere removal in the southern Sierra Nevada Region." Tuesdays at 10:30 a.m., Bldg. 25 Lecture Hall, Denver Fed. Center, Kipling St. & 6th Ave., Lakewood. Visitors are welcome. Use the main gate to enter Fed. Ctr. Building entrance and parking lot is on the east side of Bldg. 25. Contact: Peter J. Modreski, USGS, 303-202-4766, pmodreski@usgs.gov

Univ. of Colorado, Boulder, Geol. Sciences Colloquium Apr. 18 John Kaldi, *University of Adelaide*, "CO2 Sequestration: what are the big issues and opportunities?" RASEI lecture **Apr. 25** Peter DeCelles, *University of Arizona*, "Oligo-Miocene extension in southwestern Tibet: Response to rollback of subducting Indian continental lithosphere, or 'A tale of two Tibets.'" **May 2** Steve Holbrook, *University of Wyoming*, "Arcs, continents, and the andesite paradox, GeoPRISMS Distinguished Lecture." Weds., 4:00 p.m., Benson Earth Sci. Auditorium, Rm. 180. Refreshments at 3:30 p.m. on the 3rd floor. <http://www.colorado.edu/geolsci/colloquium.htm>

Colorado Scientific Society
P.O. Box 150495
Lakewood, CO 80215-0495

<http://www.coloscisoc.org>

WANTED: New Members



OFFICERS

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Secretary: Libby Prueher, 720-260-0350, lprueher@umich.edu
Past President: Lisa Fisher, Escalante Mines, Inc., 303-215-0480, lisa.fisher@escalantemines.com

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2010-2012: Liz Pesce, pesce.e@gmail.com
2011-2013: Matt Sares, CGS, 303-866-2611, matt.sares@state.co.us
2011-2013: Ben Harrison, 303-417-9633, benjh@earthlink.net
2012-2014: Paul Morgan, CGS, 303-866-2611, paul.morgan@state.co.us
2012-2014: Rebecca Flowers, CU Boulder, 303-492-5135, rebecca.flowers@colorado.edu

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Field Trips: Cal Ruleman, USGS, 303-236-7804, cruleman@usgs.gov
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History: Beth Simmons, cloverknoll@comcast.net
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Pillmore Fund: Lee Shropshire, UNC, 970-352-8778, leeshrop@comcast.net
Program: VOLUNTEERS NEEDED! CONTACT PETE MODRESKI FOR MORE INFO!
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Webmaster: Table Mountain Web Design, 303-278-2701, bwarden@tablemtn.com



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