



The Abo Formation in the area around Socorro, New Mexico

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THE ABO FORMATION IN THE AREA AROUND SOCORRO, NEW MEXICO

ANONYMOUS—I

In 1909, Lee used the name *Abo Formation* for a sequence that includes arkosic sandstone, conglomerate, and some red shale. The Abo Formation was designated the basal formation of the Manzano Group and was said to be succeeded by the Yeso Formation and San Andres.

In 1943, Needham and Bates redescribed Permian type sections in the central part of New Mexico. They designated a sequence of exposures along and adjacent to U.S. Highway 60 in the vicinity of Abo Canyon at Abo Pass and Scholle as the type section for the Abo Formation. At about the same time, a mapping and stratigraphic program by the Fuels Branch of the Geological Survey was activated by the U.S. Geological Survey in parts of New Mexico and independently interpreted the limits of the Abo Formation (Read et al., 1945; Kelley and Wood, 1946; Wood and Northrop, 1946; Wilpolt et al., 1946).

After the end of World War II, exploration for petroleum in western parts of the Permian Basin was resumed at a more normal pace and the term *Abo* was applied in the subsurface to a unit that differs from the type Abo in many important respects.

It is not the purpose of this note to arrive at a solution of the stratigraphic and facies limits of the Abo as used by various investigators. Rather, this article highlights some of the history of usage during the last quarter century and the thickness variations and attempts to interpret the sedimentary history and age limits of the unit.

STRATIGRAPHIC LIMITS OF THE ABO FORMATION

When Lee defined the Abo Formation in 1909, he made it relatively clear that it is a nonmarine unit lying above strata included in the Magdalena Group. He defined the formation as a sequence of arkosic sandstone and conglomerate with subordinate amounts of dark red shale. Most, but not all, of the sandstone beds are also red. Lee gave a maximum thickness of the Abo in Abo Canyon of about 800 feet. He was of the opinion that the Abo rests disconformably on the Magdalena.

In restudying Permian type sections in New Mexico, Needham and Bates (1943) measured the Abo Formation in the Abo Pass area in some detail. They included in the Abo Formation red sandstones and

shales above an unnamed Wolfcamp unit, now the Bursum Formation, to the base of the first dolomite bed above the arkosic strata. This interval is approximately 915 feet thick. Discussions with Bates regarding the thinking that caused the top of the Abo Formation, and hence the base of the Yeso Formation, to be defined at the base of the first reasonably continuous dolomite have indicated that this boundary was chosen rather arbitrarily. It was believed that it was impractical to draw a contact at any lower position.

Field work undertaken in 1944 and published in 1946 caused Northrop and Wood to suggest that the base of the Yeso Formation is most logically drawn, in areas north of Socorro, at the base of tangentially cross-bedded sandstones believed to represent the littoral facies of a transgressing sea in which were deposited fine clastics, carbonates, and evaporites, and which now are variously referred to as the San Ysidro, Los Vallos, or, in the Socorro area, the combined Torres, Cañas, and Joyita members of the Yeso Formation. The cross-bedded sandstones and attendant clastic sediments now believed to be the basal member of the Yeso in central New Mexico are referred to as the Meseta Blanca Member.

Inasmuch as the first dolomite bed in the Yeso Formation lies immediately on the Meseta Blanca Member in the Abo Pass area, it is apparent that Needham and Bates included all the Meseta Blanca in the Abo Formation. In consequence, the type Abo is approximately 815 feet thick and not 915 feet, as incorrectly stated by Wilpolt.

In the outcrops on the east side of the Rio Grande structural trough in the Socorro area, the Abo ranges from approximately 300 feet in the Joyita Hills to 815 feet at Abo Pass. In the northern part of the Coyote Hills it is 500 feet thick and in the southern part of the Oscuro Mountains, 780 feet. It has been interpreted by geologists, who have investigated the geologic history of the Ancestral Rocky Mountains, as the final phase of filling the troughs and base leveling the adjacent positive elements that developed in Late Pennsylvanian time in the southern part of the province.

AGE

Locally, near the base of the Abo, fossil plants and vertebrates have been collected that indicate basal Wolfcamp age for the contained sediments. Locali-

ties containing such fossil material occur in the Sacramento Mountains and also in the Nacimiento Mountains. None, however, has been reported in the vicinity of Socorro.

In 1942, P. B. King, in an important contribution entitled *Permian of West Texas and southeastern New Mexico*, cited Read as of the opinion that the upper part of the Abo is Leonard in age. Read pointed out that the flora contained in the upper part of the Abo in many localities in the southern part of the Rocky Mountains is identical with that described by White in the Supai Formation, now referred to as the *Supaia* flora. He was able to also show conclusively that the *Supaia* flora is the lateral equivalent of another flora occurring in rocks believed by all to be Leonard in the outcrops on the east side of the Permian Basin in north-central Texas. Both King and Read were criticized by the technical editors of King's report for their views.

In 1945, R. E. King published a report, mainly on the subsurface rocks of southeastern New Mexico, in which he applied the term *Abo* to rocks that are in part clastic and in part carbonate and are admitted by all geologists to be partly Wolfcamp and

partly Leonard in age. Since then Leonard Age for at least part of the Abo has been generally accepted.

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