

# New Mexico Geological Society

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## ***Front Matter***

*(Usually includes Dedication, President's Message, & Conference Organizer's Message.)*

*in:*

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*This is a section from the 2001 NMGS Fall Field Conference Guidebook.*

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## **Annual NMGS Fall Field Conference Guidebooks**

Every fall since 1950, the New Mexico Geological Society (NMGS) has held an annual [Fall Field Conference](#) that explores some region of New Mexico (or surrounding states). Always well attended, these conferences provide a guidebook to participants. Besides detailed road logs, the guidebooks contain many well written, edited, and peer-reviewed geoscience papers. These books have set the national standard for geologic guidebooks and are an essential geologic reference for anyone working in or around New Mexico.

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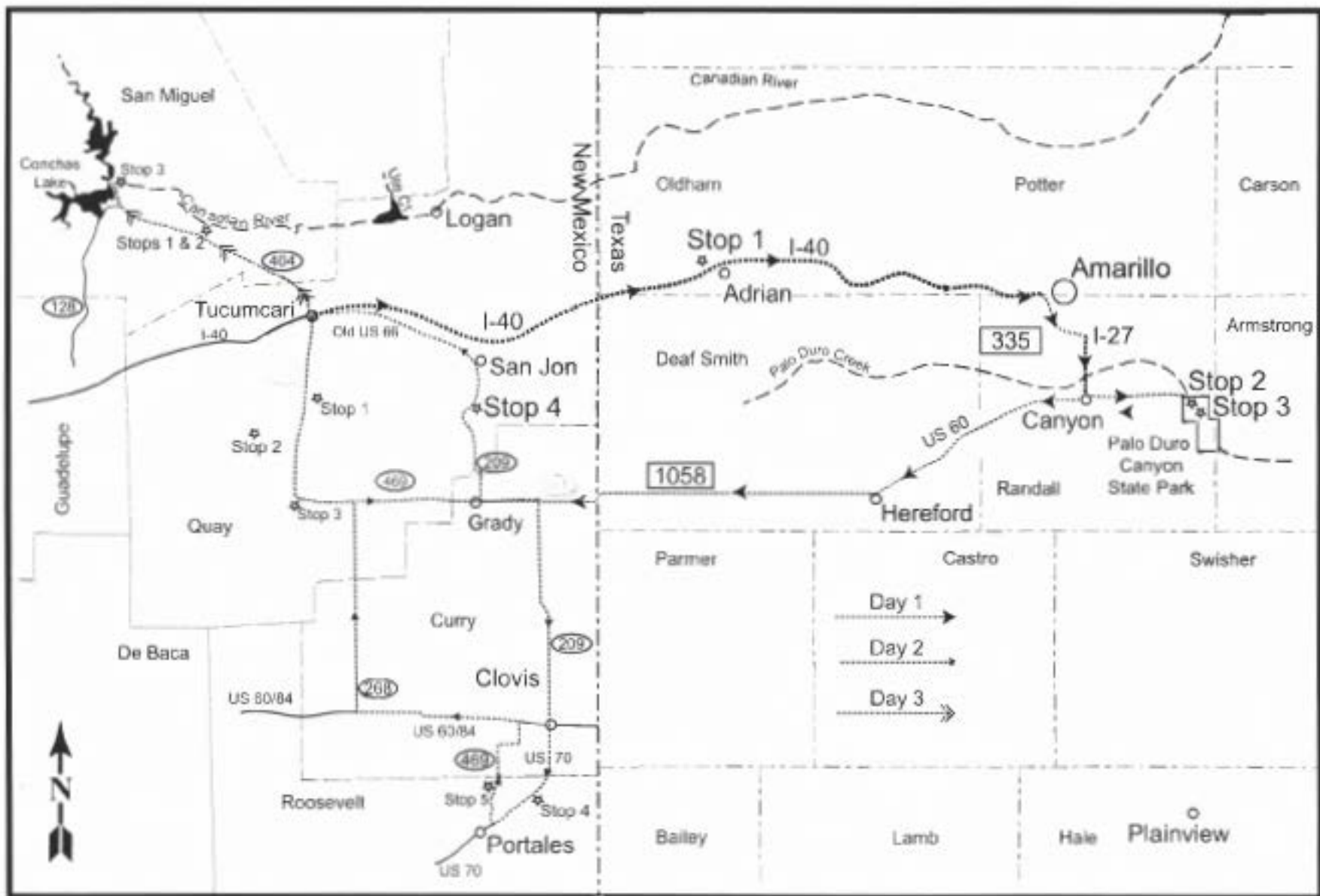
NMGS has decided to make peer-reviewed papers from our Fall Field Conference guidebooks available for free download. This is in keeping with our mission of promoting interest, research, and cooperation regarding geology in New Mexico. However, guidebook sales represent a significant proportion of our operating budget. Therefore, only *research papers* are available for download. *Road logs*, *mini-papers*, and other selected content are available only in print for recent guidebooks.

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Geologic Information Center

# Geology of the Llano Estacado

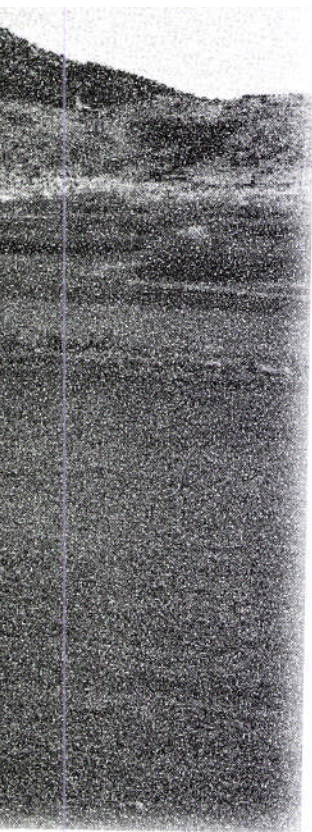
E d i t o r s

Spencer G. Lucas

Dana S. Ulmer-Scholle



**New Mexico Geological Society**  
**Fifty-second Annual Field Conference**  
**September 26-29, 2001**



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## DEDICATION

Frederick Dale Trauger inherited his interest in water. Fred was born in California's San Joaquin Valley, where his father was Chairman of the Lindsay-Strathmore Irrigation District. Geology was a natural course of study, and Fred received his B.A. from Fresno State University in 1939. He then enrolled in the graduate program at Stanford University. During this time Fred also worked with the Strategic Metals Branch of the U. S. Geological Survey as a geologic field assistant evaluating mercury and manganese deposits in Nevada and California.

At the outbreak of World War II, Fred enlisted in the Army Air Corps and was trained as a photo interpreter. He served in that capacity in North Africa and Italy until 1945. With his return to civilian life, Fred worked briefly with the Bureau of Reclamation conducting hydrologic studies in California before joining the Ground-Water Branch of the U. S. Geological Survey in the Oregon District. In 1952, Fred was transferred to the New Mexico district office in Albuquerque.

Fred Trauger joined the New Mexico Geological Society in 1956; he became Secretary of the Executive Committee in 1964 and President in 1966. Through Fred's efforts, the NMGS became fiscally solvent. Between 1966 and 1975, he was the driving force in the Society's Publications Committee. Fred set up a marketing strategy for the sale of guidebooks, upgraded their quality, and helped establish guidelines to improve the technical presentation. In 1972 he was made an Honorary Member of the NMGS.



**Frederick D. Trauger, at Palo Duro Canyon, Texas, December 2000**

Participation in the annual field conference was always a highlight for Fred. For many years he was largely responsible for planning the routes and preparation of the road logs. He was editor and co-editor, respectively, of the 1967 and 1972 guidebooks; and in the 1965-1987 period, he was the author or coauthor of many guidebook technical papers and road logs. Particularly memorable was the 1972 Field Conference jointly organized with Vincent Kelley. Fred wound up ably leading Day One, and Vin then took over with characteristic vigor. With the efforts of many persons, including Fred's, the New Mexico Geological Society's annual field conference has become a widely recognized professional event that attracts persons from across the nation and abroad.

Besides being a hydrogeologist of note, Fred's expertise in Mesozoic and Cenozoic stratigraphy and structure is widely recognized—particularly in southwestern and eastern New Mexico. On more than one outcrop, Fred has gone toe-to-toe with others on topics such as Exeter and Entrada Sandstone terminology, and Triassic stratigraphic concepts. His lengthy bibliography includes a number of ground water investigations in California, Oregon, and New Mexico. His report "Water resources and general geology of Grant County, New Mexico" (NMBMMR Hydrologic Report 2, 1972) remains a classic for southwestern New Mexico. He also belongs to the small group of recognized authorities on the ground-water resources of eastern New Mexico and the Southern Great Plains. He is senior author (with F. X. Bushman) of New Mexico State Engineer Technical Report 30 (1964) on "Geology and ground water in the vicinity of Tucumcari...", so the 2001 NMGS Field Conference is certainly on Fred's professional home turf.

Following his retirement from the Water Resources Division of the U. S. Geological Survey, Fred founded the consulting firm of Geohydrology Associates, Inc. with T. E. (Tim) Kelly in 1975. The firm specializes in water supplies for municipal and industrial purposes.

As President until his retirement, Fred consulted on projects throughout the country, but his area of special interest was always eastern and southwestern New Mexico.

Fred is also a recognized authority on turquoise. He has visited most of the turquoise-producing areas in the Southwest and made a detailed study of the Carico Lake Mine near Austin, Nevada. The late Stuart A. Northrop and Fred combined to present a series of lectures on the occurrence and quality of turquoise, with lectures being presented as far away as New York City.

In addition to his love of geology, Fred is an over-achiever in many other areas. When his late beloved wife Jeanne wanted to grow roses, he not only planted roses but also became an expert who won a number of ribbons in rose shows. Fred has become a recognized authority and has judged rose shows throughout the Southwest. He later developed the same love of orchids. Fred is a knowledgeable arborist. The Trauger yard in northeast Albuquerque contains a number of exotic trees, which Fred nurtures, including giant redwood, and various species of pine and cedar found only in California and Arizona. And cats . . . while most people are happy with one or two, the Traugers have had as many as nine. Besides innumerable friends, Fred also collects movie videos, and currently has over 1,100 films.

In 1996, friends and associates from throughout the country joined in celebrating Fred's 80' birthday. An Irish toast was made: "May Fred live to see 100 years, then be given one extra year to repent." The way he is going, it looks like he will get there! And the New Mexico Geological Society will be one of the principal benefactors. By the way, Fred mixes a mean martini, and Happy Hour always begins at 1630 hrs!

**Tim Kelly and John Hawley**

## PRESIDENT'S MESSAGE

*Tucumcari Tonight!* Anyone who has traveled the major thoroughfares of New Mexico has encountered the billboards recommending that they make this town on old Route 66 their destination for the evening. The 52nd New Mexico Geological Society Fall Field Conference succumbs to the advertising as we base the 2001 conference out of this hub of eastern New Mexico. It has been 16 years since the Society's last visit to the area. Please take time to thank Spencer Lucas (New Mexico Museum of Natural History) and Adrian Hunt (Mesa Technical College), this year's conference leaders, for their efforts on behalf of the Society.

I am pleased Dana Ullmer-Scholle (NMIMT) has agreed to serve as managing editor for the Society. This guidebook represents her first effort on behalf of the Society, although she has served in such a capacity for other geoscience groups. Although retired, the former managing editor, George Austin, continues in that role for our forthcoming special publications. We expect to see the first volume of the *Geology of New Mexico* edited by Greg Mack (NMSU) and Katherine Giles (NMSU) very soon. A second volume concentrating on geologic resources that will follow in a year or two.

The pre-press version of the updated Geologic Highway Map of New Mexico will be available about the time of this conference. The drafting and cartographic staff at the New Mexico Bureau of Geology & Mineral Resources has also assisted in the completion of the map. The Bureau continues to be a significant contributor to the continuing success of the NMGS under the direction of Dr. Peter Scholle, State Geologist and Director. Please note the Bureau changed its name as of June 15 this year. Frank Kottowski spearheaded this project for many years.

Speaking of Frank, we will all miss his presence at the Conference this year and for the years to come. Frank Kottowski (Honorary member 1967) passed away this spring after a prolonged illness. Frank was a tireless supporter of the Society and to those who studied the geology of this great state. His family asked his friends to honor him by continuing to support the Kottowski Fellowship in addition to a new endowment in his honor established by the New Mexico Bureau of Geology and Mineral Resources. Frank Kottowski's legacy lives on in the many geologists and friends touched by his generosity and kindness, this one included.

The Society will miss another one of its hardest workers and greatest supporters. Norma Meeks retired from the New Mexico Bureau of Geology & Mineral Resources after the NMGS Spring Meeting. Linda Ulbricht has agreed to assume some of Norma's duties at the Bureau and serve as registration chair for the Society.

Brian Brister (NMBMMR) and Gary Smith (UNM) co-chaired the Spring Meeting in Socorro with much success. We encourage Society members from all universities and occupations to volunteer to help with the Spring Meeting.

The Society continues to support geoscience education in the state by increasing our scholarship awards again this year. The Robert and Beverly Wellnitz and Lucille Pipkin Scholarships have allowed the Society to take support of geoscience education to new heights and directions. The Robert Root Special Projects Fund and Reprint Fund (established by Fred Trauger) provide the means for the Society to pursue special publications (*Geology of New Mexico*), develop infrastructure (the new publication storage facility built in conjunction with the Bureau) and reprint our publications. I encourage all members to consider the Society in their estate financial plans.

White Sands will be the focus of next year's field conference. The Society has never specifically visited this part of New Mexico. Access to the missile range affords the participants the opportunity to see "up close" those rocks only viewed from a distance. Kate Giles and I are co-chairs and welcome your participation.

The Society's success comes from the many talented individuals working for the benefit of the geologic community. Please find time to volunteer and continue the traditions that make the NMGS a model for all other professional societies. Enjoy the results of the hard work of this year's conference leaders and please consider how you might contribute to the Society in the future.

Virgil W. Lueth



## EDITOR'S MESSAGE

The history of geological studies in New Mexico began on 22 September 1853 when Swiss geologist Jules Marcou (1824-1898) climbed a hill about 20 km southwest of what is now Tucumcari. Dubbed by Marcou "Pyramid Mountain," this hill exposes red beds at its base, overlain by cliffs of yellow sandstone and capped by a thin shale interval from which poured shells of marine bivalves. Marcou identified these bivalves as the oyster-like *Gryphaea* (they actually pertain to a closely related genus, subsequently named *Texigryphaea*), and assigned them a Jurassic age. He thus concluded that the High Plains surface here, and throughout the region, is underlain by Jurassic strata. But the bivalves and the rocks that contain them are actually Cretaceous in age, and Marcou's mistake engendered the first scientific debate about the geology of New Mexico, one that was not resolved during his lifetime.

This year, nearly 150 years after Marcou's visit, the attendees of the 52<sup>nd</sup> Field Conference of the New Mexico Geological Society will visit Pyramid Mountain. And, although the mountain has not changed much since Marcou, our understanding of the rocks exposed on its flanks has, and is a major focus of the field conference and this guidebook.

It has long been obvious that much of what we know of the Mesozoic geological history of New Mexico comes to us from exposures on the Colorado Plateau in the northwestern portion of the state. A plethora of correlation charts and paleogeographic maps of the Mesozoic cover the Four Corners and mystically are truncated somewhere around the Plateau's southeastern edge, west and northwest of Albuquerque. Yet, the Mesozoic depositional systems knew no such boundaries—the vast Triassic, Jurassic and Cretaceous basins of the North American Western Interior extended eastward, out onto what are now the prairies of West

Texas and the Oklahoma panhandle, and in some cases beyond. Understanding their Mesozoic history—the tectonics, sediments and extinct biotas—requires geographically broad study that encompasses the outcrop and subsurface in east-central New Mexico.

Fortunately, in Guadalupe and Quay Counties and adjoining areas, the Pecos and Canadian Rivers have sculpted canyons, escarpments and mesas that well expose a Mesozoic section about one km thick. As at Pyramid Mountain, the section begins with nonmarine red beds of Triassic age, which are loaded with fossils of amphibians and reptiles, including some of the earliest dinosaurs. Bold cliffs of Jurassic eolianites follow, mantled by relatively thin sections of Jurassic claystones and Early Cretaceous marine shale—the latter are the source beds of Marcou's "*Gryphaea*" fossils. Cliff-forming Lower Cretaceous sandstones usually cap the Mesozoic section, and they are locally overlain by erosional outliers of Upper Cretaceous marine strata.

This is the third time the New Mexico Geological Society has visited the Mesozoic section in east-central New Mexico. The first time was in 1972, led by the late Vincent Kelley, one of the giants of New Mexico geology, and Fred Trauger, to whom this book is appropriately dedicated. The second time was in 1985, and I led that field conference (I gotta stop doing this!).

This year, Adrian Hunt, of the Mesalands Dinosaur Museum, is co-chairman of the conference, which is headquartered in the fabled city of Tucumcari. Andrew Heckert, Barry Kues and Virginia McLemore were the other dedicated members of the roadlogging committee. Their hard work is praiseworthy, and I am also grateful to the following organizations and to members of their staffs for providing diverse support of this field conference and guidebook: Blackwater Draw Museum, Blackwater Locality No. 1, Mesa Technical College, New Mexico Bureau of Mines and Mineral Resources, New Mexico Museum of Natural History and Palo Duro Canyon State Park. Finally, I owe special thanks to Matt Celeskey and Daniel Weismann for help with guidebook graphics; Joanne Dickenson for access to Blackwater Draw archives and collections; and Dana Ulmer-Scholle for her skills as managing editor.

**Spencer G. Lucas**

# COMMITTEES

## 2001 EXECUTIVE COMMITTEE

Virgil W. Lueth., President.....	New Mexico Bureau of Geology & Mineral Resources
Maureen Wilks, Vice-President.....	New Mexico Bureau of Geology & Mineral Resources
Gary Stephens, Treasurer.....	U. S. Bureau of Land Management
Ray Kenny, Secretary.....	New Mexico Highlands University
Katherine Giles, Past President .....	New Mexico State University

## FIELD CONFERENCE

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Spencer G. Lucas, Co-Chair .....	New Mexico Museum of Natural History

## GUIDEBOOK

Spencer G. Lucas, Editor .....	New Mexico Museum of Natural History
Dana S. Ulmer-Scholle, Managing Editor .....	New Mexico Insitute of Mining and Technology

## ROAD LOGS

Spencer G. Lucas, Chair.....	New Mexico Museum of Natural History
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Andrew B. Heckert.....	University of New Mexico
Barry S. Kues.....	University of New Mexico
Virginia T. McLemore.....	New Mexico Bureau of Geology & Mineral Resources

## REGISTRATION

Maureen Wilks .....	New Mexico Bureau of Geology & Mineral Resources
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## LOCAL ARRANGEMENTS

Adrian P. Hunt.....	Mesa Technical College
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## PUBLICATIONS COMMITTEE

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Richard M. Chamberlin .....	New Mexico Bureau of Geology & Mineral Resources

## PUBLICATION SALES

Norma J. Meeks .....	New Mexico Bureau of Geology & Mineral Resources
Linda S. Ulbricht.....	New Mexico Bureau of Geology & Mineral Resources

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FIELD CONFERENCE SCHEDULE

Wednesday, September 26, 2001—Registration Day

- 6:00-9:00 PM Registration and ice-breaker party, Holiday Inn
- 6:00-8:00 PM Free admission to Mesalands Dinosaur Museum, Tucumcari

Thursday, September 27, 2001—First Day, round trip from Tucumcari to West Texas and return

- 6:00-7:15 AM Breakfast (not provided)
- 7:00-7:30 AM Registration, Mesalands Dinosaur Museum, Tucumcari
- 7:30 AM Buses leave Mesalands Dinosaur Museum
- 5:30 PM Leave last stop
- 6:00 PM Annual barbecue, Caprock Park, San Jon

Friday, September 28, 2001-- Second Day, round trip from Tucumcari to Blackwater Draw and return

- 6:00-7:15 AM Breakfast (not provided)
- 7:00-7:30 AM Registration, Mesalands Dinosaur Museum, Tucumcari
- 7:30 AM Caravan leaves Mesalands Dinosaur Museum
- 5:30 PM Caravan returns to Tucumcari
- 7:00 PM Annual banquet (provided), Holiday Inn, Tucumcari

Saturday, September 29, 2001—Third Day, from Tucumcari to Conchas Dam

- 6:00-7:15 AM Breakfast (not provided)
- 7:30 AM Caravan leaves Mesalands Dinosaur Museum
- 1:00 PM Field conference ends at Conchas Dam

CREDITS

**Front Cover:** Watercolor of photograph of Pyramid Mountain in Quay County by Spencer G. Lucas and Dana S. Ulmer-Scholle.

**Inside Front Cover:** Satellite image from the new NASA TERRA satellite (using the new sensor called MODIS) provided by Thomas K. Budge, Earth Data Analysis Center, University of New Mexico.

**Inside Back Cover:** Stratigraphic chart of east-central New Mexico and west Texas, by Spencer G. Lucas. **Frontespiece:** Drawing of Tucumcari Mountain by Dana Ulmer-Scholle after a photograph by Wayne Lambert. **Logistical**

**Assistance:** Mesa Technical College, New Mexico Museum of Natural History, New Mexico Bureau of Geology.

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