

PALEOCENE AND MIOCENE STRATA IN SOUTHEASTERN
MONTANA: IMPLICATIONS FOR REGIONAL OR LOCAL
TECTONISM OR EUSTACY

FACULTY

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STUDENTS

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INVITED SPEAKERS

John A. Diemer, University of North Carolina at Charlotte
Jason Hicks, Yale University
Donald U. Wise, University of Massachusetts

VISITOR

Leo Hickey, Yale University

Keck Workshop on Paleocene & Miocene geology of SE Montana

Organized by E. S. Belt

Eight students and three faculty met from 14-17 January 1993 to resolve specific geologic issues left unresolved from field work last summer. Because of logistics each student was unable to visit the entire study area.

The objectives of the workshop were to pool observations and interpretations. We addressed questions that dealt with matters of correlation, stratigraphic organization, sedimentology, position of one or more unconformities in the stratigraphic record, and the nature and timing of the Paleocene slumping that was the main focus of the team effort. Other questions applied to the Miocene Arakaree Formation that unconformably overlay the Paleocene strata.

Students made presentations on the morning of Friday, 15 Jan. Just after a lunch break, general questions were addressed by the group. By 3 PM invited speakers gave formal presentations on geology germane to our project. Saturday, 16 Jan, was given over to a day of discussions which continued the those begun on the preceding day.

Ian Clark using Christene Albanese's data made a presentation on the orientation of bedding and faults within the Paleocene slump blocks. They were attempting to determine whether incised rivers caused localized slumping in many different directions, or whether the slumping had a more "regional" aspect to it. Barret Cole discussed the Paleocene paleo-drainage directions and the evidence for meandering rather than braided for the Medicine Rocks Sandstone. His correlation chart, based on measured sections by nearly all the students, showed that all of the Medicine Rocks Sandstone (Tongue River Member) unconformably overlay all older Paleocene strata in the area. Russ Able discussed the provenance of sand-size sediment found in Ludlow and Tongue River fluvial deposits. He was able to show a compositional difference between the Medicine Rocks Sandstone composition and that of the underlying Ludlow sandstone. Srabani and Kristin gave a summary of stratigraphic relationships, composition, and burrow types in the Miocene strata.

The following talks were given in the afternoon of 15 Jan 1993:

Donald U. Wise, Dept. Geology & Geography, UMass, Amherst, MA: "Block Mountain mechanics of the middle Rockies".

Jason Hicks, Dept. Geology and Geophysics, Yale Univ., New Haven, CT: "Unconformities controlled by regional tectonism in the Bighorn basin, Wyoming and Montana".

John A. Diemer, Dept. Geography & Earth Sciences, Univ North Carolina, Charlotte, NC: "Sedimentology and paleohydraulics of Lebo meandering channels, southeastern Montana".

Edward S. Belt, Dept. Geology, Amherst College, Amherst, MA:
"Late Cretaceous and Early Paleocene sedimentary facies in western Williston Basin: were the controls eustacy, regional tectonism, or both?"

Don Wise and Tekla Harms were able to help Christene and Ian with what sorts of data would best distinguish the regional from local slump orientation. John Diemer helped Barret Cole with evidence of meandering vs. braided stream features in the Medicine Rocks Sandstone. Jason Hicks and Ed Belt raised questions of the significance of the unconformity below the Medicine Rocks Sandstone. The stratigraphic gap (Figure 1) corresponded precisely with a mid-Torrejonian gap in the Bighorn Basin (Hicks, 1993).

Two days prior to the workshop, Doug Nichols of the U. S. Geological Survey, Denver, sent palynological age-dates on some of the Ludlow coal beds sampled last summer. These age dates allowed Jason Hicks and Ed Belt to make a new, though tentative, correlation chart for the strata of the study area and its correlation to the east into South Dakota (Fig. 1). This revised stratigraphy needs to be tested by further field work and additional palynological age-dates, especially in the Cave Hills area of South Dakota, a place we visited but did not study. Nevertheless, we believe it is generally accurate and reflects the new thinking that the students have developed in the area.

The workshop formed an important part of each student's understanding of the issues that need to be addressed in their respective theses. The feedback was very positive.

We missed the wisdom and guidance of Ed Buetner (F & M) and Walter Coppinger (Trinity University) both of whom were full-time field faculty last summer. We were fortunate to have the active participation in the workshop of the three invited speakers: John Diemer, Don Wise, and Jason Hicks. John Diemer had also been an active participant in the field last summer; he had been on KECK projects in eastern Montana with Belt in the summers of 1987 and '88 whilst at F & M. Our guest, Dr. Hickey also participated in some of the discussions.

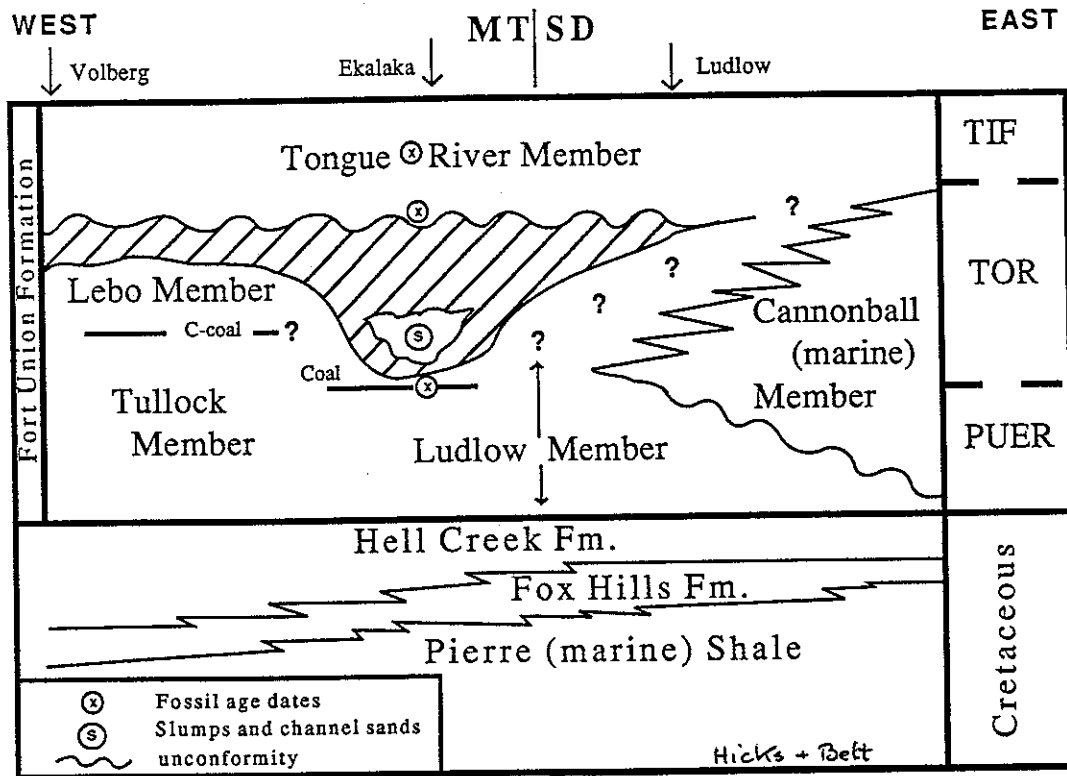


Figure 1: Correlation chart along an east-west latitude between Ekalaka, MT and Ludlow, SD. The chart shows a major time-gap within Torrejonian strata along the Miles City arch, 100 km north of the Precambrian basement of the Black Hills. This time-gap decreases to the east and west of the arch. The fluvial facies of the Tongue River Member pushed the Cannonball sea out of the Western Interior basin during latest Torrejonian time. Chart prepared by Jason Hicks and Ed Belt during the Winter Workshop, January 16, 1993.

PIKES PEAK BATHOLITH WORKSHOP

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