

Calcareous nannofossils from the late Campanian Manson impact structure at the eastern edge of the Western Interior Seaway

Richard A. Denne

Texas Christian University, Fort Worth, TX 76129, USA; r.denne@tcu.edu

Zachary A. Kita

University of Nebraska - Lincoln, Department of Earth and Atmospheric Sciences, Lincoln, NE 68588, USA; zachary.kita@gmail.com

The Manson crater is a buried impact structure with a 35km diameter that is found in north-central Iowa, USA, and which has previously been dated as late Campanian. Although the rocks within the crater were brecciated by the impact, the Cretaceous rocks represent the most easterly preserved rocks from the midcontinent portion of the Western Interior Seaway because Cretaceous rocks to the east of the crater have been removed by Pleistocene glaciation. Calcareous nannofossils were examined from nine cores that were drilled in the impact structure by the Iowa Geological Survey and the U.S. Geological Survey. The oldest nannofossil-bearing clasts contained an early Turonian assemblage from the Graneros Shale.

Other clasts contained nannofossil assemblages representative of the middle Turonian (Greenhorn), Coniacian, Santonian, and early Campanian (Niobrara), and middle Campanian (Pierre Shale). Many of the clasts were highly fossiliferous, suggesting that the seaway margin lay some distance to the east of the impact site. No late Campanian nannofossils were identified in the study, suggesting that the site was subaerial at the time of impact. The lack of mixing within the matrix is also indicative of a subaerial impact. The matrix from subaqueous impact sites, such as Chicxulub, typically contain a mixed fossil assemblage that was derived from non-indurated sediments.