Diverse geology of the Hubbell Bench, Albuquerque Basin, New Mexico

Vincent C. Kelley
1982, pp. 159-160. https://doi.org/10.56577/FFC-33.159

in:

Albuquerque Country II, Wells, S. G.; Grambling, J. A.; Callender, J. F.; [eds.], New Mexico Geological Society 33 rd Annual Fall Field Conference Guidebook, 370 p. https://doi.org/10.56577/FFC-33

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

DIVERSE GEOLOGY OF THE HUBBELL BENCH, ALBUQUERQUE BASIN, NEW MEXICO

VINCENT C. KELLEY
Department of Geology
University of New Mexico
Albuquerque, New Mexico 87131

INTRODUCTION

The Hubbell bench lies along the western bases of the Manzanita, Manzano, and Los Pinos uplifts, central New Mexico. The bench is 310 km (2-6 mi) wide and about 88 km (55 mi) long, extending from the Tijeras fault on the north into the Joyita Hills, perhaps as far south as Socorro. The Hubbell bench is the largest of several benches which border the Albuquerque and Espanola basins (Kelley, 1977, 1978). Of these benches the Hubbell contains the largest variation of stratigraphy and structure. The geomorphic aspect of the bench has been produced by two factors: (I) pedimentation and surfacing of the Ortiz gravels of early Quaternary age; and (2) the Holocene-age, Hubbell Springs fault scarp, especially in the northern part of the bench.

BEDROCK GEOLOGY

Formations exposed in the bench range from Precambrian to the uppermost rift-filling Santa Fe beds (fig. 1). Precambrian outcrops at the northern end of the bench, near the Tijeras fault, are surrounded by low-dipping Pennsylvanian beds. Just to the south, between the converging Colorado and Hubbell Springs faults, there is a patch of Permian Abo and Yeso outcrops which dip 10°-25° northeasterly. The exposure is due to uplift on the Hubbell Springs fault, and the dip to the northeast suggests considerable throw on the Colorado fault. Southward from this locality for about 18.4 km (11.5 mi) there are no outcrops, owing largely to little or no Holocene throw on the Hubbell Springs fault. The principal throw on the Hubbell Springs fault picks up again in the southern part of T7N and continues into the middle of T5N. In this stretch relief on the fault approaches 45 m (150 ft). Along the escarpment and the arroyos which dissect it, there are good exposures of Permian Yeso and Triassic beds which dip 5°-7° to the east. At the southernmost exposure in the northern part of T5N the bench is about 8 km (5 mi) wide, and outcrops are nearly continuous to the Precambrian of the Manzano uplift. About one-half the distance across the bench, Yeso beds are overlain by Eocene Baca sandstone and fanglomerates, and these in turn are overlain by Oligocene Datil tuff. Downflexing west of the Manzano fault exposes steeply dipping Yeso. The total area in which these Tertiary beds are exposed is about 18 km^2 (7 mi^2); however, the Datil tuffs are not well exposed. The Baca, on the other hand, is well exposed near the center of T5N, R4E in a northeast-trending anticline and syncline.

South of these exposures there are very few outcrops until the eroded edge of the Ortiz-pediment deposits in the Joyita Hills is reached. In T4N, R4E there are a few small inselbergs of Precambrian surrounded by alluvial fan deposits just west of the Manzano fault. Similar Precambrian exposures occur along N.M. 6 and U.S. 60 in the northern part of T2N. All these occurrences are very near the eastern edge of the bench. The position of the western edge is not perfectly clear south of the Hubbell Springs fault. The fault probably extends toward the northern end of the West Joyita fault near the Rio Grande in TIN. In this area there are few outcrops other than those of Santa Fe sand and gravel along Abo Arroyo and near Black Butte. South of Black Butte, between the East and West Joyita faults, there are continuous exposures of Santa Fe beds to their onlap over diverse pre—Santa Fe beds at the northern end of the Joyita Hills. The existence in the Santa Fe of several inliers of pre—Santa Fe outcrops attests to the likelihood that the West Joyita fault is the western edge of the bench. Inliers are mostly Datil volcanics, which is to be expected owing to the thick sequence of Datil immediately to the south in the Joyita Hills.

The southern edge of the bench-capping Ortiz pediment ends irregularly across TIN, R2E. Outcrops beneath the Ortiz gravels range from Permian strata to Eocene Baca in a considerably faulted sequence that dips principally westward. It is logical that these beds would continue northward beneath the Ortiz gravels. However, given this sequence of strata, an exposure of upfaulted Precambrian granite just west of the projected East Joyita fault is unexpected, and its occurrence some 10.4 km (6.5 mi) west of the Precambrian granite in the Los Pinos Mountains indicates the diverse geology of the Hubbell bench. The low topography south of the present Ortiz surface suggests that the pediment originally extended southward, at least to Socorro. Similar diverse bedrock geology continues to Socorro. There is also considerable diversity in the higher ground to the east of the bench (Dane and Bachman, 1965).

INTERPRETATIONS

North of the projected Colorado fault, bedrock exposures along the bench consists of Pennsylvanian and Precambrian rocks. Southward between the Colorado and Hubbell Springs faults in T8N, the top of the Precambrian may be as much as 1,800 m below the surface. Lack of bedrock exposures in the large area south toward exposures in T6,7N precludes speculation as to what formations or structures are present. However, there is reliable regional evidence that the Jurassic pinches out southward at about latitude 34°45'N. The Triassic also may have been thinned by gradual truncation southward during the Cretaceous.

The outcrops in the northern part of T5N are especially revealing. Baca beds rest directly on Yeso beds; thus, the San Andres Formation is missing. This relationship indicates considerable uplift and truncation during early Laramide time. This pre-Baca truncation must have involved removal of over a thousand meters of Triassic and Cretaceous strata. This erosion may have resulted from an eastward uplift along the Laramide Montosa and Paloma thrust faults (fig. 1). The Baca sediments were probably derived from Permian strata exposed toward the east during the same Laramide uplift.

The geologic diversity of the Hubbell bench sets it apart from other benches in the central rift and bounding uplifts. The diversity of stratigraphy and structure seen on the Hubbell bench may not be present in the central part of the rift. This observation is based on the deep drilling tests for petroleum in the rift. Additionally, this diversity is not present in uplifts bordering the eastern edge of the rift.

During the early subsidence of the rift, the structural, east-side border was most likely the Hubbell Springs fault zone. At that time the Laramide Manzano—Los Pinos uplift had probably been reduced to low mountains perhaps slightly east of its present crest. Near Socorro the bedrock edge of the rift has Paleozoic beds overturned to the east (Wilpolt and Waneck, 1951), and this relationship suggests that the diverse geology of the bench formed during the Laramide but with some additional disturbance during Cenozoic rifting. It is likely that the beds

deep in the rift west of the Hubbell bench, including pre—Santa Fe and possibly early Santa Fe beds, are deformed similarly to those within the bench. Subsidence and the diversity probably resulted from changing stress patterns, some of which were very likely torsional. In the Neocene, much of the uplift of the Manzanos and Los Pinos occurred. The final episode was the bevelling of the bench and deposition of Ortiz gravels which occurred from latest Pliocene to early Quaternary.

REFERENCES

Dane, C. H. and Bachman, G. 0., 1965, Geologic map of New Mexico: U.S. Geological Survey, scale 1:500,000.

Kelley, V. C., 1977, Geology of the Albuquerque basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Memoir 33, 60 p.

_____, 1978, Geology of Espanola basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Map 48.

Wilpolt, R. H. and Waneck, A. A., 1951, Geology of the region from Socorro and San Antonio east to Chupadera Mesa, Socorro County, New Mexico: U.S. Geological Survey Oil & Gas Investigations Map OM-121.

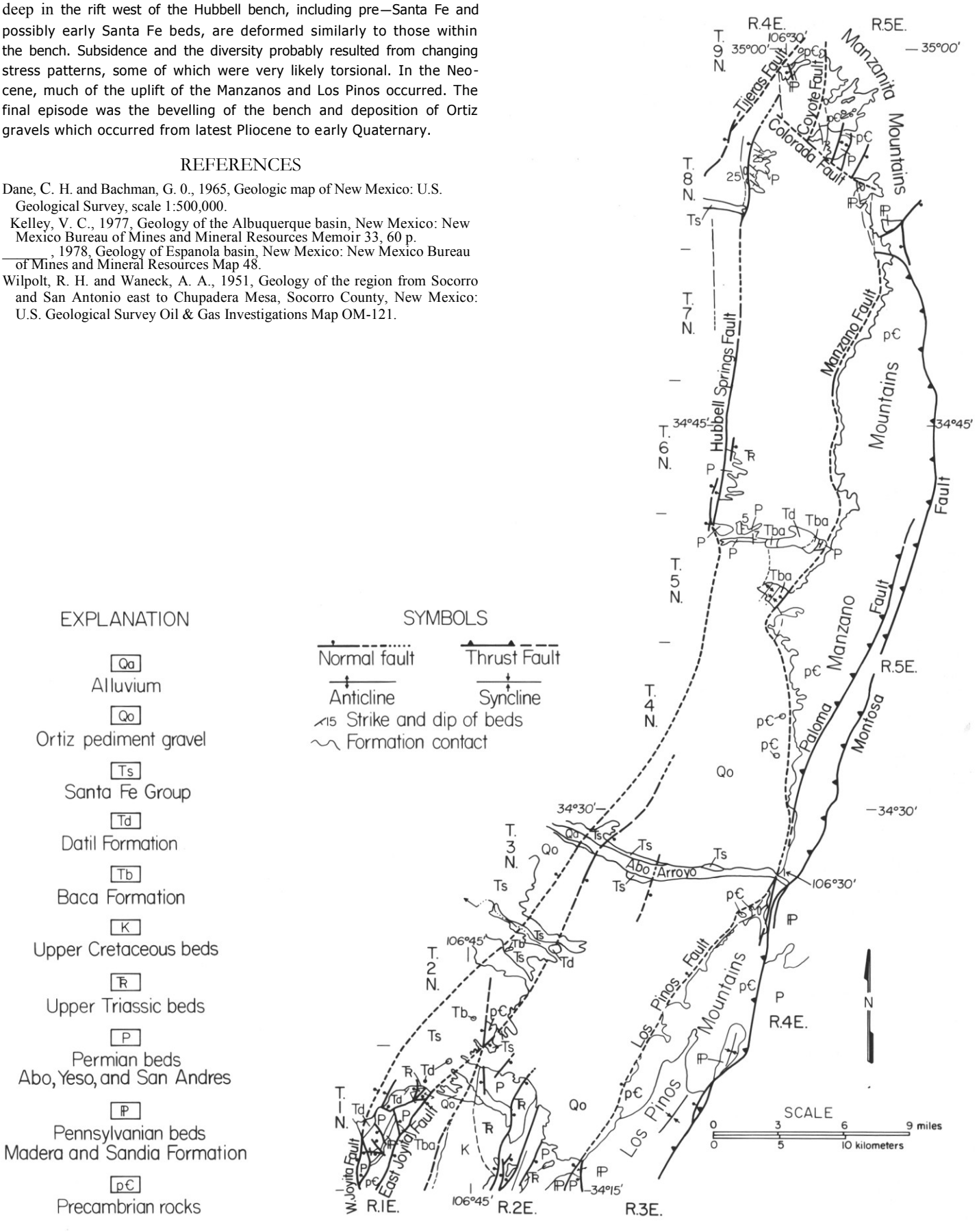

Figure 1. Geology of the Hubbell bench, eastern Albuquerque basin. Note Tba = Baca Formation.