Regional Stratigraphy of the Edwards Group and Associated Formations of Texas (Lower Cretaceous, Comanchean): In Defense of the Classic View

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ABSTRACT

Bound between regional unconformities, carbonate rocks of the Middle Albian–Lower Cenomanian Fredericksburg-Washita Division are ubiquitous across the Comanche Shelf of Texas, at the surface and in the subsurface. They represent the gradual but fluctuating marine inundation of the Comanche Shelf as Comanchean times came to an end. They were deposited in four adjoining depositional provinces: (A) the Central Texas Platform (peritidal shelf interior and shallow-marine shelf, represented by the Edwards Group); (B) the pelagic open-marine shelf of North and Trans-Pecos Texas; (C) the Maverick Basin (closed, partly restricted shelf-basin); and (D) Stuart City and Devils River shelf-edge trends (narrow belts of bioclastic and constructional marine "reef" sediments).

Utilizing a regional network of five interlocking stratigraphic cross-sections compiling the work of many geologists throughout North, Central, and southwestern Texas, this paper examines, documents, evaluates, and integrates all stratigraphic aspects of the "classic view" of the Edwards Group and adjacent formations: (a) physical stratigraphy; (b) distribution of formations, members, and key beds; (c) discontinuity surfaces (= hardgrounds); (d) distribution of paleoenvironments; (e) long-established ammonite zones; (f) limited benthic fossil occurrence; and (g) correlations based upon sequence stratigraphy.

Five published papers over the 2007–2016 decade have challenged aspects of some long-held Edwards Group stratigraphic relationships, based mostly on still-emerging paleontology and distribution of benthic molluscs, primarily rudists (the "revisionist view").

Six second- and third-order sub-cycles are identified within the undivided Fredericksburg-Washita Division of the Central Texas Platform, Maverick Basin, and North and West Texas, and provide compelling confirmatory evidence for earlier stratigraphic conclusions contributed to by eleven different published authorities, from 1958 to 2016:

(1) The Burt Ranch Member (basal Segovia Formation), the Regional Dense Member (basal Person Formation), and the Kiamichi Member (basal Georgetown Formation) are stratigraphic equivalents representing a regional flooding event, all

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three being in the Adkinsites bravoensis Ammonite Zone (lowermost Washita).

(2) The peritidal Person Formation is the shelf-interior equivalent of the pelagic-shelf Georgetown Formation (except for its uppermost member, the Main Street, which forms the thin remnant Georgetown Formation of the distal Central Texas Platform); the Person Formation is also equivalent to the combined middle and upper McKnight plus lower Salmon Peak formations of the Maverick Basin.

(3) The Dolomitic and Kirschberg members (lower members of the Kainer Formation) are laterally equivalent to all of the Fort Terrett Formation of the Edwards Plateau; and the combined Grainstone Member of the Kainer Formation, all of the Person Formation, plus the Main Street Member are laterally equivalent to the Segovia and Fort Lancaster formations of the Edwards Plateau.

(4) thus the Person Formation, comprising the second and third sub-cycles, is properly assigned to the lower Washita, not the Fredericksburg.

Comparison of the resulting comprehensive (i.e., integrated) regional stratigraphic framework (the "classic view") with the conclusions of the "revisionist view" demonstrates the fallibility of regional stratigraphic interpretations based upon limited criteria, and now encourages investigation of ancillary stratigraphic issues, such as: (i) changes in regional discontinuity surfaces passing from one depositional province to another; (ii) correlation patterns in shelf-to-basin settings; (iii) relative influence of regional versus local stratigraphic observations; and (iv) can a well-defined, physically derived stratigraphic architecture provide a framework by which lithofacies-controlled benthic fossil distribution may be detected?

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