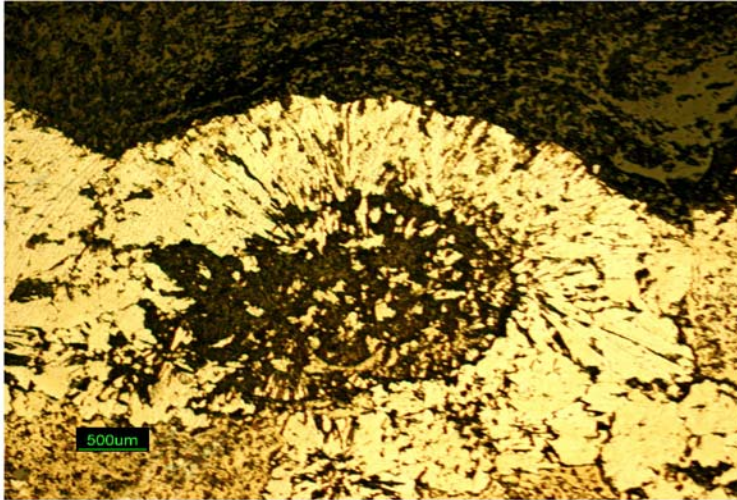




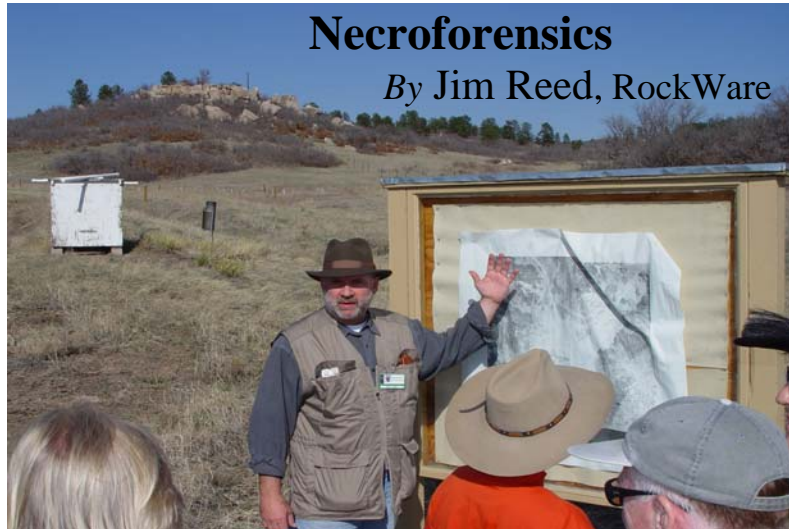
Colorado Scientific Society

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



Re-Os systematics in black shales: Marking time and the rise of atmospheric oxygen

By Judith L. Hannah,
AIRIE Program, Department
of Geosciences, Colorado



Necroforensics

By Jim Reed, RockWare

Thursday, September 15, 2005
American Mountaineering Center
710 10th St. (NE corner with Washington), Golden
Social half-hour – 6:30 pm. Meeting time – 7:00 pm.

Abstract

Re-Os systematics in black shales: Marking time and the rise of atmospheric oxygen

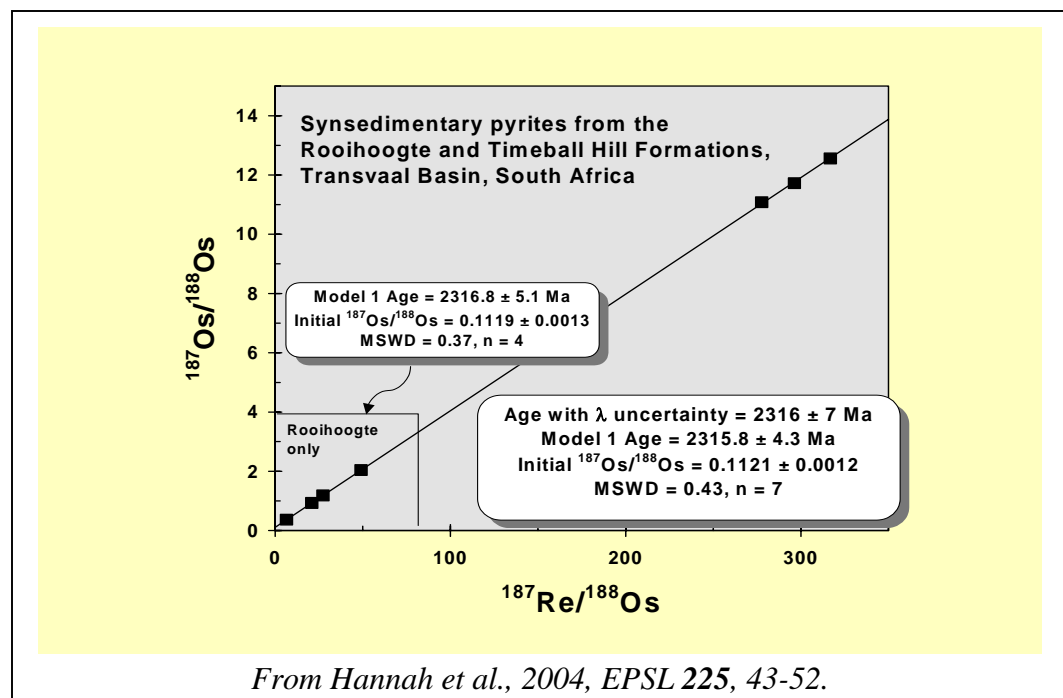
By Judith L. Hannah, AIRIE Program, Department of Geosciences, Colorado State University

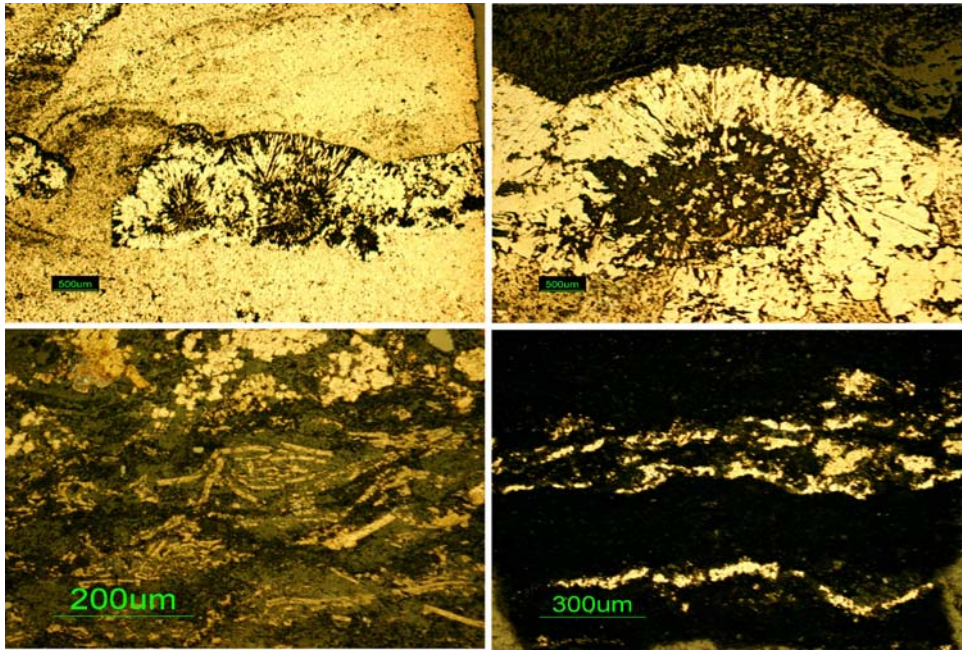
How do we mark absolute time in sedimentary sections? How do we determine the age of sedimentary rocks when fossils are lacking? How can we use the chemistry of sedimentary rocks to understand earth surface processes in the past? All of these are long-standing questions and current hot topics, and the rhenium-osmium (Re-Os) isotopic system offers some answers.

Like more familiar isotopic systems (e.g., U-Pb, Rb-Sr, Sm-Nd) the decay of ^{187}Re to ^{187}Os can be used to determine the age of geologic materials, and the $^{187}\text{Os}/^{188}\text{Os}$ ratio can be used to fingerprint source materials. Re and Os are chalcophile/siderophile elements concentrated in metals, sulfides, and organic material. Both elements are soluble in oxidizing environments but fixed by reduction. Consequently, they are enriched in organic material in shales deposited under suboxic conditions, and concentrated in diagenetic pyrite.

We have successfully dated diagenetic pyrite in 2.32 Ga shale from the Transvaal Group in South Africa. This system also yielded a surprisingly low $^{187}\text{Os}/^{188}\text{Os}$ ratio, suggesting that oxidative weathering was still minimal at the earth's surface at this time, even though sulfur isotope data show that oxygen had already begun to accumulate in the earth's atmosphere. We are exploring additional shale sequences near the Archean-Proterozoic boundary (~2.5 Ga) to track the rise of atmospheric oxygen through its reflection in Os cycling in surface materials. Preliminary work on other systems shows that some similar shales are disturbed, perhaps by exchange of Re and/or Os between coexisting organic material and sulfides during low-grade metamorphism. Research is underway on direct analysis of chemically extracted organic material to refine methods of dating shales and tracking Os sources through time.

This work was done in collaboration with my colleagues at AIRIE, Holly Stein and Richard Markey, and supported by the National Science Foundation.





Photomicrographs illustrating early diagenetic origin of pyrite: (A) spheroids overgrown by fibrous pyrite in pyrite matrix; (B) laminae consisting of clay minerals, organic matter, and silt-sized quartz grains bend around pyrite spheroid indicating pyrite growth before compaction; (C) microbial mat ripples mineralized by pyrite; (D) wavy and crinkly mineralized microbial mat structures in organic-rich shale. *From Hannah et al., 2004, EPSL 225, 43-52.*

Abstract

Necroforensics

By Jim Reed, RockWare

NecroSearch International is a non-profit organization that assists law enforcement agencies with locating clandestine gravesites. The 30+ NecroSearch volunteer members include a wide variety of scientists and crime scene investigators who specialize in animal scavenging, anthropology, archeology, botany, cadaver dogs, criminalistics, data processing, entomology, geography (GIS), geology, geophysics, meteorology, psychology, remote sensing, serology, underground and underwater exploration. The three primary goals are;

Research: For the past 15 years, NecroSearch has buried pigs at the Highlands Ranch Law Enforcement Training Facility in order to study the processes associated with burials.

Training: NecroSearch conducts annual one-week hands-on classes for law enforcement investigators from all over the world.

Assistance: NecroSearch members assist law enforcement investigators at crime scenes in the search and/or recovery of human remains and other evidence.

Bio: Jim Reed studied geology at the University of Wyoming and Washington University in St. Louis. He has worked for NASA, Freeport Exploration, AMAX Exploration, and Wold Minerals. In 1983, Jim founded RockWare, a geological software company that services the mining, petroleum, civil engineering, and environmental industries. Jim's role in NecroSearch typically involves the integration and synthesis of disparate data sets into exploration targets.

Colorado Scientific Society President's Note—September 2005

By Vince Matthews

Back to school and back to the office! Summer is always a great time for geologists. One of the projects we were working on at CGS this summer was the geology of Colorado State Parks. This was an eye opener. We figured that about half of the forty parks would be so boring that we wouldn't have to do anything with them. NOT. All of them were interesting in their own way.

These parks again highlighted the fantastic diversity of geology that is so spectacularly displayed across the state. We are blessed to have

so much within our borders. So, YOU should get out and see more of our fascinating geology-- and CSS field trips are a wonderful way to do so.

One of our trips last spring was a great aid to me in preparing the write-up on the geology of Lathrop State Park and in preparing a talk on the Geology of Huerfano County that was attended by over 100 people. Who knows how our fall trip to Gunnison County might help *you* in the near future. The geology and scenery in the area is special and Bruce Bartleson is a knowledgeable, fun leader.

Colorado Scientific Society Memorial Fund for 2004

By Emmett Evanoff

The CSS Memorial Fund Committee (Emmett Evanoff, Bruce Bryant, Don Sweetkind, and Jim Cappa) met on April 27, 2005 to evaluate research proposals for the Tweto, Oriel, Eckel, Snyder, and Pierce funds. We received 28 proposals from 21 Universities—from all across the United States. The total was an increase of 4 from the previous year.

We awarded 13 grants totaling \$9,950 from the Tweto, Oriel, Eckel, Snyder Fund, and the Pierce Heart Mountain Funds. A total of \$3,000 was awarded from the Tweto Fund for research in the Rocky Mountains, which supported four proposals. The Oriel Fund for research in the central and northern Rocky Mountains awarded \$2,000 to two proposals. The Eckel Fund for research in engineering geology awarded \$1,500 to support two proposals. The Snyder Fund for research on Precambrian geology of the Rocky Mountains awarded \$1,350 to two proposals. A total of \$2,100 was awarded from the Pierce Heart

Mountain Fund, under new guidelines established by the Pierce family last year, for research on the Heart Mountain fault and Quaternary geology. This year two proposals for work related to the Heart Mountain fault was funded as well as one other proposal.

Over the past 22 years (including this year), the Society has helped support the graduate research of 178 students, awarding a total of \$135,607 (an average of nearly \$762 per grant). This achievement is extraordinary for an organization of our size and exemplifies the commitment of its members to promote high quality research in the field of earth. It was an honor and pleasure to serve as Memorial Fund Chair this year and I want to extend a "thank you" to all the Memorial Fund donors that have made these grants possible.

Funds were awarded to the following students and projects

Jennifer L. Aschoff, University of Texas at Austin,
Control of Fold-Thrust Belt Transverse
Zones on Basinal Sandstone Tongue
Development in the Cordilleran Foreland
Basin.

Richard S. Barclay, Northwestern University,
Linking the Marine and Terrestrial Records
of the Cenomanian-Turonian Oceanic
Anoxic Event to Test the pCO₂ Drawdown
Hypothesis Using Fossil Plant Cuticle.

Erica Bigio, University of Arizona, The Integration of Tree-Ring and Alluvial Fan Records of Fire at the Missionary Ridge Fire, Durango Colorado.

Julia Ferguson, University of Illinois, Detailed Stratigraphic Analysis of the Upper Stratified Member of the Wapiti Formation, east-central Absaroka Range, Wyoming.

Kurt L. Frankel, University of Southern California, Tectonic Controls on Erosion in the Southern Rocky Mountains.

Kevin Hadder, Utah State University, Quaternary Stratigraphy and Geochronology of Browns Park, Utah and Colorado.

Jodi Lau, University of Illinois, Paleomagnetic Analysis of the Chinese Wall Trachyandesite, east-central Absaroka Range, Wyoming.

Scott Muggleton, University of New Mexico, Magnetic fabrics as indicators of magma flow and implications for emplacement mechanisms of the Spanish Peaks igneous complex (south-central Colorado).

Thomas Neeley, Colorado State University, 3D strain at transitions in foreland arch geometry: structural modeling of the Beartooth arch – Rattlesnake Mountain transition, NW Wyoming.

Daniel Peppe, Yale University, Integrated stratigraphy of a North American terrestrial Paleocene reference section: implications for long-term climate change and post-extinction biotic recovery.

Kelly R. Probst, University of Florida, Assessing Precambrian crust through a geochemical investigation of Mesozoic plutons in the northwestern Cordillera: Implications for continental reconstructions and metallogenesis.

Dustin Trail, University of Colorado, Identifying the earliest Precambrian crustal components: Detrital zircons from the Beartooth Mountains, Montana.

William Thomas Wilcox, Miami University, Ohio, Biostratigraphic evaluation of the Jurassic Curtis, Summerville, and Stump Formations, central-northeastern Utah.

Upcoming Field Trips

September 22-25—Gunnison Area. Trip leaders: Bruce Bartleson and Alan Stork, Western State College; and Pete Modresky, USGS.

The 2005 CSS fall field trip will be to the Gunnison/Crested Butte area in central Colorado. The first day will include traveling to Gunnison, then a half-day tour of the Powderhorn carbonatite. The second day's topic will be the structure of the Ancestral and Laramide Rockies as seen in the Elk Mountains near Crested Butte. Proposed stops for the second day include discussions of the structures around Almont and Jack's Cabin, Crested Butte/Gothic, and Schofield Park. We may go on an optional hike up to Schofield Basin and the Hasley Pass area to see an excellent view of the Elk Range thrust fault. The third day's topic will be on the Tertiary volcanism and igneous activity in the Gunnison Basin. Stops will include the Ohio Creek valley to see the West Elk laccolith cluster and a series of 10 Ma basalt flow on Red Mountain. We

will also see the ash-flow tuffs from the San Juans near Blue Mesa Reservoir and a drive up Red Creek to a great view of the 30 Ma West Elk Volcano. The fourth day will include the travel back to Denver with stops along the route.

Western State College will be hosting the 2006 Rocky Mountain Section Meeting of the GSA. The CSS fall field trip will be a preview of some of the field trips associated with this meeting.

Because of the decrease in motel room costs in September, the cost for the trip is \$250 and this includes transportation, lodging (double occupancy) and lunches. If you wish to have a single room, then the cost will be \$345, but please note that the number of single rooms is limited. Dinners and breakfasts are not included, but we will be staying all three nights in Gunnison that has many good restaurants.

If you are interested in attending this field trip, please fill out the following form, make out a check to the *Colorado Scientific Society* for \$250 per person and send them to: Emmett Evanoff, Department of Earth Sciences, University of Northern Colorado, Greeley, CO, 80639, no later than **September 15**. You will receive additional information concerning the trip after you register.



Deadline! Registration payment must be received by **September 15**. See Form below.

Register for CSS Gunnison field trip—September 22-25

Name: _____ Address: _____

Phone: _____

E-Mail : _____

I am interested in attending the following:

	Number of Registrants	Amount
Gunnison Field Trip , September 22-25, \$250/person	_____	_____
Additional cost of a single room (an additional \$95)		_____

Total Amount Enclosed:

(make your check out to the **Colorado Scientific Society**)

If you are registering more than yourself, please include the names and contact information for each additional registrant. For more than one additional person, please enclose this information for each person with this registration form.

Name: _____ Address: _____

Phone: _____

E-Mail : _____

Do you wish to share a double room with this person? Yes No

For the Gunnison trips, do you or your partners have any dietary or medical restrictions?.

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 Vince Matthews at 303-866-3028 or

vince.matthews@state.co.us



Denver Gem and Mineral Show, Sep 16, 17, 18, Denver Merchandise Mart, 58th and I-25.

Friends of Mineralogy, USGS, and CSM Geology Museum present "Mineral symposium on agate and cryptocrystalline quartz" at Green Center, CSM, Sept 10, 11, \$40. Field trips Sep 12, 13, free (Central City, N. Table Mountain). Contact Pete Modreski, USGS, 303-202-4766, pmodreski@usgs.gov, or Tom Michalski, 303-202-4852, tmichalski@usgs.gov.

Denver Mining Club meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave.) 11:30-1:00. Sep 12, Paul Jones, St Andrews Goldfields, "Gold exploration and mining activities in Canada and Alaska". Sep 26, Duane Richards, Western Fuels Ass., "Production and marketing of western coal". <http://china-resources.net>.

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, luncheon at noon, program at 12:30. 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. Sep 12, Andreas Dietrich, CSM, "Bulk rock and melt inclusion geochemistry of Bolivian tin porphyry systems". 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. Call Eleice Wickham at 303-573-2781 for res. <http://dwls.spwla.org>.

Rocky Mountain Association of Geologists (RMAG) Social at 11:30, lunch at noon, talk at 12:30. Reservations are taken at 303-623-5396 until 10:30 am, Wed. before the lunch. Cancellations are taken until 11 am on Wed. at 303-573-8621. Lunch--\$20 at the door. Talk only (no res)—\$3. Location: Denver Petroleum Club, Anaconda Tower, 555-17th St, 37th floor. <http://www.rmag.org>

Rocky Mountain SEPM Reception at 11:30, lunch at noon, speaker at 12:30. Reservations, Dave Uhl:303-389-5092 before noon of preceding Friday. \$15.00 lunch, \$3 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. David.uhl@EnCana.com.

Co-AIPG 11:30-social, noon-1:30-lunch and speaker. Cost-\$25. University Club, 1673 Sherman St, Denver. Reservations: Tom Cavanaugh, 303-458-5550, tcavanaugh@ascg.com.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30, Rm. 180.Refreshments at 3:30 on the 3rd floor. 303-492-8141. Web page: <http://www.colorado.edu/GeolSci>.

Colorado State University, Dept of Geosciences, Rm 320 Natural Resources Bldg, 4:10 pm. 970-491-5661. <http://www.cnr.colostate.edu/geo/seminars/fall2005.html>

Friends of Dinosaur Ridge. Web page: <http://www.dinoridge.org>. Admission is free, but donations are welcome. For more information contact the FODR Visitor Center at (303) 697-3466.

Colorado School of Mines, Van Tuyl Lectures Fri, from 3:00-4:00 in Berthoud Hall room 108. Sep 9, Paul Heller, "Late Cenozoic tilt of the Rky Mtns". Sep 30, Amir Sagy, "Shatter cones and extraterrestrial impact". <http://www.mines.edu/academic/geology.html>

USGS Geologic Division Colloquium. Thursdays, 1:30, Foord Room, Building 20, Denver Federal Center.. Contact: Pete Modreski, USGS, 303-202-4766, email pmodreski@usgs.gov.

Western Interior Paleontological Society, Ricketson Auditorium, Denver Museum of Nature and Science, 7 p.m. Free. www.wipsppc.com or call 303-663-5868

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

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