Newsletter of the

# Utah Geological Association

P.O. Box 520100 – Salt Lake City, Utah 84152-0100

http://utahgeology.org

**VOLUME 41, NUMBER 1** **January 2009**

January UGA Luncheon Meeting

January 12, 2009

## *THE CEDAR MOUNTAIN FORMATION AND ITS DINOSAURS: FINDING THE BASE OF THE CRETACEOUS IN CENTRAL UTAH*

JAMES I. KIRKLAND
Utah Geological Survey

Research over the past decade on the Lower Cretaceous Cedar Mountain Formation (CMF) has resulted in an appreciation of the 30 million year geological and paleontological record preserved in this relatively thin but complex rock sequence.

The oldest Cretaceous dinosaur fauna preserved is at present only known from the Yellow Cat Member of the Cedar Mountain Formation of east-central Utah and the basal Lakota Formation South Dakota. The ankylosaurs, iguanodontids, and sauropods indicate close temporal and geographic ties to the Barremian / earliest Aptian of Europe. Apparently, many of these groups went extinct at the beginning of the Aptian in North America. The correlative Buckhorn Conglomerate to the west has been recently been purported to be of Late Jurassic age but the identification of an ankylosaur skeleton and intertonguing relationships discount this hypothesis.

Aptian-middle Albian dinosaur sites preserve dinosaurs that during this time interval are found only in North America. These include the nodosaurid ***Sauropelta***, the primitive iguanodontian ***Tenontosaurus***, and slender-toothed brachiosaurid sauropods. Although

nodosaurids continued to be important in North America until the end of the Cretaceous, ***Tenontosaurus*** and the sauropods apparently went extinct in the Cenomanian.

Discovery of the Mussentuchit dinosaur fauna indicates that there is a dramatic faunal shift near the Albian - Cenomanian boundary with replacement of endemic dinosaurs typical of the Aptian - Albian by those characteristic of the Late Cretaceous. This dinosaur fauna is remarkably similar to those of the Campanian and Maastrichtian of western North America for which only the toothless theropods have not been recorded in the Mussentuchit fauna as yet. As the most likely ancestors of the tyrannosaurid, hadrosaurid and ceratopsian are from the Early Cretaceous of Asia, the dramatic shift to faunas typical of the North American Late Cretaceous is interpreted to result from opening migration corridors to and from Asia through Alaska at the end of the Early Cretaceous, when migration to eastern North America was still. However, flowering plants were coming into dominance during this same interval and may account for some of this faunal turnover.

Cedar Mountain research in east-central Utah over the past 50 years has resulted in various definitions of its lower contact above a regional unconformity spanning about 20 million year at the top of the Morrison Formation (MF). The basal contact has been placed at the base of a conglomeratic sandstone (Poison Strip Ss.), at the top of a regionally extensive calcrete, and at the base of this same calcrete (currently most widely accepted). However, the calcrete in this relative stratigraphic position is not present everywhere, and major calcrete horizons occur at different stratigraphic levels in CMF regionally.

Across its northern outcrop belt west of Green River and south of I-70, the Yellow Cat Member (YCM) of the CMF to the north of Arches National Park preserves polacanthine ankylosaur *Gastonia*, iguanodontids, brachiosaurid sauropods, and giant dromaeosaur *Utahraptor*. The YCM has a regionally correlative calcrete in its lower part (previous base of CMF); however, an Early Cretaceous dinosaur assemblage (including ankylosaurs, iguanodontids, and a new dromaeosaurid theropod) is now recognized from several meters lower, above a laterally persistent silcrete bed. A chert pebble lag a few meters below the silcrete suggests the basal CMF contact is even lower. Southeast of Green River, an Early Cretaceous dinosaur fauna apparently distinct from that recovered elsewhere in the YCM (a new giant polacanthine ankylosaur and the basal therizinosauroid *Falcarius*) underlies a dark-brown gravelly “caprock,” 20-50 cm thick with extensive carbonate development at its top. A chert pebble-cobble lag below the dinosaur-bearing levels marks the base of CMF.

In both areas, a chert pebble lag marks the MF/CMF unconformity well below where it has been recognized in the past. Research is underway to test for potential points of correlation between the lower YCM in the two areas (Is “caprock” equivalent to calcrete?), establish if these strata are laterally contiguous (they may well not be), and further document the earliest records of Cretaceous deposition on the Colorado Plateau.

**Biography**: Dr. Jim Kirkland (born, August 24, 1954) is the Utah State Paleontologist with the Utah Geological Survey. He issues permits for paleontological research on Utah state lands, keeps tabs on paleontological research and issues across the state, and promotes Utah’s paleontological resources for the public good.

An expert on the Mesozoic, he has spent more than thirty years excavating fossils across the southwestern US and Mexico, authoring and coauthoring more than 75 professional papers. The reconstruction of ancient marine and terrestrial environments, biostratigraphy, paleoecology, and mass extinctions are some of his interests. He has discovered and described numerous new dinosaurs including several new armored dinosaurs, bipedal plant-eaters, the oldest truly horned-dinosaur, North America’s first sickle-clawed therizinosaurid, and the giant dromaeosaur [raptor] *Utahraptor*. Additionally he has described and named many fossil mollusks and fish. His researches in the middle Cretaceous of Utah indicate that the origins of Alaska and the first great Asian-North American faunal interchange occurred about 100 million years ago, which his numerous trips to China and Mongolia have substantiated.

****** **NEW LUNCHEON LOCATION** ******

The January luncheon meeting will be at 12:00 noon, **Monday, January 12th**, 2009, at the Department of Environmental Quality, 168 North 1950 West, Building #2, room 101. Enter on eastside.

**Please make your reservations (537-3300) no later than 4:00 p.m. on Thursday, January 8th.**
Click to make reservations for the Luncheon Meeting by sending email to reservations@utahgeology.org.

Lunch at 12:00 noon. Meeting begins at 12:30. Cost: $10.00 w/ reservations; $5.00 for students. *Cash or Checks only please.*

## *President's Message*

Dear UGA Members and Friends,

Happy New Year! And best wishes for a prosperous 2009.

These are interesting times and provide immense challenges for professionals working in the Earth Sciences. The economic conditions are currently beyond comprehension. Specific basic laws of supply and demand will prevail. The current oversupply of liquid fuels is not sustainable and the demand for energy in this country will continue to grow. The need for the highly trained professional geologists that make up the membership of the UGA to rise to the demands of the times is evident. Economic downturns and the effects on members of our profession are not new and those of us with more gray hair than we might like hope this one is short.

Once again, thanks for the support from each and every member of UGA. I and the Board members are eager to continuing working with you through 2009.

Tom Faddies, UGA President

## *Did You Miss the UGA 2009 Membership Renewal Deadline?*

UGA Secretary Stephanie Carney is now preparing the 2009 UGA Member Directory, which will be distributed around the end of January 2009. If you missed the December 31st renewal deadline, please contact Stephanie ASAP to make sure that your name appears in the directory and that you are not dropped from the newsletter distribution list.

The standard membership form can be found on the UGA website: www.utahgeology.org.

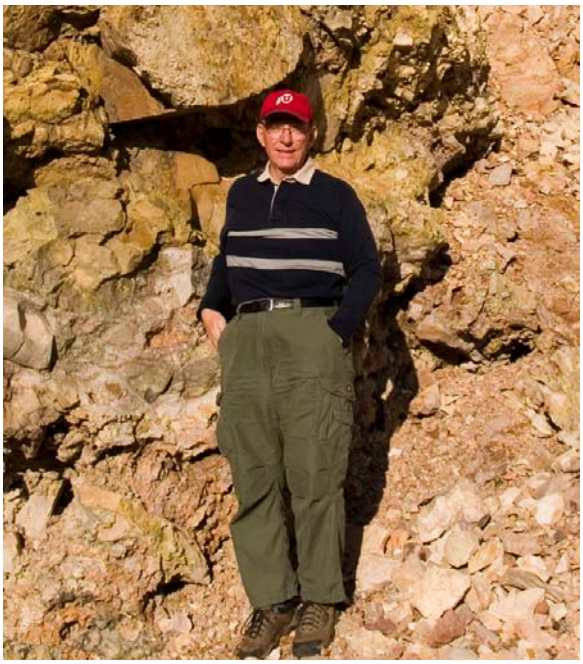
## *Welcome New UGA Member!*

The UGA would like to give a big WELCOME to the following new Active Member:

Ty Robinson – Science Instructor, Provo High School

Stephanie Carney
2009 UGA Secretary

## *2008 UGA Service Award*



The 2008 governing board of the UGA is pleased to award **Roger Bon** with a Lifetime membership for his outstanding service to the UGA.

Roger has had a long service record with the UGA. He was Treasurer in 1993, President Elect in 2002, and President of the UGA in 2003. He has also served on the planning committee for several UGA hosted meetings, including two AAPG national meetings held in Salt Lake City and several AAPG-Rocky Mountain Section meetings held in the area. He has been the Publications Chair for the past 4 years and the Social/Recreation Chair for the past 5 years. Roger is a Project Geologist with the Utah Geological Survey.

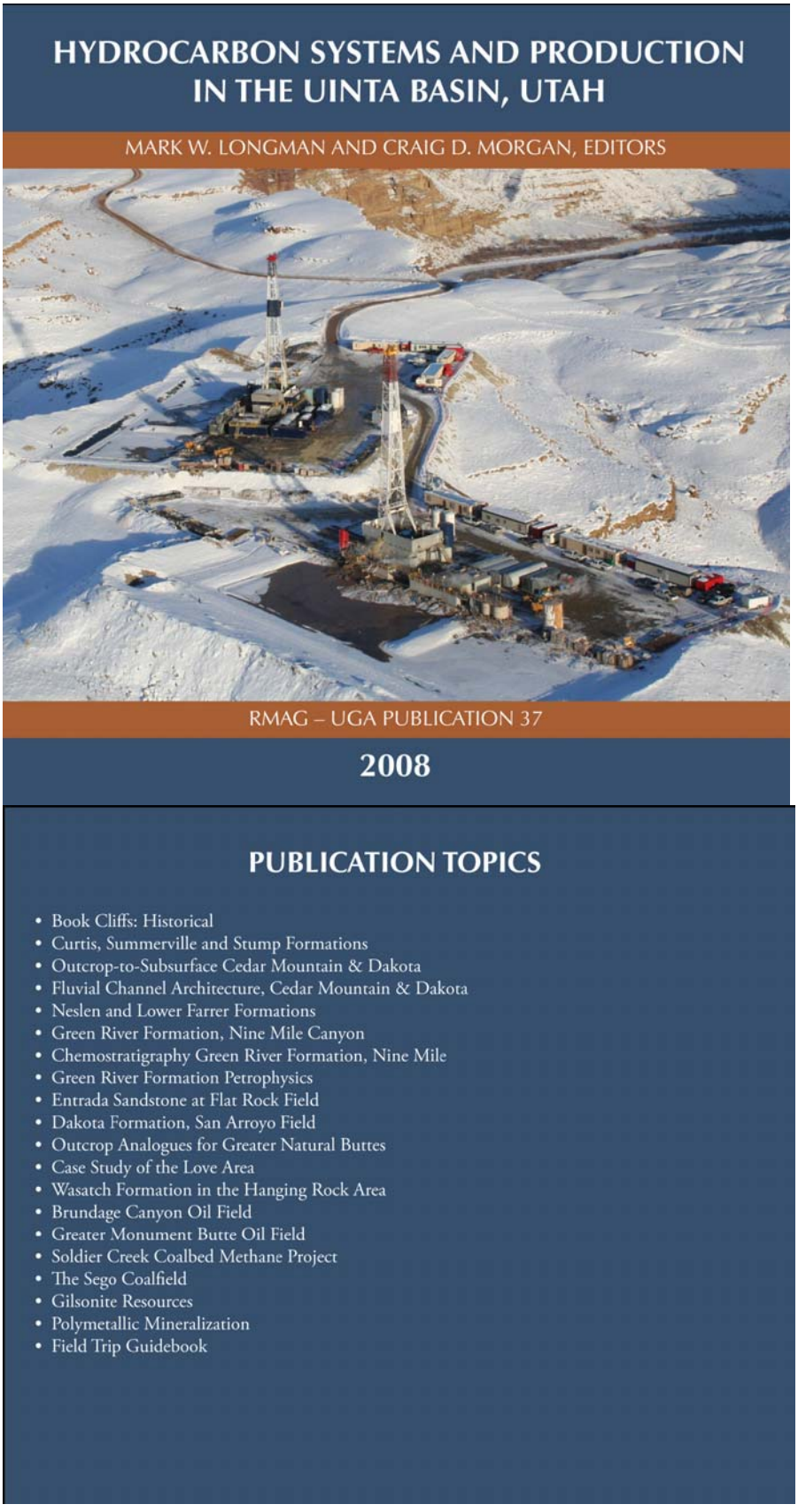
Thanks Roger!

## *AAPG Seeking Officer Nominations*

The AAPG Nominating Committee is seeking nominees for AAPG office to the Executive Committee. The deadline for nominations is February 1, 2009. Nominations received after February 1 will be held for next year's officer nominations.

The Nominating Committee will consider candidates in the Spring of 2009 for President-Elect serving 2010-2011; President 2011-2012; Vice-President for Sections 2010-2012; Treasurer 2010-2012; and Editor 2010-2013.

For more information, please see the nomination form sent separately with this newsletter.




UGA Publication 37, published jointly with the Rocky Mountain Association of Geologists, is now available at the DNR bookstore for $25 (plus shipping) on DVD.

# *Utah Chapter Association of Engineering Geologists*

January 8th Monthly Meeting

**Mark Molinari**, the national President of AEG, will talk about airborne LiDAR for environmental and engineering geology.

Meeting place/time: ROCKY MOUNTAIN PIZZA, 3977 South Wasatch Blvd., Salt Lake City (north of Dan's grocery store in the Olympus Hills Shopping Center). Because State employees from the DNR and DEQ are now required to work M-Th, 10 hours a day, the Dinner/Social has changed to 6:00 to 7:00 pm, and the presentation is now from 7:00 to 8:00 pm.

This year please R.S.V.P. with Jessica Castleton at eolianwanderer@msn.com or 801-390-3665 by 3 pm on the day of the meeting for a reservation. The costs for the dinner meeting is as follows; students: $4, members: $12 w/reservations, $13 w/out reservations, non-Members: $14, and the talk only $5.

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# *The Salt Lake Section of the Society of Petroleum Engineers*

January 15, 2009

**Hussein Hoteit**

*Higher-Order Methods in Reservoir Simulation: Luxury or Necessity?*

Higher-order methods correctly approximate the transmissibilities, faults, and fractures and capture sharp fronts in the saturations. Are the reservoir engineers willing to trade-off the accuracy and reliability of higher-order methods with the speed of the first-order methods? This lecture presents several numerical examples including some field-scale results to show that the time has come for a change.

Hussein Hoteit is a Senior Reservoir Engineer at ConocoPhillips. He earned a BS degree in pure math and computer sciences from the Lebanese University, and MS and PhD degrees in applied math from Université de Rennes, France.

Participants should plan on gathering and paying for lunch starting at 11:30 a.m.; the presentation starts at noon. The cost is $15.00 for members and guests, $8.00 for students. Please RSVP to John McLennan, email: jmclennan@egi.utah.edu or (801) 587-7925 by close-of-business on Friday November 28, 2008. Please try to adhere to the deadline for reservations in order to keep costs down. Hope to see you there. Pass on to any you feel would be interested.

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# NEW CLASS: SPRING 09

## GEO 5270: Applied & Engineering Geomorphology

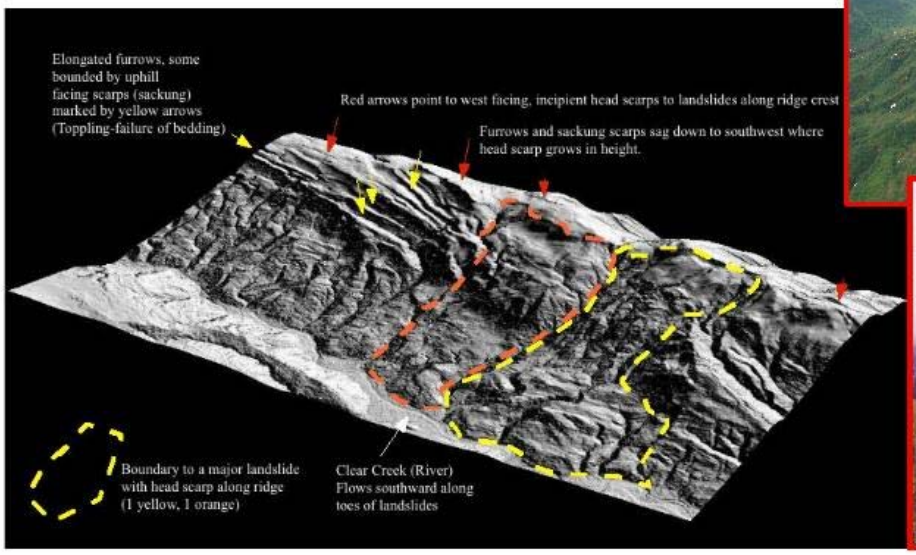
3 Credits, HOURS: 8:10 – 9:30 Tuesday & Thursday

Practical applications of geomorphology for site investigations and analysis of landscapes.

- Methods in Aerial Photography, Remote Sensing, LIDAR, GPS, and Mapping

- Earthquake & volcanic hazards, landslides, flooding, coastal processes

INSTRUCTOR: RON BRUHN
ron.bruhn@utah.edu




# UGA VOLUNTEERS

## UGA Board

(unless otherwise indicated, area code is 801)

| | | |
|---|---|---|
| 2009 President | Tom Faddies tomfaddies@utah.gov | 538-5100 |
| 2009 President-Elect | Randy White, rwhite@sinclairoil.com | 526-3734 |
| 2009 Program Chair | Mike Laine, michaellaine@utah.gov | 538-3359 |
| 2009 Treasurer | Rebecca Gustin, rg@wasatch-environmental.com | 972-8400 |
| 2009 Secretary | Stephanie Carney stephaniecarney@utah.gov | 537-3374 |
| 2009 Past-President | N. Brett Mustoe brett_mustoe@urscorp.com | 904-4000 |

## UGA Committees

| | | |
|---|---|---|
| Education/Scholarship | Loren Morton lmorton@utah.gov | 536-4262 |
| Environmental Affairs | | |
| Geologic Road Sign | Sandy Eldredge sandyeldredge@utah.gov | 537-3325 |
| Historian | Paul Anderson paul@pbageo.com | 364-6613 |
| Membership | | |
| Public Education | Paul Jewell pwjewell@mines.utah.edu | 581-6636 |
| Publications | Roger Bon rogerbon@utah.gov | 537-3363 |
| Publicity | Laura Springsteen lauraspringsteen@kennedyjenks.com | 474-9615 |
| Social/Recreation | Roger Bon rogerbon@utah.gov | 537-3363 |

## AAPG House of Delegates

| | | |
|---|---|---|
| | Craig Morgan craigmorgan@utah.gov | 537-3370 |

## UGA Web Site

http://www.utahgeology.org

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|---|---|---|
| Webmaster | Bill Case billcase@utah.gov | 537-3340 |

## UGA Newsletter

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|---|---|---|
| Newsletter Editor | Bob Biek bobbiek@utah.gov | 537-3356 |

## 2009 UGA Guidebook Editors

| | |
|---|---|
| Bryce Tripp brycetripp@utah.gov | 537-3317 |
| Ken Krahulec kenkrahulec@utah.gov | 537-3308 |