

**PS Stratigraphic Correlation of the Cherry Canyon and Bell Canyon Formations
(Guadalupian, Middle Permian), Southern Delaware Mountains, Texas
Using Fusulinid, Conodont, and Bentonite Data***

Michael J. Sweatt^{1,2}, Merlynd K. Nestell¹, and Mark D. Schmitz³

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¹The University of Texas at Arlington, Arlington, TX, United States (nestell@uta.edu)

²XTO Energy, Fort Worth, TX, United States (Michael_Sweatt@xtoenergy.com)

³Boise State University, Boise, ID, United states (markschmitz@boisestate.edu)

Abstract

Five stratigraphic sections of the Cherry Canyon / Bell Canyon (Guadalupian) transition have been studied in basinal strata of the southernmost part of the Delaware Mountains, West Texas. From west to east, the sections are named WP, WT, ERC, SC and WCC, which range from 70 m to 162 m thick, and are located 40 km northeast of Van Horn and 5 km north-northwest of Texas FM Road 2185. The strata exposed are siltstone, fine-grained sandstone, limestone, and sparse bentonite. Many of the carbonate intervals are thin fining upward debris flows. Three prominent debris flows can be mapped across the area, from oldest to youngest: C-debris, B-debris, and A-debris. The C-debris, approximately 12 m thick, is present in all sections except in the easternmost WCC section. The B-debris, about 60-65 meters above the C-debris, is a mega-conglomerate from 5-15 m thick, and caps the ridges in the area. It is exposed on Texas FM Road 2185 and, based on conodonts, correlates to the basal interval of the Pinery Member, Bell Canyon Formation. The fusulinid, *Polydiexodina* first appears in beds approximately 50 m below the B-debris and approximately 10 m above the last occurrence of *Parafusulina*. *Polydiexodina* first appears in the Hegler Member of the Bell Canyon Formation and is known from the Pinery, Rader and McCombs Members of the Bell Canyon Formation in the Guadalupe Mountains. The A-debris at 2-5 m thick is only present in the WCC section, but can be traced south, southeast to Texas FM 2185. Conodont faunas in the sections are dominated by *Jinogondolella aseratta*. The WT, SC, and WCC sections have three thin, closely spaced distinct bentonite beds approximately 26-29 m above the C-debris and below the B-debris. Preliminary U/Pb radiometric dating suggests age equivalency to bentonites in the Manzanita Limestone Member, Cherry Canyon Formation, Guadalupe Mountains.

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Dutton, S., M. Holtz, T. Tremblay, and H. Zirczy, 2000, Expansion of Gas Reservoir Data Base, Permian Basin, Texas: The Permian Basin: Proving Ground for Tomorrow's Technologies: West Texas Geological Society Publication No. 00-109.

Lambert, L., B. Wardlaw, and C. Henderson, 2007, Mesogondolella and Jinogondolella (Conodonta): Multielement definition of the taxa that bracket the basal Guadalupian (Middle Permian Series) GSSP: *Palaeoworld*, v. 16, p. 208-221.

Stratigraphic correlation of the Cherry Canyon and Bell Canyon Formations (Guadalupian, Middle Permian), southern Delaware Mountains, Texas using fusulinid, conodont, and bentonite data



Michael J. Sweatt^(1, 2), Merlynd K. Nestell⁽¹⁾, and Mark D. Schmitz⁽³⁾

(1) Department of Earth and Environmental Sciences, University of Texas at Arlington, TX 76019-0049

(2) XTO Energy, 810 Houston St., Fort Worth, TX 76102

(3) Boise State University, Boise, ID 83725

e-mail: michael_sweatt@xtoenergy.com, nestell@uta.edu, markschmitz@boisestate.edu



BOISE STATE UNIVERSITY

ABSTRACT

Five stratigraphic sections of the Cherry Canyon / Bell Canyon (Guadalupian) transition have been studied in basinal strata of the southernmost part of the Delaware Mountains, West Texas. From west to east the sections are named WP, WT, SC, ERC and WCC, which range from 70 m to 162 m thick, and are located 40 km northeast of Van Horn and 5 km north-northwest of Texas FM Road 2185. The strata exposed are siltstone, fine-grained sandstone, limestone, and sparse bentonite. Many of the carbonate intervals are thin fining upward debris flows. Three prominent debris flows can be mapped across the area, from oldest to youngest: C-debris, B-debris, and A-debris. The C-debris, approximately 12 m thick, is present in all sections except in the easternmost WCC section. The B-debris, about 60-65 m above the C-debris, is a mega-conglomerate from 5-15 m thick, and caps the ridges in the area. It is exposed on Texas FM Road 2185 and, based on conodonts, correlates to the basal interval of the Pinery Member, Bell Canyon Formation. The fusulinid, *Polydixodina* first appears in beds approximately 50 m below the B-debris and approximately 10 m above the last occurrence of *Parafusulina*. *Polydixodina* first appears in the Hegler Member of the Bell Canyon Formation and is also known from the Pinery, Rader and McCombs Members of the Bell Canyon Formation in the Guadalupe Mountains. The A-debris at 2-5 m thick is only present in the WCC section, but can be traced south, south-east to Texas FM 2185. Conodont faunas in the sections are dominated by *Jingondolella aserrata*. The WT, SC, and WCC sections have three thin, closely spaced distinct bentonite beds approximately 26-29 m above the C-debris and below the B-debris. Preliminary U/Pb radiometric dating suggests age equivalency to bentonites in the Manzanita Limestone Member, Cherry Canyon Formation, Guadalupe Mountains.

CONCLUSIONS

There are several correlative beds in the 5 sections (WP, WT, SC, ERC, WCC) measured across the southern part of the Delaware Mountains. The major debris flows, C and B are present in all sections as well as the WP-60 carbonate debris bed. Unfortunately these stratigraphic markers are not known in the Guadalupe Mountains region.

The correlation of the transitional strata of the Cherry Canyon and Bell Canyon Formations in the Guadalupe Mountains to equivalent age strata in the southernmost part of the Delaware Mountains can be made biostratigraphically by identifying several key microfossils. Conodonts recovered from a number of stratigraphic intervals are currently being studied. The only conodont discovered in these sections is *Jingondolella aserrata*, which only confirms that the strata in these sections belong to the Wordian Stage.

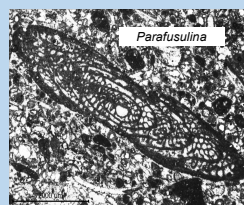
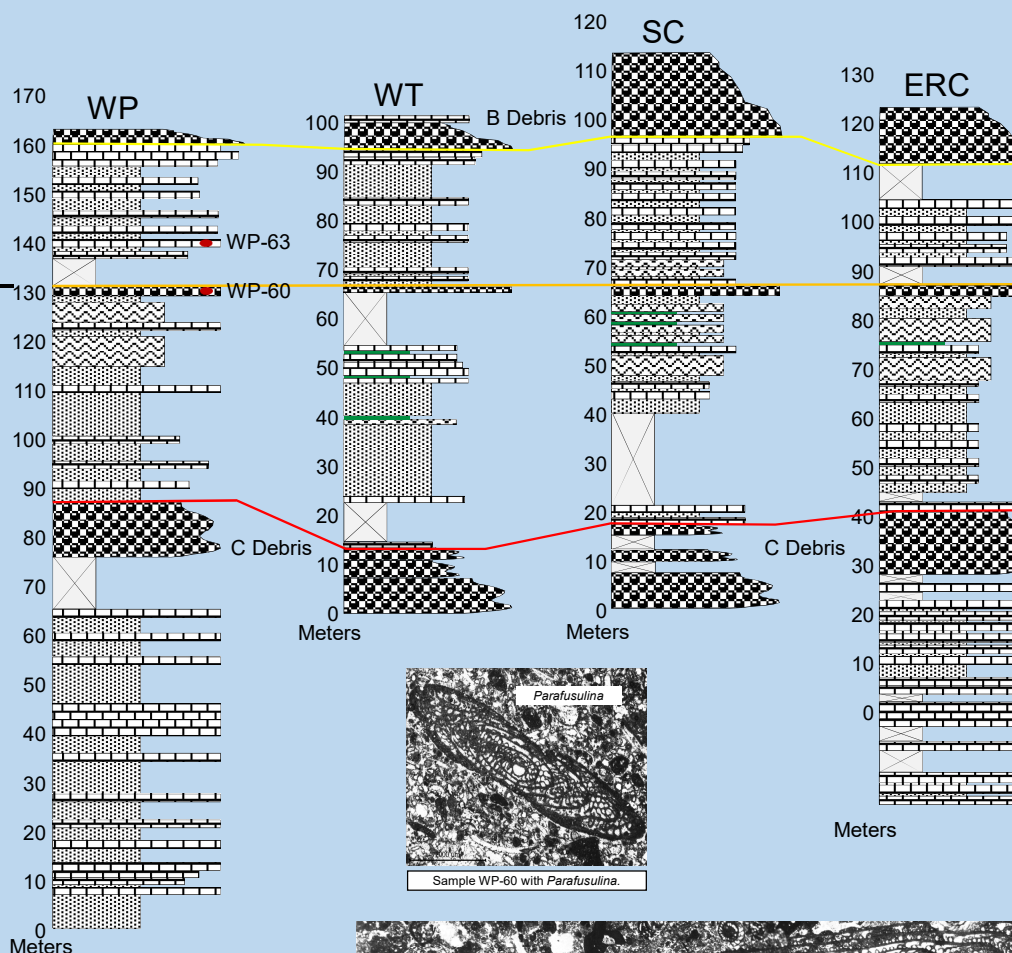
The fusulinacean *Parafusulina* is a key microfossil for the Cherry Canyon Formation and it is abundantly present in these measured sections. *Parafusulina* is present in the strata in and below the WP-60 carbonate debris bed. The fusulinacean *Polydixodina* first occurs approximately 10 m above the WP-60 bed in sample W-63. This genus is a key microfossil for the Hegler, Pinery, Rader and McCombs Members of the lower part of the Bell Canyon Formation.

The bentonites exposed in the measured sections have been processed for zircons. Currently, only the zircons from the WCC section have been radiometrically dated using CA-TIMS U-Pb methods to yield dates between 265.36 to 265.17 MY which correlate to the age of the bentonites exposed in the Manzanita Member of the Cherry Canyon Formation in the Guadalupe Mountains region.

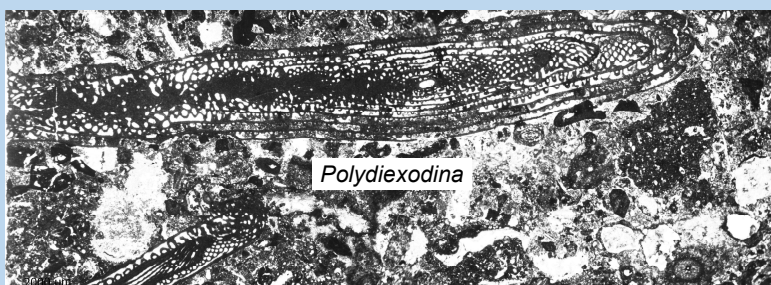
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- Lambert, L., Wardlaw, B., Henderson, C., 2007. Mesogondolella and Jingondolella (Conodonts): Multielement definition of the taxa that bracket the basal Guadalupian (Middle Permian Series) GSSP. Palaeoworld vol. 16, pp. 208-221.

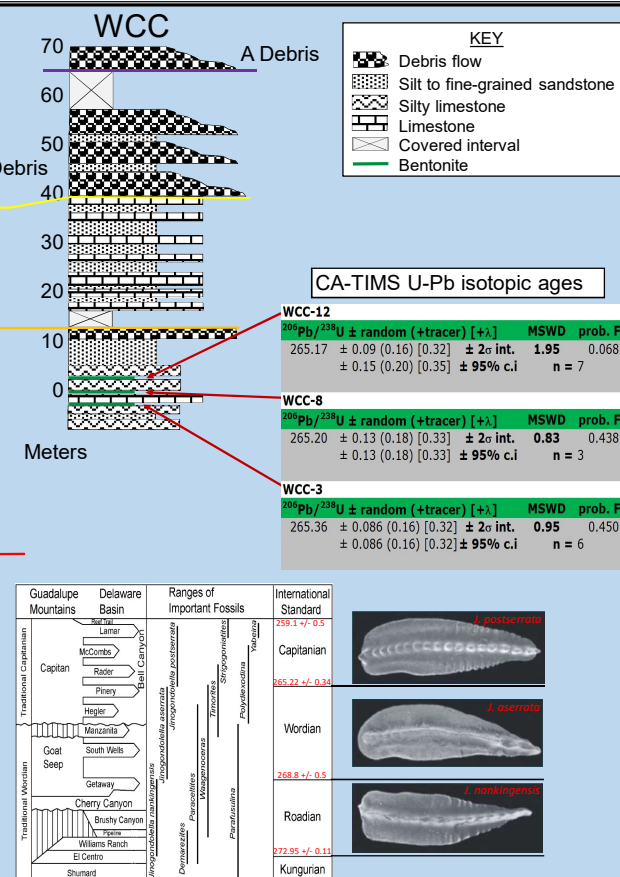
Cherry Canyon | Bell Canyon



Sample WP-60 with *Parafusulina*.

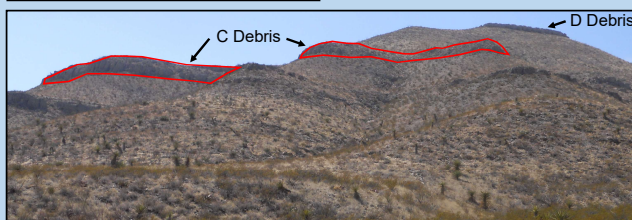
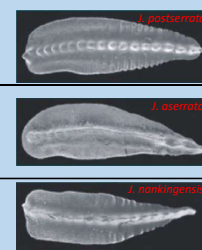


Sample WP-63. This bed has the first occurrence of *Polydixodina* in the WP-section.

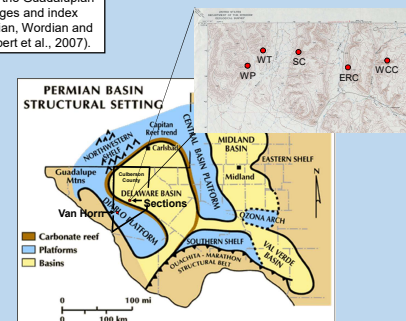


Guadalupe Mountains	Delaware Basin	Ranges of Important Fossils	International Standard
Traditional Capitanian	Capitanian	<i>Parafusulina</i>	259.1 +/- 0.5
Traditional Wordian	Wordian	<i>Polydixodina</i>	268.8 +/- 0.5
Traditional Roadian	Roadian	<i>Jingondolella</i>	272.95 +/- 0.15
Traditional Kungurian	Kungurian		

Delaware Basin stratigraphic units of the Guadalupian Series with international GSSP key ages and index conodont P elements for the Capitanian, Wordian and Roadian Stages (modified from Lambert et al., 2007).



WP section above showing the C-debris outlined in red, and B-debris capping the hill.



West Texas Middle Permian paleo-map showing major geographic features and the location of the WP Section (after Dutton et al., 2000).