

LITHOSTRATIGRAPHY AND PLIOCENE MAMMALIAN BIOSTRATIGRAPHY AND BIOCHRONOLOGY AT BELEN, VALENCIA COUNTY, NEW MEXICO

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INTRODUCTION

Extending south of Los Lunas volcano to Belen and into northern Socorro County, badlands developed in the Arroyo Ojito Formation of Connell et al. (1999) are well exposed in an east-facing escarpment just west of Interstate Highway 25 and several km west of the Rio Grande (Fig. 1). In 1982, John Young examined numerous sections exposed on the east and west sides of the Llano de Albuquerque and described four in his master's thesis at the New Mexico Institute of Mining and Technology. The two thickest sections exposed more than 100 m of upper Santa Fe Group basin fill. As can be seen in the outcrops at the Belen site, cross-bedded gravel and gravelly sands alternate up section with finer-grained units. Weak soils and eolian deposits are also common. The gravel commonly has a suite of pebble types, including well rounded siliceous pebbles (recycled from Paleogene, Mesozoic, and upper Paleozoic units of the Colorado Plateau), basaltic, intermediate, and silicic volcanic rocks, red granitic rocks, silicified wood, sandstone concretions (recycled Mesozoic), pycnodonte shell fragments (Cretaceous; Hook and Cobban, 1977), carbonate rocks (upper Paleozoic limestones and Neogene travertines), and rare obsidian pebbles from East Grants Ridge, about 112 km northwest of here. The presence of Grants Ridge obsidian indicates that much of this section was derived from the ancestral Rio San Jose fluvial system, which is presently a tributary to the Rio Puerco.

Young (1982) compared amounts of Rb, Y, Zr and Sr in obsidian samples from East Grants Ridge to the same trace elements in the pebbles and found almost identical amounts, thereby demonstrating more than a visual match. Shackley (1998) showed that there were two similar but distinct sources of obsidian in the area of East Grants Ridge and was able to distinguish them by amounts of Zr, Y, and Nb, among other elements. Lipman and Mehnert obtained an age of 3.2 ± 0.3 Ma for the East Grants Ridge obsidian.

The obsidian is recognized in conglomeratic units as deep as 53 m below the Llano de Albuquerque surface, with a marked increase in amounts above 27 m. The presence of this obsidian constrains the age of the upper 50 m of section to less than 3 million years old.

BIOSTRATIGRAPHY

The New Mexico Museum of Natural History and Science (NMMNH) has two collections of Blancan vertebrates from southwest of Belen in Valencia County. In 1992, Bill Wood collected vertebrate fossils about 5 km southwest of Belen (NMMNH Site L-3778). Fossils from this site include lower jaws of the gomphotheriid proboscidean *Stegomastodon mirificus* and postcranial elements of the horse *Equus*. Christopher Whittle and several students collected fossils from conglomeratic sandstone and slightly indurated sandstone about 2 km southwest of Belen (NMMNH Site L-3737), about 4 km north of site L-3778 and just south of Camino del Llano Road (formerly Sosimo Padilla Road). Fossils from this site include a snake, the mole *Scalopus*, the rodent *Geomys*, the horse *Equus*, and a small antilocaprid. Because of the close proximity of sites L-3737 and 3778 southwest of Belen and their occurrence in similar strata referred to the Arroyo Ojito Formation, the fossils from these two sites are combined as the Belen Fauna (Morgan and Lucas, 2000).

The Belen Fauna (Morgan and Lucas, 2000) is composed of five species of mammals, including *Scalopus* (*Hesperoscalops*) cf. *S. blancoensis*, *Geomys* (*Neterogeomys*) cf. *G. paenebursarius*, *Equus* cf. *E. calobatus*, a small antilocaprid, and *Stegomastodon mirificus*. A dentary with m1-m3 from the Belen Fauna is the first mole (family Talpidae) ever reported from New Mexico, recent or fossil (Morgan and Lucas, 1999, 2000). This mole is referred to *Scalopus* (*Hesperoscalops*), an extinct subgenus of *Scalopus* restricted to the Blancan. Three species of *S.* (*Hesperoscalops*) have been described, *S. seawardensis* from the very early Blancan Saw Rock Canyon LF in Kansas, *S. rexroadi* from the early Blancan Rexroad and Fox Canyon faunas in Kansas and the medial Blancan Beck Ranch LF in Texas, and *S. blancoensis* from the late Blancan Blanco LF in Texas (Hibbard, 1953; Dalquest, 1975, 1978; Kurtén and Anderson, 1980). The Belen dentary is tentatively referred to *S. blancoensis* based on its similarity to that species in size and morphological features. A dentary with a complete dentition from Belen is identified as the extinct pocket gopher subgenus *Geomys* (*Neterogeomys*).

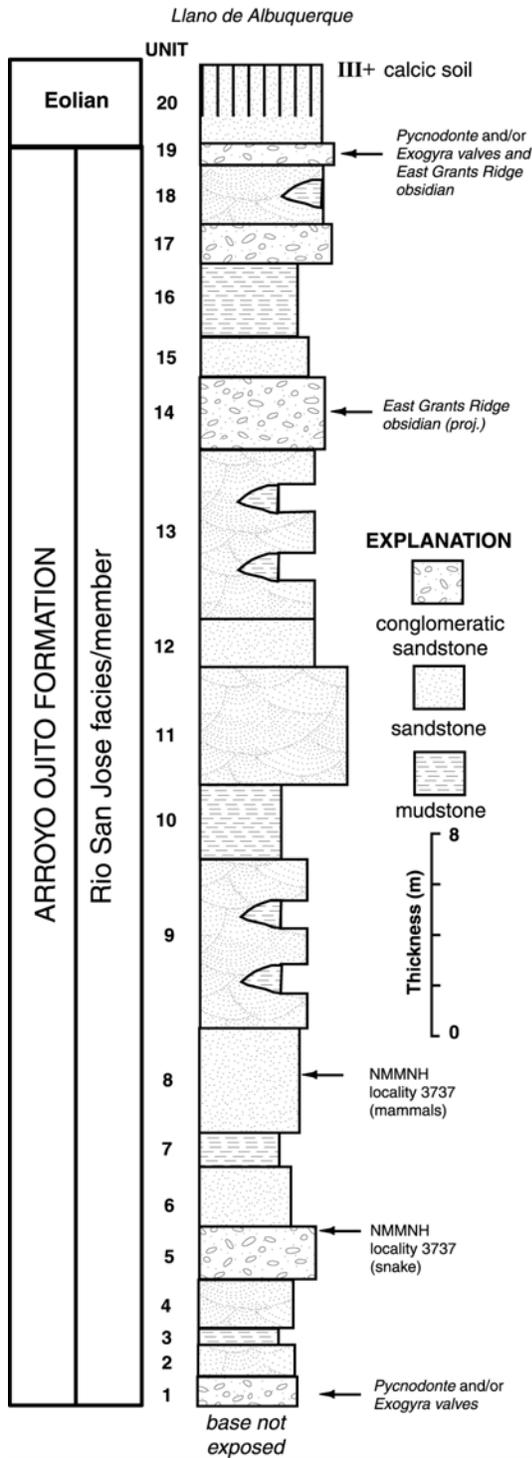


Figure 1. Stratigraphic column near Camino del Llano (formerly Sosimo Padilla Road). Modified from Morgan and Lucas (2000) with projections of *Pycnodonte* and/or *Exogyra* valves and East Grants Ridge obsidian from Young (1982).

The morphology and size of this mandible are similar to the species *G. (N.) paenebursarius*, also identified from the Pajarito LF, and first described from the late Blancan Hudspeth and Red Light LFs of

southwestern Texas (Strain, 1966; Akersten, 1972).

The most common fossils in the Belen Fauna are postcranial elements of horses of the genus *Equus*, most of which are not diagnostic at the species level. A nearly complete metatarsal is tentatively referred to the large, stilt-legged horse, *E. calobatus*, a species known from the late Blancan Santo Domingo LF (Tedford, 1981) and from late Blancan and early Irvingtonian faunas in the Mesilla basin (Vanderhill, 1986). A well preserved pair of mandibles with right and left m2-m3 are referred to the gomphothere *Stegomastodon mirificus*. The presence of seven lophids on m3 separates this specimen from *Rhynchotherium* and *Cuvieronius*, and the highly complicated enamel with double trefoiling distinguishes the teeth from the more primitive species *S. rexroadensis*.

Four mammals in the Belen Fauna are age diagnostic. The extinct subgenus *Scalopus* (*Hesperoscalops*) is restricted to the Blancan, and the species *S. blancoensis* occurs in the late Blancan. *Geomys* (*Nerterogeomys*) *paenebursarius* is known from two late Blancan faunas in southwestern Texas (Strain, 1966; Akersten, 1972), and the medial Blancan Pajarito LF in the northern Albuquerque basin (Tedford, 1981; Morgan and Lucas, 2000). *Stegomastodon mirificus* is known from the medial Blancan through the early Irvingtonian, and *Equus calobatus* occurs in the late Blancan and Irvingtonian (Kurtén and Anderson, 1980). The age of the Belen Fauna thus is either medial or late Blancan. *S. blancoensis* and *E. calobatus* occur in late Blancan faunas, but are not known from the medial Blancan, whereas *G. (N.) paenebursarius* and *S. mirificus* first appear in the medial Blancan. The lack of South American immigrants in the Belen Fauna suggests a medial Blancan age, although their absence could be related to biogeographic factors. Neotropical mammals are unknown from Blancan faunas in northern New Mexico; however, *Glyptotherium* occurs in two early Irvingtonian faunas in the Albuquerque basin, Tijeras Arroyo and Western Mobile. We tentatively place the Belen Fauna in the medial Blancan based on similarities with other medial Blancan faunas (e.g., Pajarito LF) from the Arroyo Ojito Formation in the Albuquerque basin.

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