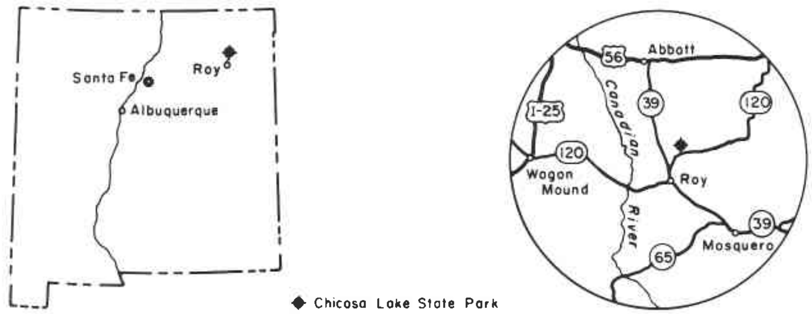
Chicosa Lake State Park

Virginia T. McLemore

New Mexico Geology, v. 10, n. 3 pp. 62-64, Print ISSN: 0196-948X, Online ISSN: 2837-6420.
https://doi.org/10.58799/NMG-v10n3.62

This page is intentionally left blank to maintain order of facing pages.

Chicosa Lake



Modern technology has changed the character and appearance of the Great Plains, but at Chicosa Lake State Park in Harding County one can recapture the spirit of life on the plains during the 1800's and early 1900's. The land is flat, treeless, monotonous, desolate, and relatively dry; the summers are hot, the winters are cold; the wind blows constantly. Comanche, Cheyenne, and Kiowa once roamed this area hunting buffalo; later, settlers lived in sod huts and depended on buffalo chips for heat. On the Goodnight–Loving cattle trail Chicosa Lake was an important natural waterhole. In honor of that time, the State purchased a small herd of Longhorn cattle and two buffalo from the Wichita Mountain Wildlife Refuge in Oklahoma for the park (Fig. 1). During the summer the herd is in pasture, so look carefully for them in the fields nearby.

Chicosa Lake, at an elevation of 5,900 ft, is about 7 mi northeast of Roy, about 40 mi east of Wagon Mound and I–25 via NM–120. Annual visitation at Chicosa Lake State Park is 18,000 to 26,000 (New Mexico Natural Resources Department, State Park and Recreation Division, written comm., 1987). The park was established in 1969 and consists of 407 acres. It lies on the southern edge of the Kiowa section of the Panhandle National Grasslands. This area has been administered by the U.S. Forest Service since the 1930's to assist in the rehabilitation of grassland agriculture in the region.

Both the National Grasslands and the State Park provide outdoor recreation, watershed protection, and game and bird habitats. Mule deer, antelope, coyotes, badgers, fox, and a multitude of bird species including hawks and eagles are found in the grasslands; Barbary sheep from Africa were introduced into the region in 1950. Many of these animals can be observed while enroute to Chicosa Lake. Ducks, geese, and other birds frequent the lake.

When full, Chicosa Lake is about 8 ft deep and covers about 233 acres containing approximately 900 million gallons of water. The New Mexico Department of Game and Fish stocks the lake with rainbow trout and fingerlings, thereby providing recreational fishing. Twelve camping units, picnic facilities, a playground, dump station, and modern restrooms with hot showers provide the visitor with modern conveniences (Fig. 2) not available to the men who originally enjoyed this waterhole.

History

In 1866, Charles Goodnight and Oliver Loving left Ft. Belknap, Texas bound for the mining camps of northern New Mexico and Colorado with about 2,000 head of cattle (Haley, 1949). They headed southwest to the Pecos River and then north along the river to Ft. Sumner (Fig. 3). This route was chosen in the hope of avoiding hostile Indians.

Once they reached Ft. Sumner, they found a ready market for most of their cattle. The U.S. Army purchased the beef to feed Navajo and Mescalero Apache Indians held on the Bosque Redondo Reservation. The Indians had been relocated to the reservation in 1863 to learn farming; however, the project failed and the Indians were returned to their original homes several years later after suffering starvation and many deaths. After Goodnight and Loving had sold most of the cattle to the army in 1866, Loving continued to Denver via Las Vegas and Raton Pass (Loving Trail) with the remaining cattle while Goodnight returned to Texas with the profits to purchase more cattle. In 1867 Goodnight blazed a new trail from Ft. Sumner northward past Chicosa Lake, through Trinchera Pass east of Raton, and into Denver and

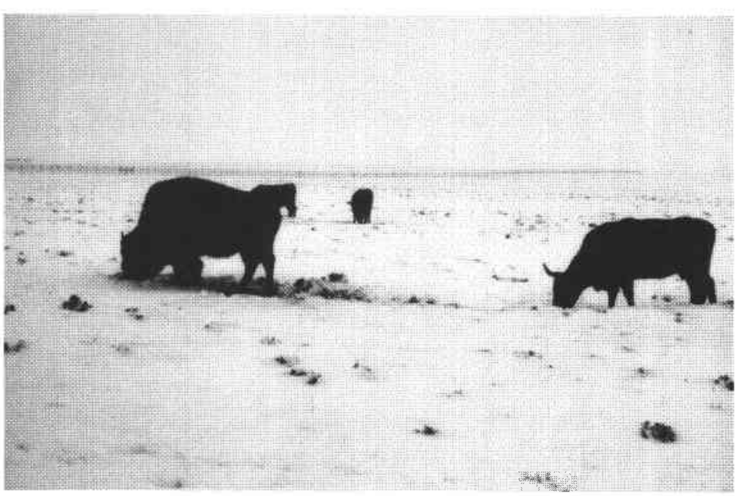


FIGURE 1—Cattle and buffalo graze through the snow at Chicosa Lake State Park.

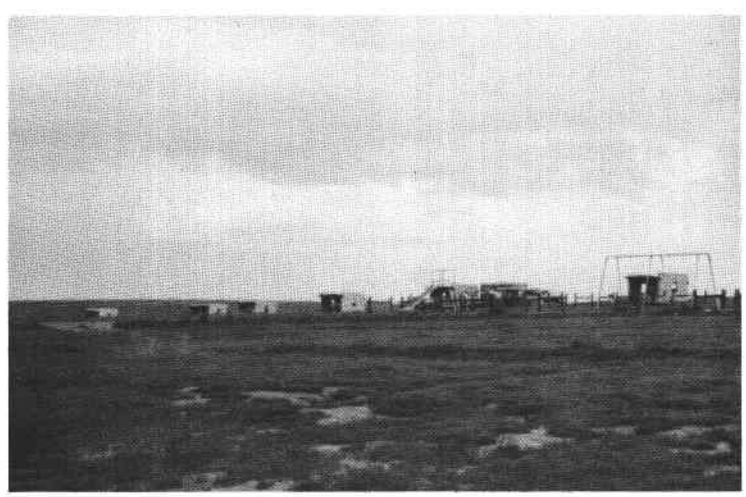


FIGURE 2—Camping facilities and playground at Chicosa Lake.

Cheyenne (Fig. 3). Years later he blazed a third segment from Ft. Sumner to Granada, Colorado. Other cattlemen, such as John Chisum, followed the Goodnight–Loving trails. Between 1866 and 1875, an estimated 250,000 head of cattle traveled over the 2,000-mile-long Goodnight–Loving Trail. But Oliver Loving did not live to see his trails used; in 1867 he died of wounds received in a skirmish with Indians near present-day Carlsbad (Fig. 3). The coming of the railroad and the establishment of permanent ranges, with barbed-wire fencing and windmills providing a steady supply of water, ended the long cattle drives in the late 1880's.

Charles Goodnight is credited with designing the traditional chuckwagon. He modified a surplus army supply wagon to carry equipment and food needed on the cattle drives. A replica of this essential vehicle is on display at the park along with other exhibits describing the history of the cattle drives.

Physiography and geology

Chicosa Lake is an example of how geology has influenced history. This is a relatively permanent water-table lake, which is east of the Canadian River in the Raton section of the Great Plains physiographic province (Hawley, 1986). Without such reliable waterholes, cattle could never have made the long, dry trek to the northern markets. The lake lies within a natural basin on top of the Ogallala Formation of mid-Miocene to early Pliocene (4–12 m.y.) age. A thin veneer of younger Holocene (less than 10,000 yrs old) and upper Pleistocene (1.6 m.y. to 10,000 yrs old) sediments, derived from the underlying Ogallala Formation, covers the Ogallala at Chicosa Lake. These surficial deposits consist of 10–50 ft of gray sandy silt, clay, and organic mud reworked and deposited by water and wind (Scott, 1986). The eastern margin of the lake basin is formed by silt and clay dunes derived from the lake by wind erosion (deflation). Fossil mollusks occur in the lake sediments and are 1,000 to 27,000 yrs old (Frye et al., 1978). These small organisms are common in fresh-water permanent lakes.

The Ogallala Formation is one of the most widespread units in the United States, extending from South Dakota to southern New Mexico and northwestern Texas. It is the prime reservoir of ground water throughout the region that is responsible for man changing the appearance and character of the Great Plains. The Ogallala is approximately 200 ft thick at Chicosa Lake and consists of eolian sand and silt and fluvial sandy clay, siltstone, sandstone, and local gravel derived from the Rocky Mountains about 4–12 m.y. ago (Wanek, 1962; Reeves, 1972; Hawley, 1984; Scott, 1986). Caliche beds are common throughout the unit. Caliche is composed of fractured and permeable deposits of gravel, sand, silt, and clay cemented by calcium carbonate (McGrath and Hawley, 1987).

Lakes throughout the Great Plains, such as Chicosa Lake, probably formed by one, or

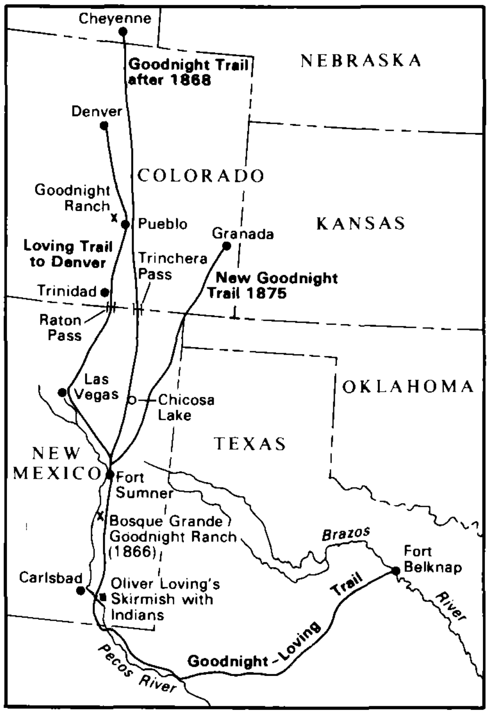


FIGURE 3—Sketch map of the Southwest showing the Goodnight–Loving Trails (modified from Haley, 1949).

a combination, of three methods. First, thin overlying clay, silt, and sand cover locally blows away forming dunes and leaving typically elongated, shallow deflation basins that subsequently fill with water and lake sediments (Fig. 4A; Reeves, 1971). Second, natural undulations or irregularities in the underlying caliche may also be responsible for local depressions that form shallow lakes (Fig. 4B). A third method of forming these natural depressions is by dissolution of carbonate cements in underlying rocks within the Ogallala or older limestones; a natural circular sink or collapse structure would form as the overlying materials subside or wash into resulting voids (Fig. 4C; Lucas et al., 1987; Osterkamp and Wood, 1987; Wood and Osterkamp, 1987). After the depression is formed, enlargement of the lake can occur by 1) further dissolution of underlying carbonates by downward percolation of organic acids, 2) eolian removal of clastic material from the floor of the lake, and/or 3) downward transport of clastic material by soil water (Osterkamp and Wood, 1987; Wood and Osterkamp, 1987). Eventually, the elevation of some lakes, such as Chicosa Lake, coincides with the level of the ground water in the area, thereby providing a permanent surface supply of water. The water level in the lake varies seasonally as the level of ground water changes (Frederick D. Trauger, pers. comm., 1987).

About 30 mi east of Chicosa Lake, modern technology has changed the plains. Carbon dioxide is produced from Permian sediments at depths of 1,000–2,500 ft in the Bueyeros and Bravo dome CO_2 fields (Broadhead, 1987). This area has reserves of 5.3 to 9.8 trillion ft^3 of 98–99% CO_2 (Smith, 1984; Broadhead, 1987). At the end of 1985, 240 wells were producing CO_2 from the Bravo dome field and 18 wells were producing from the Bueyeros field. A pipeline transports the CO_2 to the Permian Basin in southeastern New Mexico and west Texas where it is used to enhance oil recovery.

Summary

Although picnicking, camping, and fishing are the main recreational activities at Chicosa Lake State Park, visitors are also treated to a rare glimpse of what life was like on the Great Plains during the 1800's and early 1900's, a time of cattle drives, Indians, and homesteaders. The lake, a permanent natural water-table lake, was an important waterhole on the Goodnight– Loving cattle trail. As one of the lesser-known and out-of-the-way state parks, the area offers peace and solitude from the everyday life of the 1980's.

ACKNOWLEDGMENTS—Discussions with Fred Trauger and James McLemore and critical reviews by Fred Trauger, Dave Love, John Hawley, and William Stone are appreciated. Lynne McNeil typed various stages of this manuscript; Rebecca Titus drafted Figs. 3 and 4.

—by Virginia T. McLemore

References on next page

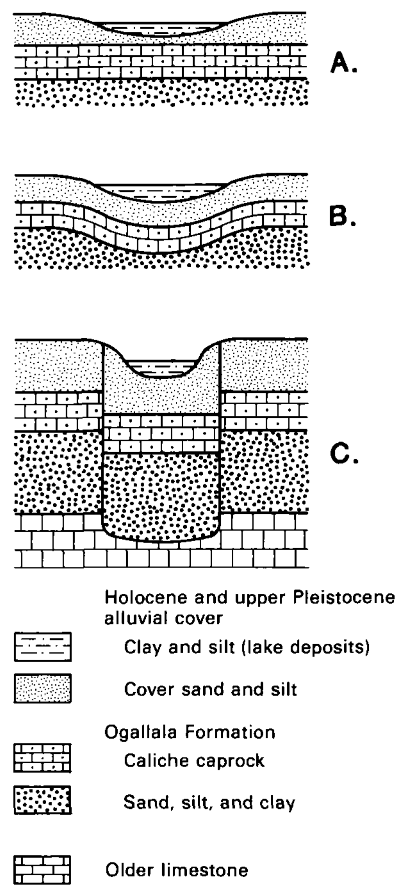


FIGURE 4—Generalized cross sections of typical depressions forming lakes such as Chicosa Lake (modified from Reeves, 1971). **A.** Shallow deflation basin in cover sands with no major dunes. **B.** Shallow basin formed by undulations in the underlying caliche. **C.** Collapse structure or sinkhole, a result of dissolution of underlying limestone.

References

Broadhead, R. F., 1987, Carbon dioxide in Union and Harding Counties: New Mexico Geological Society, Guidebook to 38th Field Conference, pp. 339–349.

Frye, J. C., Leonard, A. B., and Glass, H. D., 1978, Late Cenozoic sediments, molluscan faunas, and clay minerals in northeastern New Mexico: New Mexico Bureau of Mines and Mineral Resources, Circular 160, 32 pp.

Haley, J. E., 1949, Charles Goodnight, cowman and plainsman: University of Oklahoma Press, Norman, 485 pp.

Hawley, J. W., 1984, The Ogallala Formation in eastern New Mexico; **in** Whetsone, G. A. (ed.), Proceedings of the Ogallala Aquifer Symposium II: Texas Tech University, Water Resources Division, pp. 157–176.

Hawley, J. W., 1986, Physiographic provinces; **in** Williams, J. L. (ed.), New Mexico in maps, 2nd edition: University of New Mexico Press, Albuquerque, pp. 23–27.

Lucas, S. G., Hart, A. P., Kues, B. S., Trauger, F. D., and Holbrook, J., 1987, Second-day road log, from Clayton to Clapham, Miera, Bueyeros, Mosquero, Roy, Yates, and back to Clayton: New Mexico Geological Society, Guidebook to 38th Field Conference, pp. 23–40.

McGrath, D. B., and Hawley, J. W., 1987, Geomorphic evolution and soil-geomorphic relationships in the Socorro area, central New Mexico; **in** McLemore, V. T., and Bowie, M. R. (compilers), Guidebook to the Socorro area, New Mexico: New Mexico Bureau of Mines and Mineral Resources, pp. 55–67.

Osterkamp, W. R., and Wood, W. W., 1987, Playa-lake basins on the southern High Plains of Texas and New Mexico—Part I, hydrologic, geomorphic, and geologic evidence for their development: Geological Society of America Bulletin, v. 99, pp. 215–223.

Reeves, C. C., Jr., 1971, Relations of caliche to small natural depressions, southern High Plains, Texas and New Mexico: Geological Society of America Bulletin, v. 82, pp. 1983–1988.

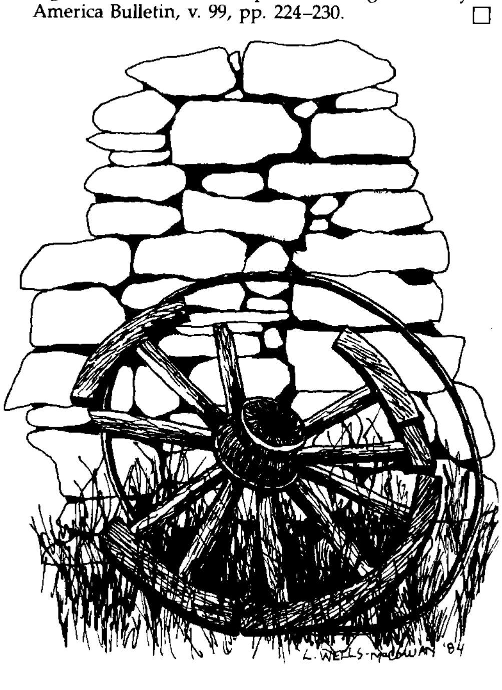
Reeves, C. C., Jr., 1972, Tertiary–Quaternary stratigraphy and geomorphology of west Texas and southeastern New Mexico: New Mexico Geological Society, Guidebook to the 23rd Field Conference, pp. 108–117.

Scott, G. R., 1986, Geologic and structure contour map of the Springer 30′ × 60′ quadrangle, Colfax, Harding, Mora, and Union Counties, New Mexico: U.S. Geological Survey, Map I-1705, 2 sheets, scale 1:100,000.

Smith, L. R., 1984, "Old" area setting for new technology: Drill Bit, v. 33, no. 6, pp. 15–18.

Wanek, A. A., 1962, Reconnaissance geologic map of parts of Harding, San Miguel, and Mora Counties, New Mexico: U.S. Geological Survey, Oil and Gas Investigations Map OM-208, scale 1:96,000.

Wood, W. W., and Osterkamp, W. R., 1987, Playa-lake basins in the southern High Plains of Texas and New Mexico—Part II, a hydrologic model and mass-balance arguments for their development: Geological Society of America Bulletin, v. 99, pp. 224–230. □



Abstracts

New Mexico Geological Society

The New Mexico Geological Society annual spring meeting was held at New Mexico Institute of Mining and Technology (Socorro) on April 15, 1988. Following are abstracts from sessions given at that meeting. Abstracts from the other session will appear in future issues of *New Mexico Geology*.

Poster session

REVISION OF THE NEW MEXICO STATE GEOLOGIC MAP: COMPILATION METHOD, STYLE, NOMENCLATURE CHANGES, AND STRATIGRAPHIC REASSIGNMENTS, by *O. J. Anderson*, and *Darrell Daude*, New Mexico Bureau of Mines and Mineral Resources, Socorro, NM 87801

In 1985, a decision to revise and publish an updated version of the 1965 New Mexico State Geologic Map was made. The project is being carried out jointly with the U.S.G.S. Justification for the revision derives from 1) much detailed geologic mapping during the last 22 years, 2) new radiometric dating methods (Ar40/Ar39) that have permitted a better understanding of the sequence of mid-Tertiary volcanics, 3) a keener understanding of Precambrian events, and 4) refinements to our biostratigraphic knowledge. The recompilation is currently underway at the NMBMMR using a computerized digitizing system. The computer-assisted approach to the project was found to be superior to a more conventional approach such as graphical-data transfer instrument, e.g. a Bausch and Lomb zoom transfer scope. Stylistic changes will include 1) color selections and contrasts, 2) more attention to portrayal and definition of structure, and 3) legend format. Nomenclature changes have been most apparent in, but not limited to, the Precambrian, Jurassic, Cretaceous, and the mid-Tertiary. The Precambrian rocks will be assigned to one of five age or genetic groups: a) sedimentary, b) plutonic, or c) one of three suites of early Proterozoic metamorphic rocks. Changes in the Jurassic include proposals by the U.S.G.S. to replace the middle part of the San Rafael Group with the name Wanakah Fm. The change reduces the rank of the Todilto and Summerville Fms. to Members of the Wanakah. The Zuni Sandstone will be redefined and restricted geographically. Changes to the Cretaceous will include restricting the stratigraphic range of the Mesaverde Group in the west-central part of the state, and elevation of the Dakota Sandstone to Group status with both upper and lower Cretaceous components in the east-central part of the state. Extensive revisions of the Tertiary volcanics are largely the result of accurate dating of ignimbrites which permit correlations across the Datil–Mogollon volcanic field.

Stratigraphy, sedimentation, and paleontology session

TRIASSIC STRATIGRAPHY NEAR LAMY, SANTA FE COUNTY, NEW MEXICO, by *Bruce D. Allen*, and *Spencer G. Lucas*, Department of Geology, University of New Mexico, Albuquerque, New Mexico 87131

The Triassic section exposed near Lamy is approximately 410 m thick and can be divided into three distinct units that correspond to the Middle Triassic Anton Chico Formation and the Upper Triassic Santa Rosa and Chinle Formations. The Anton Chico Formation is up to 37 m thick and composed of reddish-gray, trough-crossbedded litharenite and conglomerate. It lies unconformably on the Permian Bernal Formation and is unconformably overlain by the Santa Rosa Formation in sec. 7, T12N, R11E, and has yielded fragments of capitosauroid labyrinthodont dermal armor indicative of an Early–Middle Triassic age. The Santa Rosa Formation is about 140 m thick and dominated by yellowish-brown, trough-crossbedded quartz-arenite. It is overlain by the Chinle Formation in sec. 28, T15N, R11E. Outcrops in secs. 9 and 11, T12N, R10E and in sec. 29, T12N, R11E expose about 230 m of redbeds of the Chinle Formation, which consists of mudstone-dominated and sandstone-dominated intervals. It is unconformably overlain by the Entrada Sandstone in sec. 9, T12N, R10E. Fossil bone fragments from the Chinle Formation include phytosaur and metoposaurid labyrinthodont remains and are of Late Triassic age. The vertical succession of Triassic strata near Lamy is similar to the stratigraphic succession in east-central New Mexico, suggesting that the two areas existed within the same Triassic depositional basin and experienced similar depositional cycles or events.

TRIASSIC MOENKOPI FORMATION OF THE LUCERO UPLIFT, VALENCIA COUNTY, NEW MEXICO, by *Steven N. Hayden*, and *Spencer G. Lucas*, Department of Geology, University of New Mexico, Albuquerque, NM 87131

The oldest Triassic strata in west-central New Mexico have previously been assigned to various formations. Originally classified as Shinarump Conglomerate or Dockum Group, Stewart et al. (U.S.G.S. Prof. Paper #691, 1972) designated them as Moenkopi(?) Formation. These strata are best exposed in the SE1/4SE1/4NE1/4, sec. 10, T5N, R4W on Mesa Gallina in the Lucero uplift, where they consist of as much as 70 m of conglomerate, sandstone, siltstone and mudstone, in three to four repetitive sedimentary packages. The conglomerates range from clast to matrix supported, with predominantly limestone clasts in a matrix of gray, to grayish-red sandstone which resembles the nonconglomeratic sandstones. These sandstones show abundant trough and planar crossbedding. The siltstones range from medium reddish-brown to dusky red, yellowish, and gray, and from coarsely laminated with current ripples to massive. The mudstones are mostly dark red to dusky red-purple with green mottling. The sedimentary packages tend to thicken toward the top of the sequence, and the sands also become more laterally continuous and show higher energy sedimentary structures in the upper units. These strata overlie limestone of the San Andres Formation and underlie mottled strata of the Chinle Formation. Fragments of fossil bone collected from the basal conglomerate of the uppermost unit include three partial vertebrae and most of a scapula of a non-parasuchian thecodont reptile, and one partial interclavical armor plate from a capitosauroid amphibian, indicating an Early to Middle Triassic age. Ostracodes from these strata suggest an Early Triassic age. These fossils preclude assignment of these strata to the Shinarump Conglomerate or the Dockum Group, and together with lithologic and paleocurrent data suggest that these strata are correlative with the Holbrook Member of the Moenkopi Formation of northeastern Arizona.

THE CALCAREOUS MICROFAUNA OF THE MOENKOPI FORMATION (TRIASSIC, SCYTHIAN OR ANISIAN) OF CENTRAL NEW MEXICO, by *Kenneth K. Kietzke*, Department of Geology, University of New Mexico, Albuquerque, NM 87131

Lacustrine and fluvial sediments thought to be outliers of the Moenkopi Formation in the Lucero Mesa area of Valencia County, New Mexico were sampled for microfossils. These samples yielded charophytes and ostracodes. The charophytes are represented by two species of *Porochara* and one