

Ichnological and Sedimentological Facies Variations Across a Mixed-Influenced (River-Wave) Asymmetric Delta Lobe, Upper Cretaceous Basal Belly River Formation, Central Alberta

Cindy Hansen*
Simon Fraser University, Burnaby, BC
cdhansen@sfu.ca

and

James MacEachern
Simon Fraser University, Burnaby, BC, Canada

Summary

Cycle G of the Campanian Belly River Formation comprises two recurring and mappable facies associations (FA1 and FA2), both interpreted to record distal prodelta through proximal delta-front accumulation. FA1 is characterized by uniformly coarsening-upward successions, with abundant wave- and storm-generated sedimentary structures, subordinate syneresis cracks, convolute bedding, and claystone drapes. Trace fossils are sporadically distributed in low- to moderate-abundance and moderate-diversity suites, recording stressed expressions of the *Cruziana* Ichnofacies. FA2, by contrast, forms coarsening-upwards successions marked by pronounced facies variability. Facies are heterolithic, displaying abundant current-generated sedimentary structures, claystone drapes, structureless siltstones, normally graded beds, convolute bedding, and syneresis cracks. Some event beds probably record hyperpycnal emplacement. FA2 also includes distributary channel/mouth-bar complexes. FA2 displays sporadically distributed, low-intensity bioturbation, and very low- to moderate-diversity ichnological suites. Dominant ichnogenera comprise strongly facies-crossing deposit-feeding structures, attributable to highly stressed expressions of the *Cruziana* Ichnofacies.

FA1 is interpreted to record progradation of a wave-influenced to wave-dominated delta, whereas FA2 is consistent with accumulation in a river-dominated delta. The spatial distributions of FA1 and FA2, however, delineate a predictable along-strike variation in facies character - the two facies associations represent deposition within the same delta lobe. Cycle G in the study area records a mixed river-, wave- and storm-influenced delta lobe. FA1 yields facies characteristics corresponding to positions lying updrift of distributary channel discharge. FA2, in contrast, records positions downdrift of active distributary discharge and yields a more fluviually dominated character. The integration of ichnological and sedimentological facies characteristics, coupled with the spatial distribution of the facies associations, demonstrates that this cycle of the Belly River Formation represents the progradation of an asymmetric delta complex.