



Stratigraphy of Sierra Banco de Lucero, State of Chihuahua

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STRATIGRAPHY OF SIERRA BANCO DE LUCERO, STATE OF CHIHUAHUA

by

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ABSTRACT

Sierra Banco de Lucero is located 15 km northwest of Villa Ahumada, Chihuahua. It is made up of the Lucero, Ahumada and Loma Plata Formations whose ages range from early Albian to early Cenomanian. The first two units are 738 m of limestone with shale interbeds, and the Loma Plata Limestone is over 150 m thick. At the south end of the sierra, there is a dacitic lava flow representing the lower member of the Carolina Formation, of Oligocene-Miocene age. This flow covers the Lucero Formation unconformably. The sierra trends NW-SE, parallel to the axes of its structures.

Two fault systems cut the structures in Sierra Banco de Lucero; one is partially parallel to the strike of the beds, and the other is perpendicular to the strike of the beds and thus cuts across the structures. A normal fault has been inferred parallel to the northeastern flank of the sierra.

RESUMEN

La Sierra de Banco de Lucero, localizada a 15 km al noroeste de Villa Ahumada, Chihuahua, está constituida por las Formaciones Lucero y Ahumada y por la Caliza Loma Plata que representan todo el Albiano y el Cenomaniano temprano. Las dos primeras unidades consisten en una alternancia de caliza y lutita y tienen un espesor conjunto de 738 m; el escarpe arrecifal de la Caliza Loma Plata tiene un espesor de 150 m. En la parte meridional de la sierra, los derrames dacíticos del miembro inferior de la Formación Carolina, de edad oligoceno-mioceno, cubren discordantemente a la Formación Lucero.

La sierra tiene una orientación NW-SE y los ejes de las estructuras existentes son aproximadamente paralelos a ésta. Dos sistemas de fallas cortan a las estructuras; el primero es parcialmente paralelo al rumbo de las capas y el segundo, más o menos, perpendicular a este y corta abruptamente a algunas de las estructuras. Se ha inferido una falla normal paralela al flanco nororiental de la sierra.

STRATIGRAPHY

Sierra Banco de Lucero lies within the Basin and Range physiographic Province (Raisz, 1959). The Mesozoic rocks that crop out range in age from early Albian to early Cenomanian; Córdoba (1969), includes them within the Chihuahua Group. The lowermost stratigraphic unit is the Lucero Formation, followed by the Ahumada Formation which, in turn is overlain by the Loma Plata Limestone.

Lucero Formation.—The name Lucero Formation was introduced by Guerrero (Rodríguez and Guerrero, 1969) for a 386 m-thick calcareous-argillaceous sequence that crops out in the eastern part of Sierra Banco de Lucero. The type-section is at the promontory, locally known as Banco de Lucero, located 19.6 km northwest of Villa Ahumada, Chihuahua. The Lucero Formation forms a smooth group of hills crowned by a thick-bedded ridge-forming limestone. The lower part of the unit is fine- to medium-grained, black limestone with dark gray, medium-bedded, calcareous siltstone interbeds. The middle part is medium-grained, black, thin-bedded limestone and siltstone. The upper part contains black, fine-grained limestone. No fossils were found in the formation except a crinoid, similar to the genus *Saccocoma* sp. that ranges in age from Late Jurassic to Late Cretaceous, and a few badly preserved echinoids. In Sierra de Presidio, 80 km northeast of Banco de Lucero, the same lithologic unit crops out below beds that contain

Orbitolina sp. Thus the age of the Lucero Formation is early to middle Albian.

Ahumada Formation.—The name Ahumada Formation was proposed by Guerrero (Rodríguez and Guerrero, 1969) to designate 352 m of a calcareous-argillaceous sequence that crops out in Sierra Banco de Lucero. The type-section is at Banco de Lucero, located 19.7 km northeast of Villa Ahumada. The unit crops out widely in the area as a continuous slope readily recognizable. The lower part of the unit is black, thin-bedded, fine-grained limestone that weathers brown to beige, and contains black shale interbeds. The medial part of the formation is black, fine-grained, thin-bedded limestone with gray, thin-bedded layers of calcareous shale that weather to a yellowish to brownish color. The shale-limestone ratio in the unit is 60 to 40 percent. The upper part of the formation is dark gray, fine-grained, medium-bedded limestone. The contact of the Ahumada Formation with the underlying Lucero Formation is conformable and is located at the slope change above the highest escarpment of the Lucero Formation. Even though fossil content is scarce, the following forms have been collected: *Pecten (Neithea)* sp.; *Alectryonia carinata* (Lamarck) and *Oxytropidoceras trinitense*. The age of the formation based on the fossil content ranges from middle to late Albian. It may be equivalent to Amsbury's lower member of the Loma Plata Limestone and with the Chi-

huahua Group that includes formations such as Lágrima, Finlay and Benavides.

Loma Plata Limestone.—The name Loma Plata was proposed by Amsbury (1957) to designate a lower member (120 m thick) of nodular limestone and an upper member composed of light brown massive limestone (130 m thick), with chert stringers and silicified rudistids, that crops out between the Benevides Formation and the Grayson Marl, in the area of Pinto Canyon, Presidio County, Texas. In Sierra Banco de Lucero, the equivalent of Amsbury's upper member is exposed in the uppermost parts of the sierra as a continuous 150 m high escarpment of light gray, coarse-grained, thick-bedded limestone with chert stringers and abundant rudistids of the genus *Caprina* sp. and *Toucasia* sp. The contact between the Loma Plata Limestone and the Ahumada Formation is located at the slope change between the soft slope of the Ahumada Formation and the abrupt ridge formed by the Loma Plata Limestone. The age of the Loma Plata Limestone, because of its fossil content and its stratigraphic position, is late Albian-early Cenomanian.

Carolina Formation.—The volcanic rocks of the region have been named by Rodriguez (Rodriguez and Guerrero, 1969) as Carolina Formation, which is composed of tuffs, ignimbrites, and lava flows whose composition varies from dacite to latite and rhyolite. The type section is located near the mine called La Carolina, in Sierra de Magdalena located 18.5 km east of Villa Ahumada. At the southern end of Banco de Lucero, the basal member of the Carolina Formation crops out as 70 m of bluish gray to dark brown aphanitic dacite and covers the Lucero Formation unconformably. The age assigned by Rodriguez to this formation is Oligocene-Miocene.

STRUCTURE

The structure of the sierra is simple; it is the southwest flank of a NW-SE trending anticline in which the beds dip toward the southwest, with some local variations produced by faults and small folds. The main tectonic feature of the sierra is a system of normal faults that almost follows the strike of the beds. The larger fault displacement is located in the middle part of the sierra where the Loma Plata Limestone is in contact with the Lucero Formation. This relation implies a vertical displacement of about 400 m. A second system of normal faults, almost perpendicular to the first, cuts across the structural grain. In the southern part of the sierra, there are three mafic dikes that came up along normal faults. In the northeastern part of the sierra, the same mafic rock crops out as a sill with a small apophysis that intrudes the Ahumada Formation. A normal fault parallel to the northeastern flank of the sierra has been inferred, to explain the rugged truncation of the sierra against the adjacent bolson.

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BANCO de LUCERO