

# Using Ichnology and Sedimentology to Assess the Paleoenvironments and Paleoecology of an Upper Cretaceous (Campanian) Fine-grained Turbidite Succession, Cedar District Formation, Nanaimo Group, British Columbia

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The Late Campanian Cedar District Formation comprises a succession of fine-grained, thin-bedded siliciclastic turbidites. The unit is dominated by T<sub>CDE</sub> and T<sub>CE</sub> event beds periodically intercalated with T<sub>BCDE</sub> and T<sub>BCE</sub> turbidites, producing a coarsening- and thickening-upward succession.

The trace fossils reflect an abundant but low diversity *Zoophycos* ichnofacies, dominated by *Zoophycos*, *Thalassinoides*, *Planolites*, *Anconichnus*, and *Taenidium*, with lesser *Helminthopsis*, *Chondrites*, *Ophiomorpha*, *Granularia*, *Skolithos*, *Cosmorhapha*, and *Scolicia*. Overall, the ichnogenera represent a combination of dwelling, deposit-feeding, and grazing behaviours typical of distal marine environments subjected to high-frequency episodic sediment emplacement. Graphoglyptids, typical of the *Nereites* ichnofacies, are notably absent. Facies analysis highlights six facies associations and four recurring post-turbidite ichnocoenoses from the base of the unit to the top: the *Chondrites* ichnocoenose, the *Taenidium* ichnocoenose, the *Anconichnos* ichnocoenose, and the *Scolicia* ichnocoenose.

These ichnocoenoses record an upward progression from predominantly sessile deposit feeding and mobile grazing behaviours in mudstones, to mobile deposit feeding and lesser semi-permanent dwelling behaviours in sandstones. These ethological changes mirror the lithofacies changes, and correspond to a shift from lower fan basinal settings to middle fan depositional lobe settings toward the top of the Cedar District Formation.

The absence of graphoglyptid or other pre-turbidite suites preserved in the mud-rich turbidites supports persistent and high-frequency sediment input; conditions uncharacteristic of lower fan settings. Low energy emplacement of the distal turbidites is not sufficient to explain the erosional removal of grazing and farming benthic communities. These benthos, therefore, were more likely precluded from colonizing the seafloor by paleoenvironmental conditions.