

## **Paleopedology, Palynology, and Paleoenvironmental Interpretation of Two Alluvial Paleosols, Cretaceous Dunvegan Formation, Alberta Canada**

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Paleosols and pollen are both useful paleoenvironmental indicators. Most studies, however, examine either fossil soils or pollen, but rarely both. Alluvial paleosols in the Dunvegan Formation formed, at least partly, in environments which were conducive to the preservation of pollen. This provides an opportunity to examine both the paleosols and the fossil pollen assemblages in concert to formulate a multi-proxy paleoenvironmental interpretation. Micromorphological features from both paleosols, including illuvial clay coatings and infillings, Fe-oxide coatings, nodules and mottles, papules and pedorelicts, depletion residues, sphaerosiderite, bioturbation and strial matrix fabrics, indicate generally wet conditions alternating with periods of dryness that are probably attributable to local and strial matrix fabrics, indicate generally wet conditions alternating with periods of dryness that are probably attributable to local fluctuations in water table levels. Taken together these micromorphological features are consistent with those features formed in modern Inceptisols and Alfisols. The palynological assemblages are overwhelmingly dominated by trilete and monolete spores. Pollen of angiosperms and gymnosperms is rare. Bissacate pollen constitutes less than 1% of the assemblages, indicating that arboreal gymnosperms were located distal to the study site. The paucity of arboreal pollen in conjunction with the abundance of diverse, well-preserved fern and lycopod spores suggests moist conditions and poorly drained soils and/or early successional colonization of these sites. Together, the pollen and paleosol data suggest that these Cretaceous soils formed in a cool temperate, humid to sub-humid paleoclimate. Our results support previous paleoenvironmental reconstructions for this area based upon macrofloral and stable isotopic data.