



Colorado Scientific Society

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

Presidential Address

Cenozoic History of the Laramie Mountains in Wyoming and its Relation to the Physiographic Development of the Colorado Front Range

Emmett Evanoff
University of Colorado, Boulder

Thursday, December 16, 2004
American Mountaineering Center
710 10th St. (NE corner with Washington), Golden
Social half-hour – 6:30 pm. Meeting time – 7:00 pm.

Presidential Address: Cenozoic history of the Laramie Mountains in Wyoming and its relation to the physiographic development of the Colorado Front Range

By Emmett Evanoff, University of Colorado Museum, Boulder

The physiographic development of the Colorado Front Range is difficult to unravel. Major Late Cenozoic uplift especially affected the west flank and southern margin of the range. After late Cenozoic erosion, Tertiary rocks in the Front Range are relatively few, and scattered sedimentary rocks (mostly conglomerates) are poorly dated. Glaciers have modified the uplands in the Front Range such that little remains there of the original pre-Quaternary topography. Nevertheless, the general consensus is that there are an older rolling topography of Cenozoic age along the eastern flanks of the range, broad valleys below the rolling topography, and very deep canyons cut by modern streams into the older topography. Unfortunately, these physiographic features in the Front Range itself do not indicate their time of formation.

The Laramie Mountains in southeast Wyoming is a northern extension of the Front Range that is still covered by Cenozoic sedimentary rocks. The highest peak in the Laramie Mountains (Laramie Peak at an elevation of 3,130 m) is below the limit of Pleistocene glacial ice, so no glaciation occurred in the range. Tertiary sedimentary rocks cover much of the range. Finally, the flanks of the range contain physiographic features similar to those in the Front Range. Unlike the Front Range, these landforms can be related to Cenozoic deposits and can therefore be dated.

The broad valleys within the Laramie Mountains are filled with the fine-grained ash deposits of the latest Eocene and early Oligocene White River Formation. The White River Formation filled valleys with high relief (maximum relief = 1,170 m). From the highest crest in the northern part

of the range, White River drainages flowed into adjacent basins. The broad rolling surface above these White River paleovalleys is associated with broad sheet conglomerates of Oligocene and Miocene age (Arikaree and Ogalalla Formations). Locally these conglomerates extend far into the Precambrian core of the range and represent gravels deposited on pediments cut during the long tectonic quiescence of the middle Cenozoic.

Modern streams have cut deep canyons in an unusual pattern across much of the Laramie Mountains. In the northern part of the range, almost all of the drainages that flow west and southwest from the topographic crest of the range are barbed and flow east or northeast across the entire width of the range. In the southern part of the range, where the low-level Sherman Surface is developed, all of the drainages flow east across the range from the western margin of the range. Therefore, the modern drainage divide is at the margin or even within the adjacent Laramie and Shirley basins. This anomalous drainage pattern reflects tilting of the range to the east and northeast during the late Cenozoic, after deposition of the Ogallala Formation. Extending these landforms southward to the Front Range, the broad valleys below the gently rolling topography may reflect the late Eocene surface; the rolling topography may be as young as Miocene in age; and the deep canyons reflect late Cenozoic uplift of the Front Range and adjacent Great Plains.

This talk is dedicated to Donald L. Blackstone, Jr. (1909–2004), whose first publication was on the development of wind gaps in the Laramie Mountains, and whose last studies also included the structure and Cenozoic history of the range.

Colorado Scientific Society President's Note—December 2004

By Emmett Evanoff

We are at the close of the 122nd year for the Colorado Scientific Society. This year has been a

good one: Malcolm C. McKenna presented the Emmons Lecture in January; the Thursday evening

meetings had 12 excellent talks, and we went on a fall four-day field trip to the Black Hills of South Dakota.

This year was also the year of some changes in the usual schedule and some new programs were started. The family night in April was held at the University of Colorado Fiske Planetarium, we had the one-day symposium on the Geology of the Front Range, and we had four one-day field trips in the Front Range and in northeast Colorado. The society sponsored three theme sessions and three field trips at the 2004 Annual Meeting of the Geological Society of America that was held in Denver in early November. Sue Hirschfeld completed a task that has been years in the production, preparing signs for the new Triceratops Trail in Golden and the signs at the overlook on Lookout Mountain above Golden.

We also held an excellent, but little advertised, Student Night in November. The competitions in the three colleges were postponed until after GSA, so the final competitors were not known until the week of the meeting (see the article with the abstracts of the three finalists in this newsletter).

Donations to provide for the Pillmore Memorial Funds are continuing to arrive, and so far there is about \$6000 of the \$10,000 needed to make the funds into a long-term memorial endowment. We have about 6 months to raise the money for this task, but I am confident this will happen.

Last March I wrote a short note on the role of the Colorado Scientific Society in the regional geological community. As part of these comments, I mentioned the possibility of the Society becoming nonexistent from a lack of interest. It has been my experience this year that lack of interest is not the problem. We still have a base of support from all the members and the many people who volunteer their time to working for the Society. Also, all the programs this year were well received, and were (for the most part) well attended. New members continue to join as we provide new programs of interest. It is my hope that such programs, such as

the yearly symposium, be continued and that the participation increases. The Society is continuing, not only to exist, but also to thrive.

There are many people to thank for their support this last year. First is the president-elect Vince Matthews, not only for his clear visions for the Society but also for his role as the program chair. Vince will be an excellent president in 2005. I have also thoroughly enjoyed working with Don Sweetkind, our treasurer, who has been ably managing our funds for several years. The CSS Council, who includes Celia Greenman, John Lufkin, Charles Kluth, Sue Hirschfeld, and Lee Shropshire, has been very helpful in their comments and suggestions. Lisa Fisher (nee Lytle) has been doing a wonderful job in recording our meetings as Secretary and did double duty as a field trip co-leader for the April and August one-day field trips. The past presidents Jim Cappa and Eric Nelson gladly provided information and comments concerning the Society business.

It has been a pleasure working with our newsletter editors Mary-Margaret Coates and Scott Minor, both of whom will be leaving this job at the end of this year. Celia Greenman will be taking over the editor position in 2005. Chuck Weisenberg has continued to be the chair of the science fair committee, and thanks goes out to Chuck and to those who volunteered their time to judge the Science Fair this last year. Our long-time web-master, Bill Wingle, ended his well-preformed task this year, and John Ghist has now taken over the job. Finally, our database manager, Cynthia Rice, who has managed our membership database for years, is also stepping down from this task. Cory Conrad will be stepping into this position in 2005.

As field-trip organizer, I want to thank the field trip committee, which includes Kathy Brill, Terry Heister, Sue Hirschfeld, John Lufkin, and Chris Morrison for their help and comments. Finally, thanks to all of the members who attended the meetings and programs, provided funds for the endowment grants, and made the society an active organization.

Colorado Scientific Society Student Night Competitions, Nov. 2004

By Emmett Evanoff

The Society's Student Night was held at the

American Mountaineering Center on Thursday,

November 18. Pre-meeting competitions were held at Colorado State University, the Colorado School of Mines, and the University of Colorado at Boulder. The three winners at Colorado State were Andrew Wilcox (1st prize), Thomas Neeley and Nyssa Loeppke. The winners at CU Boulder were Joya Tetreault (1st prize), Ali Jaffre, and Adam Huttenlocker. Kathryn E. Barba was the sole competitor from the Colorado School of Mines. Of

the three competitors at CSS Student Night, Andrew Wilcox won first prize for his talk on flow resistance partitioning in step-pool channels, while Kathryn Barba and Joya Tetreault were runners up. The final awards this year were increased to \$250 for the first place winner, and \$150 each for the runner up contestants. Abbreviated abstracts of the three finalists' talks are given below.

Flow resistance partitioning in step-pool channels

By Andrew C. Wilcox, Colorado State University

To better understand how sediment transported and other physical processes in steep stream channels, we need to better understand controls on flow resistance and how resistance is partitioned between different sources. Step-pool channels are an important category of steep channels in which flow resistance is created by large clasts, spill-over step-pool bedforms, large woody debris (LWD), and other factors.

To measure resistance partitioning, variables contributing to flow resistance in step-pool channels were manipulated by a series of laboratory flume runs; a factorial design was used. Total resistance for flume runs was measured with and without grains, steps, and LWD, and at multiple slopes and discharges. Independent estimates of resistance partitioning were based on calculations of grain resistance, using empirical formulas, and of debris

resistance, using calculations of drag force associated with the cylinders used here to represent LWD.

Spill resistance and debris resistance were responsible for the largest components of total resistance, and grain roughness was a small component of total resistance. This suggests that standard methods of calculating flow resistance, which assume that grain resistance is dominant, will substantially underestimate total resistance in step-pool channels. Interaction effects between resistance components, discharge, and debris density were also documented, indicating that the relative contribution of debris resistance increases with both discharge and debris density. These results provide new insight into hydraulic effects of bed sediments, step-pool features, and LWD in steep channels.

Please add to the Pillmore Memorial Fund (student field trip support)

By Don Sweetkind

The Colorado Scientific Society (CSS) Memorial Funds support graduate student research in earth science. There are currently five funds named in honor of outstanding geologists who were connected with the CSS in some way. The funds honor Ogden Tweto, Steve Oriel, Ed Eckel, George Snyder, and Bill Pierce. The funds currently award as much as \$10,000 each year; since their inception in the early 1980s they, have awarded a total of about \$125,000 in 165 grants.

We are well on the way to the establishment of a new fund named in honor of Charles L. (Chuck) Pillmore, long-time USGS employee, and

Colorado Scientific Society member and past president. A basic endowment of \$10,000 is required to start a new fund; that amount must be raised within a three-year period. Chuck passed away a year ago last August; approximately \$7000 has been donated to establish a fund in his honor. Thus, we have about 18 months to raise an additional \$3000.

Chuck advocated support for student participation in the Colorado Scientific Society and on field trips. He was a leader in starting the Memorial Funds during the early 1980s. He also encouraged and spearheaded the effort to develop a

Student Night among the CSS monthly programs. If the fund is established, Chuck's family has expressed a desire that the resources be designated for supporting student participation on CSS field trips. In the past, the Society has supported some student participation in CSS field trips through our endowment fund, but establishment of a Pillmore Fund would formalize the CSS commitment to field trips for young scientists and help bring young people to the Society.

Please help launch the Pillmore Fund; your contributions will show our support for young earth scientists and honor a CSS member who supported such activities throughout his career. If you choose to contribute to this new fund, please make your check payable to the Colorado Scientific Society Memorial Funds and indicate that the gift is to help establish of a Pillmore Fund. Checks should be mailed to CSS Memorial Funds, P.O. Box 150495, Lakewood, CO 80215-0495.

The Colorado Scientific Society asks, “Will you give more?”

By Don Sweetkind, USGS

The Colorado Scientific Society Council is here asking members if they would support (or at least tolerate) an increase in membership dues.

Your annual dues payments help to cover our operating expenses, such as insurance, rental of auditorium space, newsletter, and website, and they also help pay for other expenses such as honoraria for the Emmons lectures, awards to winners of the state science fair, awards for CSS student night speakers, and research grants to outside groups. Despite our efforts to reduce costs, our activities are not fully covered by membership dues; we typically run a deficit of \$500 to \$1000 each year. This

perpetually in-the-hole budget leaves no room for the society to pursue new activities.

The last time the dues were raised was in 1990. An increase of \$5 in the amount for regular membership would generate an extra \$1200 income; a \$10 increase would generate an extra \$2400.

Please let us know how you feel about an increase in CSS dues payments. Fill out the questionnaire below and send it to the Colorado Scientific Society at PO Box 150495, Lakewood CO 80215. Or send your opinion by e-mail to the CSS Treasurer, Don Sweetkind, at dsweetkind.usgs.gov

I would support a dues **increase** of _____ \$5 _____ \$10

I do not think that member dues should be increased _____

Would you like to learn about *other* “Other Talks”?

By M.M. Coates, TechEdit

Take a look at the last page of the newsletter—the page that lists talks being given by academic institutions and other societies in the Denver Metro area. Are talks given through these organizations the ones that you would like to hear? Or are there other organizations whose talks you would rather see listed?

The Colorado Geological Survey keeps an online, continuously updated, more extensive list of talks (<http://geosurvey.state.co.us>). Should the Society newsletter just refer to the online list, rather than duplicating some of CGS’ fine work? E-mail your ideas to Celia Greenman, Colorado Geological Survey (celia.greenman@state.co.us) between now and the December meeting.

Colorado Scientific Society 2005 dues are due!!

By Don Sweetkind

Membership dues for the coming year (2005) are now due. You will also see a reminder in the mail this month. If you are uncertain of your member status or whether you owe dues, contact CSS Treasurer Don Sweetkind by phone at 303-236-1828 or by e-mail at dsweetkind@usgs.gov

As you pay your dues, please consider making an additional contribution to one of our Memorial Funds (which support our student

research grants program) or the Endowment Fund (which we use to defray operating costs). Any contributions made in 2004 (i.e., checks dated before Jan. 1, 2005) will be credited toward the 2004 tax year. Please remember that your entire contribution goes towards generating interest for the grants and that your contribution is 100% tax deductible since the Society is a non-profit Section 501 (c)(3) organization.

2005 DUES & FUNDS CONTRIBUTIONS COLORADO SCIENTIFIC SOCIETY

[Download PDF Form.](#)

Last Name: _____ First Name: _____ Initial: _____

Current email: _____

DUES: Dues are for the calendar year (January-December)

Regular Members (\$15, CO Front Range) _____

Corresponding Members (\$10) _____

Student Members (\$5, enrolled in college) _____

MEMORIAL FUNDS: These funds support earth-science research grants to graduate students throughout the nation. If your contribution is not directed to a specific fund, it will be distributed equally among the funds:

(A) Ogden Tweto Memorial Fund _____ \$ _____

(B) Steven Oriel Memorial Fund _____ \$ _____

(C) Edwin Eckel Memorial Fund _____ \$ _____

(D) Bill Pierce-Heart Mountain Fund _____ \$ _____

(E) George Snyder Memorial Fund _____ \$ _____

This contribution is made in the memory of: _____

ENDOWMENT FUND: This fund is used to support the Society's monthly meetings and newsletter, field trips, family night, annual Emmons Lecture, and special activities. _____ \$ _____

TOTAL CONTRIBUTIONS (DUES AND FUNDS): _____ \$ _____

Please make your checks payable to the *Colorado Scientific Society*

Colorado Scientific Society
P.O. Box 150495

Send this form & your check to:

Lakewood, CO 80215-0495



Earth Science Meetings and Talks



Newsletter items must be received by the 25th of each month. Items may include special events, open houses, etc...thanks!

Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the American Mountaineering Center in Golden (unless otherwise advertised). Social time begins at 6:30 p.m. and talks start at 7:00 p.m. For more information, contact Emmett Evanoff at (303) 444-2644 or emmettevanoff@earthlink.net

Denver Mining Club meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave.) 11:30 a.m.-1:00 p.m.

Denver International Petroleum Society meets the second Friday of each month at the Wynkoop Brewing Co., 18th and Wynkoop Streets. Reception begins at 11:30 a.m., luncheon at 12 p.m., program at 12:30 p.m. Make reservations (required) by leaving message at (303) 623-5396. Reservations accepted after 8 a.m. on Friday until 10:30 a.m. on Wednesday prior to the meeting. Cancellations accepted until 11:00 am Wednesday prior to the meeting. Cost: \$15 for lunches; talk only is available for \$2 (make checks payable to "D.I.P.S."). Contact Keith Murray at (303) 986-8554 for information.

Denver Region Exploration Geologists' Society (DREGS) meets in the Mutual Consolidated Water Building, 12700 West 27th Avenue, Lakewood. Social hour 6:00-7:00 p.m. Technical presentation at 7:00 p.m. Meetings are normally scheduled for the first Monday of each month. For information contact Jim Piper, (303) 932-0137, or the website <http://www.dregs.org>.

Denver Well Logging Society (DWLS) meets on the third Tuesday of each month, Sept. through May. Lunch and a technical talk at the Wynkoop Brewery begins at 11:30 a.m., 18th and Wynkoop Sts. in Denver. Subject matter usually deals with the application of well logs to oil and gas exploration. **TBA**—Dec. 21, 2004. Call Elice Wickham at 303-573-2781 for reservations. Web page: <http://dwls.spwla.org>.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30 a.m., lunch at 12:00 p.m., talk at 12:30 p.m. Reservations are taken by recording at 303-623-5396 until 10:30 a.m., Wed. before the luncheon. Cancellations are taken until 11:00 a.m. on Wed. at 303-573-8621. Luncheon cost is \$20 payable to RMAG at the door. Reservations are not required for talk only—cost is \$3. Meeting location: Denver Petroleum Club, Anaconda Tower, 555-17th St, 37th floor. Web page: <http://www.rmag.org>.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30 p.m., Rm. 180. Refreshments at 3:30 pm on the 3rd floor. For more information, call 303-492-8141. **TBA**, Jan. 2005. Web page: <http://www.colorado.edu/GeolSci>.

Friends of Dinosaur Ridge meets at 7:00 pm at Red Rocks Elementary School in Morrison, Colorado. Join now. Web page: <http://www.dinoridge.org>. Admission is free, but donations are welcome. For more information please contact the FODR Visitor Center at (303) 697-3466.

Colorado School of Mines, Van Tuyl Lectures Fridays from 3:00PM to 4:00PM in Berthoud Hall room 108. **TBA**—Jan. 2005 For further information, check <http://www.mines.edu/academic/geology.html>

USGS Geologic Division Colloquium. Thursdays, 1:30 p.m., Foord Room, Building 20, Denver Federal Center. For more information contact: Peter J. Modreski, U.S. Geological Survey, Denver, Colorado tel. 303-202-4766, fax 303-202-4767 email pmodreski@usgs.gov

For a constantly updated, online geo-calendar, visit the Colorado Geological Survey at
<http://geosurvey.state.co.us>

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