

Ichnology of the Doe Creek Member of the Kaskapau Formation: An Example of the Stark Contrast of Brackish and Fully Marine Assemblages

Scott A. Reid and S. George Pemberton
Ichnology Research Group, University of Alberta, AB T6G 2E3
sar6@ualberta.ca

Abstract

The Cenomanian Doe Creek Member comprises sand-dominated units within the Kaskapau Formation shale. The sandstones are of reservoir quality and have been estimated to hold crude oil reserves of 460 million barrels (100 million barrels initial established reserves). The Doe Creek sandstones are sedimentologically complex, with polygenetic origins from open-marine shoreface, deltaic, and brackish settings. This complexity provides a unique situation to study and compare the ichnology of unstressed, open-marine settings and stressed deltaic and brackish settings. The open-marine shelf to lower shoreface profiles present in the Doe Creek Member comprise an exceptionally well preserved record of an unstressed ichnological succession from the Zoophycos ichnofacies beyond maximum wave base to the proximal Cruziana ichnofacies of the lower shoreface. This unstressed offshore trace fossil suite provides a baseline for ichnologic comparison of the deltaic successions of the Doe Creek Member. The deltaic settings in the Doe Creek exhibit an overall stressed ichnologic assemblage induced by fluctuations in salinity, sedimentation rates, and turbidity, all of which influence biogenic activity well into offshore areas. These stresses cause a change in benthic behavior and result in deviations from typical offshore ichnological assemblages. The Doe Creek Member also hosts brackish bay and a tidal inlet deposits which display strong salinity-stressed ichnofaunal assemblages.