

# Colorado Scientific Society

*In pursuit of the promotion of knowledge,  
understanding of science,  
and its application to human needs.*

## *May Presentations*

### **SANDSTONE-HOSTED COPPER DEPOSITS, LISBON VALLEY, UTAH**

**John Thorson**

Consulting Geologist

### **SPACE WEATHER AND THE COMING SOLAR CYCLE**

**Gary Heckman**

Chief, Space Environment Services Center, NOAA

Tuesday May 13, 1997

Social Time: 7:00 p.m.; Meeting Time: 7:30 p.m.

In The Theater at the Sheraton Hotel, 360 Union Blvd., Lakewood, Colorado

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**Sandstone-hosted copper deposits, Lisbon Valley, Utah***John Thorson*

Consulting Geologist

opper deposits occur within several sandstone units of the Mesozoic sedimentary section adjacent to the structural margins of salt dome anticlines in the Paradox Basin. Three of these deposits are undergoing active exploration and pre-development by Summo USA Corp.

The Lisbon Valley copper project is located at the southeastern end of the faulted Lisbon salt anticline in southeastern Utah. Host rocks are Cretaceous Dakota Fm. and Burro Canyon Fm., both dominated by braided fluvial sandstones. Copper occurs adjacent to the Lisbon Valley Fault, a major axial structure with up to 4000 feet of displacement, and outward from the fault as much as 1500 feet along favorable sandstone beds. Ore grades are continuous for >2000 feet along strike and >1000 feet of dip across thicknesses of 60 to >200 feet at the Centennial deposit. Two other significant deposits are included within the project.

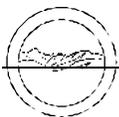
The Lisbon Valley project has announced reserves of 42.6 million tons of 0.45% Cu, and Summo is confident that this reserve can be expanded. The deposits are amenable to open-pit mining, heap leaching, and SX-EW recovery. The Lisbon Valley project is currently in the permitting phase of preparation for a 12,000 ton per day open-pit mine that would recover 34 million pounds of copper per year over a 10 year mine life.

**Space Weather and the Coming Solar Cycle***Gary Heckman*

Chief, Space Environment Services Center, NOAA

**W**

e have recently reached the end of an eleven-year solar cycle. A new cycle is beginning. By the end of the millennium, solar activity will reach another peak. Astronauts on the International Space Station will be interrupting their experiments in a zero-gravity environment to dodge space debris whose orbit has been changed as a result of the rising solar activity. At the same time, scientists at Houston will be monitoring the crew's dosimeters to avoid the chance of exposure to energetic solar particles that are a radiation hazard for the crews. Power companies will be struggling to stabilize power-distribution grids while the aurora borealis surges overhead. Flight attendants finishing their flights on the Concorde will be calling the Space Environment Center in Boulder, Colorado, to inquire whether they have been exposed to excess radiation doses. GPS systems will face their first extensive testing under adverse conditions as pilots use them to descend to the end of a runway in limited visual conditions. Communication satellites will experience sudden shutdowns and crews defense-monitoring systems will have to face false alarms in their warning systems. Police on the Golden Gate Bridge will find themselves talking to a Minneapolis dispatcher when they call for backup. Garage doors on the California coast will be opening in response to Navy radio signals. The rise in solar activity will produce these and other unexpected effects. Forecasters at the Space Environment Center in Boulder will be issuing daily forecasts and alerts of the activity. This talk will describe solar activity, illustrated with pictures, and the terrestrial effects that result. It will offer a glimpse into the working day of a space weather forecaster, one of the smallest occupational groups in the country.



## Society Business

### Colorado Science and Engineering Fair

**B**

**onnie Crydale, Josh Bean, Marith Reheis, and Lisa Doner** represented CSS this year in judging 255 finalists from junior and senior high schools statewide. The fair, held April 10-12 in Fort Collins was the last step before the International Fair this month in Louisville, Kentucky, where state finalists will be judged in individual and team competitions.

Our judges awarded \$325 in cash prizes to students whose exhibits that emphasized earth and environmental sciences. We tried to stimulate an interest and participation in the earth and environmental sciences, says Bonnie.

Because they were all outstanding exhibits, CSS' judges had an extremely difficult time making their decisions. In the end, they awarded prizes to:

**Dylan M. Schwindt**, Cortez (hometown), "Tree chemistry: a new method for addressing ancient resource depletion. A wood sourcing study of Utah juniper trees growing in Sand Canyon, southwestern Colorado"

**Travis J. Carter**, Greeley, "Molybdenum and its effect on *Rhizobium leguminosarum* and *Pisum sativum*"

**Martha F. Rooney**, Roxborough Park, "An investigation into the mitigation of expansive soils by the use of safe chemical additives"

**Pete L. Ashman**, Grand Junction, "Can you wash soil?"

Congratulations to these future scientists and many thanks to our judges.

### 1997 Memorial Funds Grants

The Memorial Funds Committee, which consists of Gregory Holden, Susan Landon, David MacKenzie, Richard Madole, and John Rold, is in the process of evaluating applications for the 1997 Memorial Funds Grants. The committee received 40 applications from students at 25 universities; 11 of the universities are in the eastern U.S., 2 are in the central U.S., 20 are in Rocky Mountain states, and 6 are in the far west or southwestern U.S. Multiple applications were received from the Colorado School of Mines (8), the University of Colorado (4), the University of Wyoming (3), Northern Arizona University (2), and Oregon State University (2). Applications from Masters degree and Ph.D. candidates were evenly divided.

The amount available for grants in 1997 is \$9,750, up \$1850 from 1996. The amount available for awards from each of the four Memorial Funds is a function of the amount of bond interest earned in the preceding year. In 1997, the committee will award about 10 grants, ranging from \$800 to \$1200, during the first week of May.

By fund, the amounts available for grants are Tweto Fund, \$3900; Oriel Fund, \$2400; Eckel Fund, \$1750; Pierce Fund, \$1700. The differences in amounts between funds are mainly a function of how long the fund has existed and the total contributions to date. The Tweto and Oriel Funds are intended to help support field-oriented student research related to areal and regional geology, geochemistry, and geophysics in the Rocky Mountain region. The Eckel Fund supports student research in topical or field studies in the application of geology to engineering problems in any region. The Pierce Fund is for topical or field studies directed toward a better understanding of the Heart Mountain fault in northwestern Wyoming.

*Richard F. Madole*



## Earth Science Meetings

**Colorado Scientific Society's** regular meetings are held the 2nd Tuesday of the month (unless otherwise advertised). Social time begins at 7:00 p.m. and program is at 7:30 p.m. Contact Karl Kellogg at 236-1305 for information. Next scheduled meeting will be in September, after our summer recess.

**Denver International Petroleum Society (DIPS)** meets the 2nd 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 calling GRI Information Center Office, (303) 575-9030. 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: \$13 for lunch; talk only is available for \$2 (make checks payable to "DIPS"). 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 Cappa, 866-2611.  
May 5 Bryon Hoal, Former Director, Namibian Geological Survey: "Namibia, a Key Player in the Southern Africa Mineral Boom"

**Denver Mining Club** meets Thursdays from 11:30 a.m. to 1:00 p.m. at the Denver Federal Center, Building 41 Cafeteria (south entrance) in Lakewood. For more information contact Dick Beach at (303) 986-6535.

### Colorado School of Mines Van Tuyl Lectures

For information call the Dept. of Geology at 273-3800.

### Colorado State University Geology Lectures

All presentations are at 4:00 p.m. in room NR 316, with the exception of the AAPG Distinguished Lecture, which will be at NOON. For information, contact Eric Erslev at (970) 491-6375.

May 2 John Morgan, CSU-ER: "Coupled 190Pt/186Os and 187Re/187Os Isotope Systematics: A New View of Core-Mantle Interaction"

## Museums, Internet, News

**Friends of Dinosaur Ridge**...for information call 697-DINO. Visitors' Center is located at 16831 West Alameda Parkway (north side of Alameda, just west of the C-470 overpass). Open 9 a.m. to 4 p.m. weekdays and weekends. Fireside chats are held at the Morrison Town Hall, 110 Stone Street in Morrison starting at 7 p.m.

### Fireside Chats

May 15 Jack Reed, USGS: "The Shaping of the Hogback Development of the Present Landscape of Dinosaur Ridge." Reception before talk, possibly at the Morrison Museum of Natural History.

**Morrison Natural History Museum**...is open 1-4 p.m., Wednesday through Sunday. The Museum is located on State Highway 8,  $\Omega$  mile south of Morrison. Fireside chats are cosponsored periodically by Friends of Dinosaur Ridge (see above).

**Women in Mining**...the local chapter and the Colorado Section of SME/GEM Committee are helping Denver's Young Americans Bank and Education Foundation refurbish their science and nature exhibit in Cherry Creek. The bank hosts "Young AmeriTown," a bank learning experience for top students from the Metro area. Annually, more



than 38,000 students pass through the exhibit along with more than 2,000 teachers. For more information, contact Guy Johnson at (303) 969-0365 or [GPJ222@aol.com](mailto:GPJ222@aol.com).

**Colorado Mining Exhibit**...is soliciting funds to help finance the 1997 mining and minerals education exhibit at the Taste of Colorado. Last year more than 40,000 people toured the 40ft x 80ft tent at the Taste. For more information, contact Guy Johnson.

## Interesting Web Sites

### E

Each month we mention web sites that relate to that month's presentation(s) or to the geology of the Southwest. This month we look at the USGS's Front Range Infrastructure Resources Project (FRIRP) web site <http://webserver.cr.usgs.gov/frirp/FRIRP.html>. The goal of the project is to provide the public and decision makers with objective information about the location and characteristics of land, natural aggregate, water, and energy resources that are vital to sustaining an area and its infrastructure.

Scientists from the Survey's Geologic, Water Resources, National Mapping, and Biological Resources Divisions are collaborating on several interrelated natural resource issues. A common thread for their research is the generation and distribution of digital geospatial data to the Survey's customers and partners in science, government, and land use planning. The consortium's web site also lists the names of USGS scientists who are available to make presentations about the project and their specialties.

FRIRP is one of Gordon Eaton's special projects. Eaton is the current Director of the U.S. Geological Survey and a former geoscientist in the USGS.

## New Members

### W

We extend welcomes to Stephanie L. Moret (Oregon State University) and Jo Stanley (University of Northern Colorado).

## Are you delinquent?

Maybe or maybe not. If you are unsure as to whether you are delinquent with your dues, please look on your newsletter mailing label. The upper right-hand corner of your label should say 97 (Reg or Corr or Stu) if you are paid up for 1997. If it says 96, you are in arrears and we would appreciate prompt payment of your dues. There are still 58 unpaid members who will receive their last newsletter in May. After that we really turn up the heat and resort to draconian measures too cruel to be mentioned in print. Please don't let this happen. Dues are \$15 for regular members, \$10 for corresponding members, and \$5 for students. Needless to say, membership in the Colorado Scientific Society constitutes one of the last real bargains in America.

*Michael Machette, Treasurer*



# Colorado Scientific Society Spring Field Trip

17-18 May 1997

## ACTIVE GEOLOGIC COLLAPSE RELATED TO SALT DISSOLUTION IN THE GLENWOOD SPRINGS AREA

### LEADERS

Robert M. Kirkham, Colorado Geological Survey

Bruce Bryant, U.S. Geological Survey

Randall K. Streufert, Colorado Geological Survey

## B

right and early at 7:30 AM on Saturday May 17, we will leave from the upper parking area of the Cold Spring Park and Ride on the southeast side of Union at the 6th Avenue exit of the Denver Federal Center. We will travel by vans to the Glenwood Springs area.

On the way to the Glenwood area, we will stop at the 4000-year-old Dotsero crater, one of Colorado's youngest volcanic vents. Once in the Glenwood Springs area, we will concentrate on evidence of Neogene deformation related to dissolution, flowage, and diapirism of Pennsylvanian evaporites but will also view structures bordering the flanks of the White River Uplift, landslide and debris-flow hazards, and volcanic features. The downdropping of Neogene mafic flows from a 3,000-m-high datum defines this deformation over an area covering at least 650 km<sup>2</sup> and locally records 1,300 m of collapse. Structural collapse styles include monoclinical draping and faulting of mafic flows and unfolding of the late Laramide Grand Hogback monocline. Individual structures within the collapse area have as much as 300 m of structural relief. They include salt-cored diapiric anticlines, synclinal sags, half grabens, and evaporite intrusive contacts with clastic country rocks, subsidence troughs in Quaternary terraces, late Pleistocene tilted terraces, and sinkholes. The high dissolved salt load in the Colorado River and its tributaries requires that dissolution and tectonism are active processes.

On the way to Glenwood, we will enjoy a gourmet picnic lunch at the rest area at the east end of Glenwood Canyon. Bring warm clothing because cool weather is possible, even in late May. At day's end we will check into the Silver Spruce Motel in Glenwood Springs in time to enjoy dinner and the hot springs (bring your bathing suit). You will be on your own for dinner and breakfast; a restaurant guide will be provided. On Sunday morning, we will board the vans at 7:30 AM ready for the second day. Our gourmet lunch this day will be in the Carbondale City Park. We plan to arrive back at the Cold Spring Park and Ride about 6:30 PM on Sunday evening.

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### REGISTRATION FORM

_____	_____
Name(s)	Address
_____	_____
	City, Zip code
_____	_____
Phone	e-mail / Fax

### Food (lunches, snacks, beverages)

Beverage preferences (red or white wine, beer, sodas, iced tea) \_\_\_\_\_  
Check sandwich preference: "Strict carnivore" (meat only) \_\_\_; Omnivore (meat and cheese) \_\_\_;  
Cheese \_\_\_; "Strict herbivore" (no animal products) \_\_\_; Other \_\_\_\_\_

**Room preference:** Shared room (name of roommate) \_\_\_\_\_ Single room \_\_\_\_.

**Trip cost per person with shared room: \$60      Trip cost per person single occupancy: \$75**  
{Trip cost does not include dinner and breakfast.}

**To register**, please mail your check for the total amount, payable to the Colorado Scientific Society, to the CSS Field Trip Chair: Bob Scott, 65 Cottonwood Drive, Evergreen, CO, 80439, by **Thursday May 8th**. Refunds must be requested **BEFORE** Friday May 9th by calling Anne Harding at 674-5306.



# Invitation to Join the Colorado Scientific Society

The Society is dedicated to the advancement of science through open forums and activities. We sponsor lectures, field trips, student scholarship grants, and discussions of scientific matters of public concern.

I hereby apply for \_\_\_\_\_ membership in the Colorado Scientific Society.  
(Regular, Corresponding, Student)

\_\_\_\_\_  
(Last Name) (First Name) (Middle)

\_\_\_\_\_  
(Address) (Telephone) (e-mail)

\_\_\_\_\_  
(City) (State) (Zip)

\_\_\_\_\_  
(Company/Agency/University)

\_\_\_\_\_  
(Mailing address if different than above)

\_\_\_\_\_  
School Degree Year Major

## Main Scientific Interests

## D

**UESY** Your dues are for the calendar year and help support the newsletter, monthly meetings, two field trips each year, family night, and the Emmons Lecture.

Regular Member (\$15) \_\_\_\_\_  
Corresponding (outside Denver metro area) Member (\$10) \_\_\_\_\_  
Student Member (\$5) \_\_\_\_\_

Please make your dues payable to Colorado Scientific Society. Thank you!!

## T

The success of certain Colorado Scientific activities depend on your volunteer help. Please circle those activities for which you can provide assistance. We will pass your name on to the appropriate Committee Chairperson.

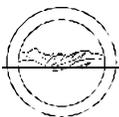
<i>Arrangements</i>	<i>Fund Raising</i>	<i>Newsletter</i>	<i>Publicity</i>
<i>Best Paper Award</i>	<i>History</i>	<i>Outreach</i>	<i>Science Fairs</i>
<i>Field Trips</i>	<i>Membership</i>	<i>Program</i>	<i>Web Site</i>

I certify that all statements in this application are correct and, I agree to promote the objectives of the Society and to abide by its Constitution, Bylaws, and Rules.

\_\_\_\_\_  
Applicant's signature

\_\_\_\_\_  
Date

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



## Colorado Scientific Society Officers, Councilors, and Chairpersons

### OFFICERS

President: Karl S. Kellogg, USGS, 236-1305  
President-Elect: Eric Erslev, CSU, (970) 491-6375  
Treasurer: Michael N. Machette, USGS, 273-8612  
Secretary: Stephen F. Personius, USGS, 273-8611  
Past President: Richard F. Madole, USGS, 236-4612

### COUNCILORS

1995-97: Mark Hudson, USGS, 236-7446  
1995-97: Lisa R. Bader, USGS, 236-5547  
1996-98: James A. Cappa, CGS, 866-2611  
1996-98: Richard B. Wanty, USGS, 236-1819  
1997-99: Michelle L. Tuttle, USGS, 273-8626  
1997-99: William D. Nesse, UNC, (970) 351-2830

### COMMITTEE CHAIRPERSONS

Arrangements:	Aaron John Kullman, CSM, 384-2011
Database Manager:	Robert C. Bucknam, USGS, 273-8566
Best Paper Award:	Bruce R. Bryant, USGS, 238-1234
Field Trips:	Robert B. Scott, USGS, 236-1230
History:	Marjorie E. MacLachlan, USGS-retired, 986-7192
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Memorial Funds:	Richard F. Madole, USGS, 236-4612
Memorial Funds Treasurer:	Michael N. Machette, USGS, 273-8612
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Outreach (signs):	Peter J. Modreski, USGS, 236-5639
Program:	Eric P. Nelson, CSM, 273-3811
Publicity:	Vacant
Science Fair:	Bonnie L. Crysdale, DOE, 443-7261

**\*\* NOTE: Please help us with publicity by posting copies of the Newsletter on bulletin boards.**

