



Colorado Scientific Society

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



The Role of Lake Levels in Oil Shale Distribution

Yuval Bartov,
Colorado School of Mines



Thrust Faults as a Mechanism of Attenuation in the Steep Limbs of Forced Folds

Vince Matthews, *Colorado Geological Survey*



Thursday, September 21, 2006

American Mountaineering Center

710 10th St. (NE corner with Washington), Golden

Social half-hour – 6:30 pm. Meeting time – 7:00 pm.

Abstract

The role of lake levels in oil shale distribution

By Yuval Bartov, Research Assistant Professor, Colorado School of Mines

The oil shale richness and distribution in the Piceance Creek basin is not uniform and is mostly developed at the central part of the basin. Towards the margins there is a significant reduction of richness and thickness of the organic rich beds. This trend is controlled by several processes, some of which are also applicable in marine settings: rate of organic production, rate of consumption (oxidation and bacterial) and rate of dilution by the inorganic sedimentation.

However, lake systems have another control that most often plays a most important role – lake levels. Lake levels control water depth, location of depositional environments, distribution of sediment volume and lake salinity.

The depositional history of the Green River Fm illustrates the above model. Numerous lake level changes controlled the location of the lake shorelines. After an initial highstand, the lake regressed, and deeper water was restricted to the central part of the basin. During periods of low lake level, the water depth was too shallow on the lake margins for long term stratification, which is required for the anoxic state in the lower part of the water column. Yet the algal bloom persisted, as indicated by the rich oil shale deposits in the center of the basin. After the low lake level phase, water chemistry changed and salinity increased. Soon after, prominent oil shale beds were deposited throughout the basin. These beds are related both to the high lake levels and creation of brines in the lake, both enhancing long-term stratification of the lake's water column.

Abstract

Thrust faults as a mechanism of attenuation in the steep limbs of forced folds

By Vince Matthews, Director, Colorado Geological Survey

East-dipping thrust faults in the steeply-dipping limb of the basin-bounding monocline along the east flank of the Colorado Front Range have been ascribed to a variety of origins:

- Backthrusting from the upper detachment of a triangle zone (Sterne and Reynolds, 2001; Sterne, 2002))
- Shortening from east-west compression (Siddoway, 2002)
- Rotated growth faults (Weimer, 2004)

An analysis of this large displacement structure (associated with the Golden and Rampart Range faults), as well as several small-displacement folds,

shows that the east dipping faults are part of a conjugate thrust system. The conjugate faults are a primary mechanism of attenuation as the strata are folded over the edge of an uplifted basement block. Thinning of 19 percent by this mechanism was measured in a shale unit in one outcrop.

Analyzing the orientation of thrust faults in the steep limbs of a variety of structures along the Front Range and in Central Colorado indicates that this is a common phenomenon in extended steep limbs of forced folds. These thrust faults appear to be part of an orderly system of layer-parallel extension. Thrust faults that dip into the uplifted block will place older strata over younger strata and thrust

faults that dip away from the uplifted block place younger strata over older strata.

This system appears to be scale-independent, as it is observed operating on the sub-meter scale and the sub-kilometer scale. The process can create isolated, rhombic boudins or fault panels. These conjugate systems can tectonically isolate a sandstone boudin within a shale unit.

Our results suggest that the conjugate set may initiate when the strata have been tilted about 60 degrees from horizontal. With further rotation of the steep limb (even to overturned) the conjugate set is also rotated. With rotation, one of the sets becomes more favorably oriented to slip and becomes dominant.

WANTED • Volunteers

This October, Girl Scouts from the Denver Metro area will participate in a Dinosaur Ridge Day in Morrison. This event gives them opportunities to earn badges in a number of areas, particularly in the geosciences. These young ladies will also have the opportunity to meet and talk to women geoscientists and potentially consider careers in these areas.

AWG and RMS-AEG, which are co-sponsors of this event, are looking for volunteers from all geoscience organizations in the Rocky Mountain region. About 60 volunteers will be needed, overall. Commitment will involve a half-day (or more) on the Open Ridge Day October 7.

Please consider volunteering for this important event. If you have any questions, please contact the coordinator Clare Marshall at dinodiscovery@dinoridge.org.

CSS Fall Field Trip to the Paradox Basin, September 29-October 1

This year's Fall Field Trip for the Colorado Scientific Society will be to the Paradox Basin, on September 29- October 1, 2006. The trip leader will be Don Rasmussen, who has worked in the Basin for more than 30 years and has led numerous field excursions for universities and industry into the region. The trip will begin and end in the La Quinta Hotel parking lot in Moab, Utah. **The trip will start at 8:00 am on Saturday September 30.** We have blocked some rooms at the La Quinta, but there are also campgrounds nearby. Note though, that preliminary interest response for this trip has been high, and that there is some sort of sky diving group also in Moab that weekend, so you need to make plans early. Our hotel room block is for the nights of September 29 and 30th. Details are listed below.

Moab's La Quinta Inn is located at 815 S. Main Street, 8 blocks from downtown and 1.5 blocks from the City Market, where we'll be assembling our own box lunches early Saturday and Sunday mornings (September 30 and October 1) before heading out to the field.

We've reserved a block of 25 rooms (most with single kings, but some with double queens) for Friday and Saturday, September 29-30 at **\$78 + tax** per night for single or double occupancy. The hotel offers a heated outdoor pool, exercise and laundry facilities and, last but not least, complimentary continental breakfast in the lobby starting at 0700.

Note: Each person will be responsible for his lodging in Moab. So, while we have reserved the

rooms, you will have to pay for your room yourself. Camp grounds and locations can be found on the Moab city website www.moab-utah.com

For more information on our accommodations, including directions, visit <http://www.lq.com> and enter Moab, UT in the search form, or call the hotel directly (435) 259-8700.

Cost for the trip is **\$35.00**. That will cover the guidebook printing, and refreshments.

We have tried to keep costs to a minimum for the participants. So we decided that participants will have to bring their own lunches on the field trip. We will be providing water and soft drinks. There is a City Market that opens at 6:00 am, a few blocks from the La Quinta, for those who would like to buy lunch materials. We will provide a guidebook.

A few of the stops have not been included on other field trips. Some of the stops will require high clearance vehicles so if you have one, please bring it along, and plan on carpooling on the field trip days with the folks who don't have that kind of vehicle. It would be good if friends who know others that will attend the trip carpool from Denver. **The trip will end between 4 and 5 p.m. on Sunday.**

Deadline! Registration payment of **\$35** must be received by September 25. See Form below. return to

Jeremy McCreary

6242 S. Elmira Circle East

Greenwood Village, CO 80111

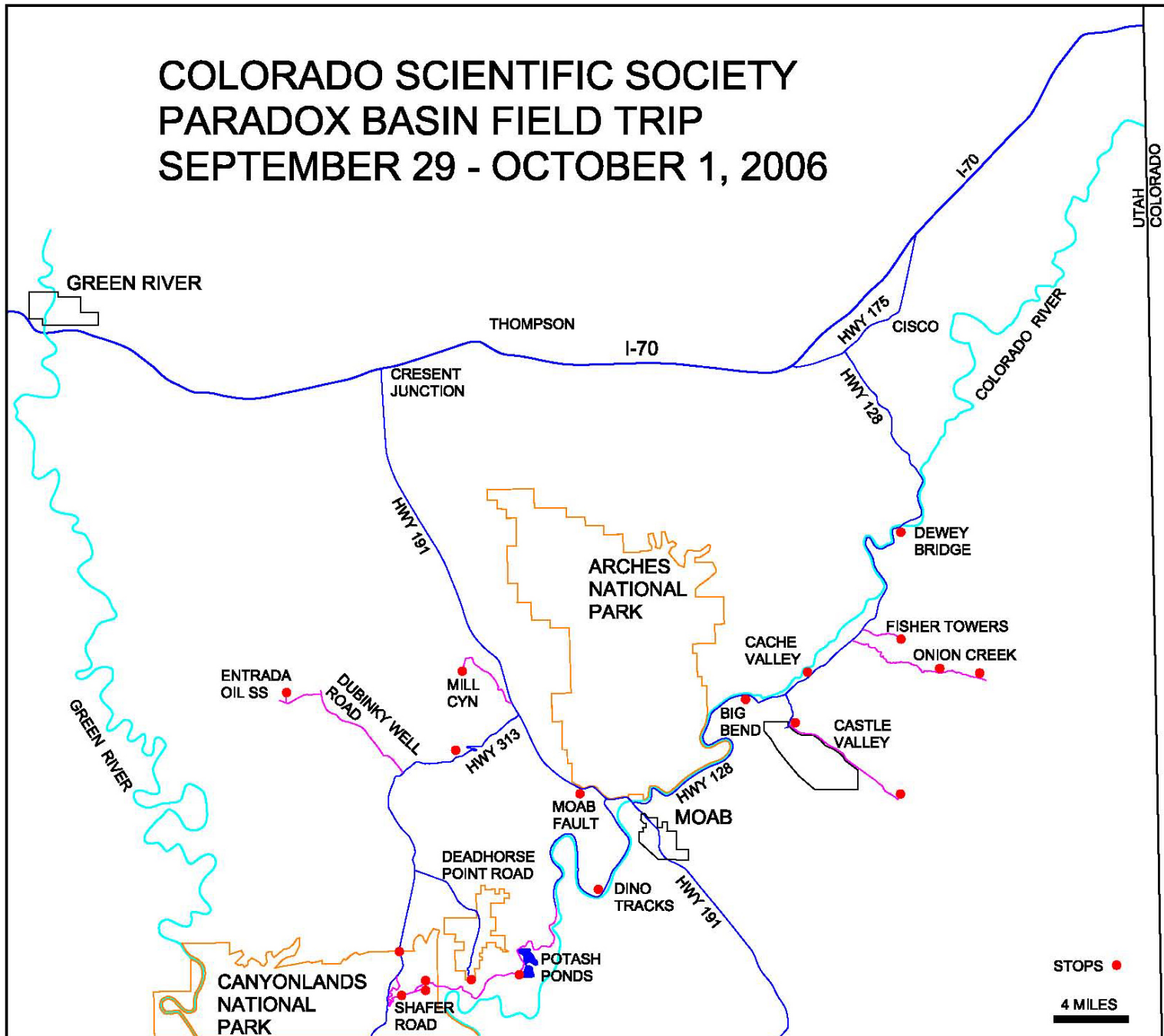
Home: (303) 744-0907

Mobile: (303) 901-8280

E-mail: jeremy@cliffshade.com (jeremy@cliffshade.com)

A receipt will be printed and handed out at the field trip.

COLORADO SCIENTIFIC SOCIETY PARADOX BASIN FIELD TRIP SEPTEMBER 29 - OCTOBER 1, 2006



Register for CSS Paradox Basin Field Trip

Name(s): _____

Phone: _____

E-Mail: _____

Bring appropriate clothing, snacks, and water.

Number of Participants: _____ at \$35 per person

Total for all attending: \$ _____

For registration, send this form and your check made out to **Colorado Scientific Society** to Jeremy McCreary, 6242 S. Elmira Circle East, Greenwood Village, CO 80111. **Deadline is Sept. 25.**



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 Chuck Kluth at 303-273-3889 or ckluth@mines.edu



Denver Gem and Mineral Show, Sep 15-17, 10 a.m.-6 p.m., Merchandise Mart, 58th Ave and I-25. "Minerals of South America. Admission \$5. kids under 13 w/ parent, free; teens, seniors 65+, \$3. www.denvermineralshow.com.

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 11, Nick Michael, SRK Consulting, "Financing your mine". Sep 18, Chris Herald, Solitario Resources, "New exploration developments, Pachuca Real, Mexico (silver), Bongara, Peru (zinc), Brazil (gold). <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 11, Paul Schmidt, "Coarse gold and diatreme volcanic vents at the Spring Valley discoveries, Pershing County, Nevada". 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 reservations. Web page: <http://dwls.spwla.org>.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30, lunch at noon, talk at 12:30. Reservations by recording at 303-623-5396 until 10:30 a.m., Wed. before the luncheon. Cancellations until 11:00 a.m. on Wed. at 303-573-8621. Luncheon is \$20 payable to RMAG at the door. Talk only (no res)—cost is \$3. Location: Denver Marriott, 17th & California. Sep 15, Steve Natali (tentative), "Geophysics cracks the Piceance Basin". Web page: <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.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30, Rm. 180. Refreshments at 3:30 on the 3rd floor. Sep 13, Tom Marchitto, "The ocean's role in atmospheric CO₂ lowering during glacial periods". Sep 27, Alan Robock, "Comparing climatic response to low and high latitude volcanic eruptions." 303-492-8141. Web page: <http://www.colorado.edu/GeolSci>.

Colorado State University, Dept of Geosciences, Rm 320 Natural Resources Bldg, 4:10 pm. Sep 11, Paul Nicholson, ARAMCO, Richard Groshong, UA, "A structural model for typical hydrocarbon traps in Saudi Arabia." 970-491-5661. <http://www.cnr.colostate.edu/geo/seminars/spring2005.html>

Friends of Dinosaur Ridge. Morrison Town Hall, 7:00p.m. 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 Fridays from 3:00-4:00 in Berthoud Hall room 108. <http://www.mines.edu/academic/geology.html>

USGS Geologic Division Colloquium. Thursdays, 1:30, 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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