



## ***Westward extension of Seboyeta Bay, late Cretaceous (Cenomanian) of west-central New Mexico***

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# WESTWARD EXTENSION OF SEBOYETA BAY, LATE CRETACEOUS (CENOMANIAN) OF WEST-CENTRAL NEW MEXICO

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**Abstract**—A molluscan fossil assemblage dominated by *Exogyra levis* Stephenson and *Granocardium enstromi* (Bergquist) is present in the upper part of the Dakota Sandstone along Cottonwood Canyon in extreme western Catron County. These fossils indicate correlation with the middle Cenomanian Paguate Tongue of the Dakota Sandstone. They thus extend the Seboyeta bay in which the Paguate was deposited 40 km to the west-southwest.

### INTRODUCTION

The Upper Cretaceous section throughout large areas of west-central New Mexico is represented by an intertongued Dakota Sandstone-Mancos Shale sequence of Cenomanian age (Fig. 1). Landis et al. (1973) first recognized this intertonguing relationship and also named the various tongues. Several Dakota Sandstone tongues are very similar to each other lithologically, and without the entire sequence present stratigraphic assignment to a particular tongue can be problematic. Fortunately, an abundant molluscan fauna

is present in these rocks, and is sufficiently varied to allow distinctions based on biostratigraphy (Cobban, 1977).

One Dakota unit, the Paguate Tongue, is of interest here for several reasons. It is recognized and may be traced biostratigraphically throughout much of the southern San Juan Basin. The ammonite *Acanthoceras amphibolum* is present together with the bivalves *Exogyra levis* and *Granocardium* sp. in the Paguate Tongue; *Acanthoceras amphibolum* is not present in the older Cubero Tongue of the Dakota or the younger Twowells Tongue (Cobban, 1977). The

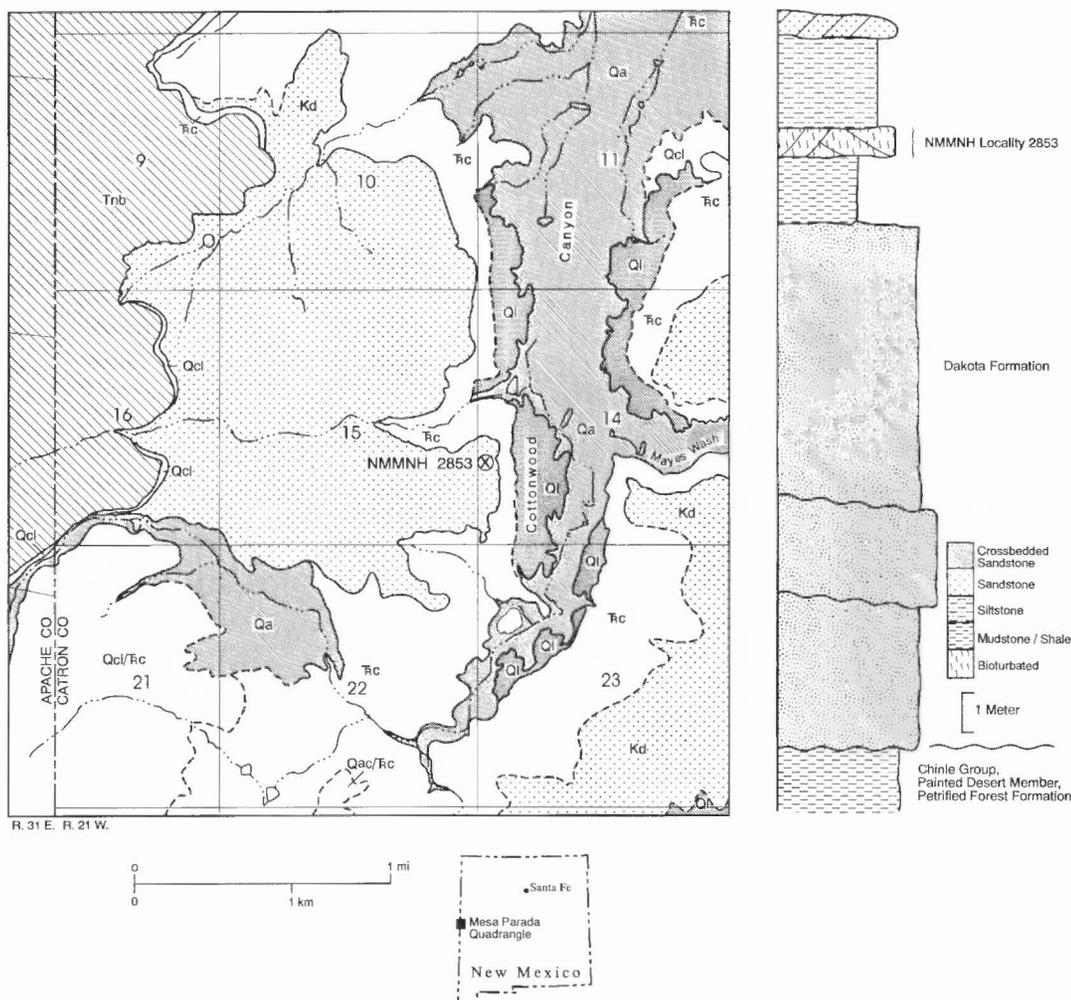


FIGURE 1. Map of a portion of the Mesa Parada quadrangle showing location of molluscan fossil assemblage (NMMNH 2583) in Dakota Sandstone on west side of Cottonwood Canyon. Stratigraphic section through the fossiliferous zone also shown.

Paguate Tongue is also associated with the concept of a Seboyeta bay, an embayment that reveals some of the details of the initial transgression of the Western Interior seaway in New Mexico.

The intertongued Dakota-Mancos sequence was recognized in the Zuni Basin of west-central New Mexico by Hook et al. (1980), who used the nomenclature of Landis et al. (1973) to describe and define the section. With the recognition of this intertongued sequence in the Zuni Basin many errors and uncertainties in the correlation of Upper Cretaceous rocks were addressed and corrected. Miscorrelations in this part of the section had appeared in Pike (1947), Dane (1959), Dane and Bachman (1965), and in numerous hydrologic reports.

The Paguate Tongue of the Dakota Sandstone was later recognized and mapped in the Atarque area by Anderson (1987) and in the Fence

Lake-Moreno Hill area by Campbell (1989). Southward into Carrizo Wash, Tertiary erosion has stripped off most of the Cretaceous rocks, leaving Triassic rocks exposed. South of Carrizo Wash, however, recent reconnaissance mapping on the Quemado 30° x 60° quadrangle (Chamberlin et al., 1994) has revealed the presence of a discrete fossiliferous sandstone bed at the top of the Dakota Sandstone (Mesa Parada 7½ quadrangle, Fig. 1). The stratigraphic position and the faunal attributes of this sandstone are such that it may be correlated with the Paguate Tongue of the Dakota. Although the diagnostic ammonite *Acanthoceras amphibolum* was not found at this southern locality (NMMNH locality 2583, Fig. 1) the bivalve assemblage dominated by *Exogyra levis* Stephenson and *Granocardium enstromi* (Bergquist) identify it biostratigraphically as a middle Cenomanian Paguate equivalent.

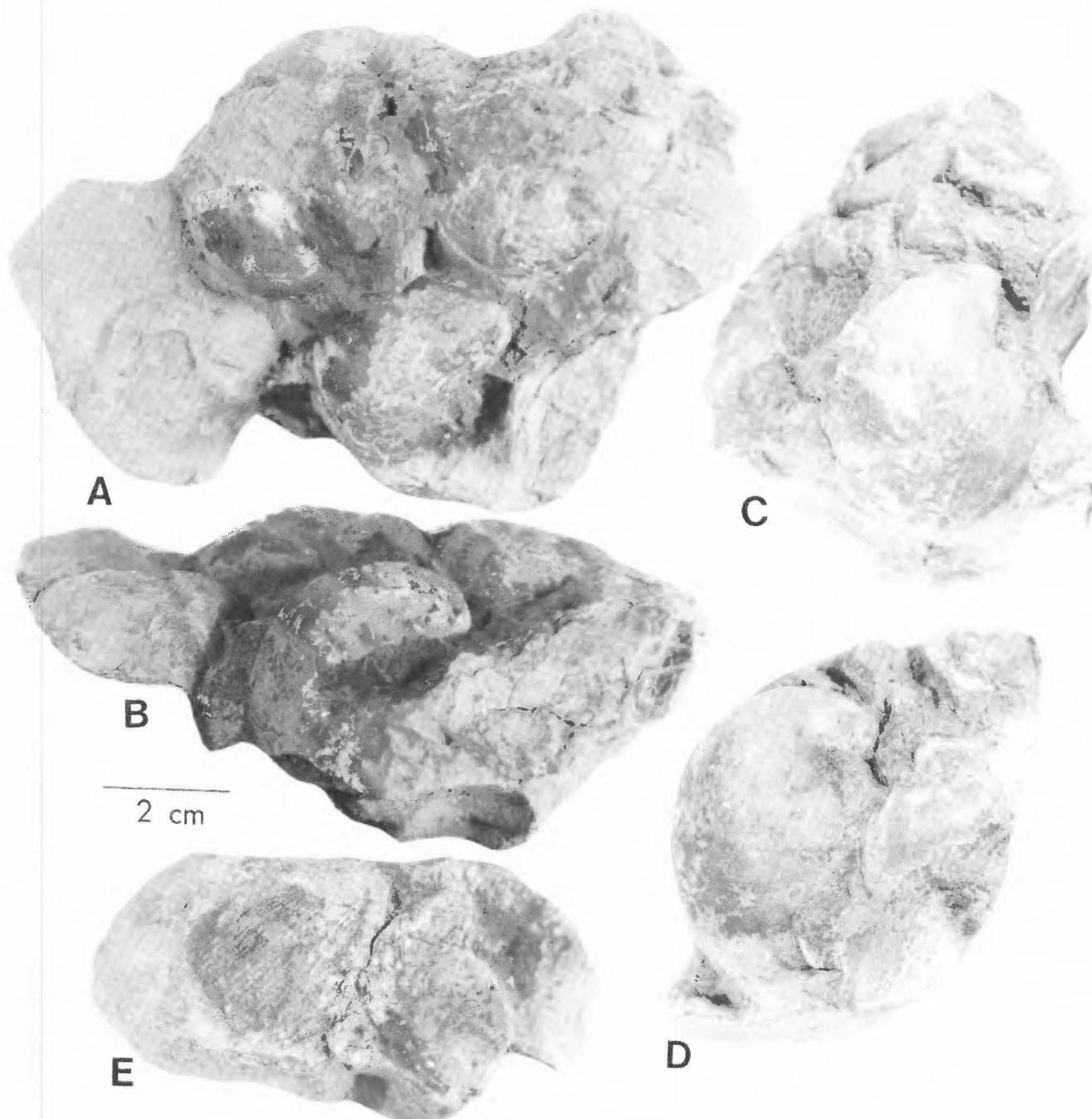


FIGURE 2. Selected fossils from NMMNH locality 2583. A-D, *Exogyra levis*, two views (A-B and C-D) of two samples of packstone, NMMNH P-22498; E, *Granocardium enstromi*, NMMNH P-22499.

The significance of this fossil assemblage is related to the concept of a Seboyeta bay (Hook et al., 1980). Seboyeta bay was an embayment along the western margin of the Interior seaway. Although embayments per se were not unusual, this one was large, as much as 120 km north-south, and in essence represents an arm of the sea that was transgressing at a faster rate than shoreline segments to the north or south. The molluscan assemblage we have found south of Carrizo Wash, along the tributary named Cottonwood Canyon (Fig. 1), is described below. This assemblage records the middle Cenomanian transgression of the Western Interior seaway and suggests that Seboyeta bay extended further westward than previously recognized.

#### DESCRIPTION OF LOCALITY AND FOSSIL ASSEMBLAGE

NMMNH locality 2583 is located near the crest of the escarpment just west of Cottonwood Canyon in the NW $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$  sec. 14, T2N, R21W, Catron County (UTM 3807530N, 682350E, zone 12) (Fig. 1). The locality is in the Dakota Sandstone (undivided) 14.9 m above the base of the formation, which is its disconformable contact with underlying red-bed mudstones of the Chinle Group (cf. Lucas and Hayden, 1989). The fossiliferous unit is a 0.8-m-thick ledgy sandstone that is trough-crossbedded and bioturbated. The fossils occur as packstone lenses throughout the unit.

The packstones produce a low-diversity fossil assemblage of molluscs, many of which are poorly preserved as hematitic steinkerns and thus cannot be identified precisely. Most of the identifiable molluscs (about 90% of all macrofossils) belong to *Exogyra levis* Stephenson, and the next most common taxon is *Granocardium enstromi* (Bergquist), which is about 5% of all macrofossils. Representative specimens of *E. levis* (Fig. 2A-D) are catalogued as NMMNH P-22498, whereas those of *G. enstromi* (Fig. 2E) are designated NMMNH P-22499. Other macrofossils are poorly preserved unidentifiable bivalves and turritellid gastropods.

In west-central New Mexico, *Exogyra levis* and *Granocardium enstromi* are characteristic of the Paguate Tongue of the Dakota Sandstone (Cobban and Hook, 1989). The Paguate Tongue is of middle Cenomanian age and produces ammonites of the *Acanthoceras amphibolum* and *Pleisiacanthoceras wyomingense* zones. It was deposited in what Hook et al. (1980, p. 44) termed the Seboyeta bay, which was a conspicuous embayment of the Western Interior seaway that extended into west-central New Mexico during middle to Upper Cenomanian time (Fig. 3).

NMMNH locality 2853 is in strata that we believe are homotaxial to the Paguate Tongue of the Dakota Sandstone, although they are 40 km west-southwest of the nearest previously identified Paguate outcrops (McLellan et al., 1983). This locality plus another one on the Manuelito quadrangle immediately southwest of Gallup (Anderson, 1991) thus requires an extension of the western limit of the Seboyeta bay, 40 km further to the west-southwest (Fig. 3).

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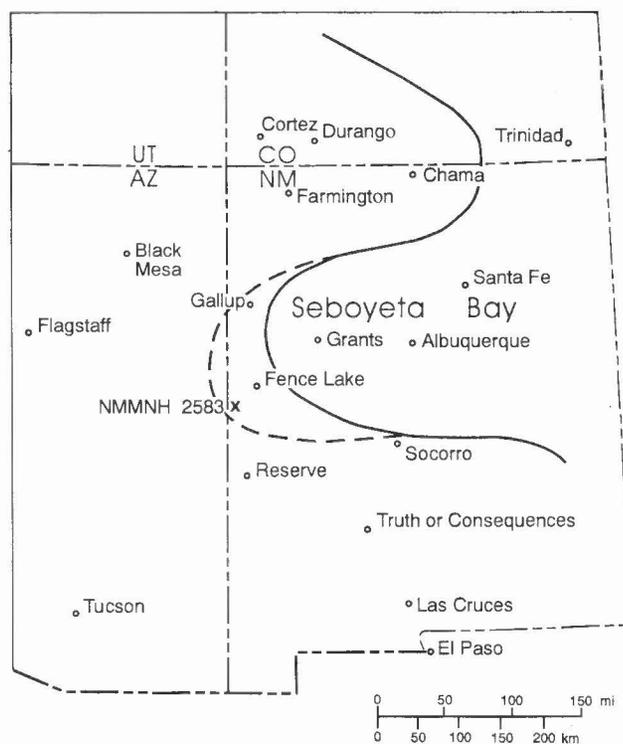


FIGURE 3. Seboyeta bay in west-central New Mexico, illustrating the extent to which the bay was extended based on the molluscan fossil assemblage at Cottonwood Canyon.

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Pie Town Community Center. View is N89°E. Handbill on the door announces "The Country Coins" musical group. The community center is south of US-60 and east of dirt road that leads south out of Pie Town, New Mexico. Wayne Lambert photograph No. 93L57. August 12, 1993, 3:35 p.m. MDT.