

Stratigraphic Discontinuities, Characterized by Palimpsest Softground Trace Fossil Suites in the Viking Formation, Alberta

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Abstract

The development of palimpsest softground trace fossil suites resembles that of the firmground Glossifungites Ichnofacies, wherein colonization of the surface succeeds erosion and/or a depositional hiatus. Palimpsest softground suites can be differentiated from firmground suites, based on evidence of soft-sediment conditions during endobenthic colonization. Burrowing of soft sediment is indicated by at least one or several of the following characteristics: traces passively to actively infilled; traces lined; trace fossil boundaries indistinct; laminae disrupted in the underlying substrate; traces compacted; and soft-sediment deformed bases of lag deposits.

Stratigraphic discontinuities are abundant the Viking Formation. Several of these surfaces are characterized by recurring trace fossil suites, are typically overlain by pebbly or sandy lag deposits, and are interpreted as palimpsest softground suites. Development and expression of these suites is controlled by: the consistency and lithology of the underlying substrate; environmental conditions following erosion and/or during the depositional hiatus; presence or absence of an overlying lag; and morphology and behavior of the trace-making organisms.

Integration of ichnology, sedimentology, and stratigraphy facilitates the differentiation of these palimpsest softground suites into those associated with wave ravinement surfaces, amalgamated sequence boundaries and transgressive surfaces of erosion, or minor erosion/hiatal events. Accordingly, palimpsest softground suites can be as stratigraphically significant as suites attributable to the Glossifungites Ichnofacies. However, these surfaces may locally represent shorter durations of erosion and/or depositional hiatus, in comparison to the better-known exhumed firmgrounds. Recognition of palimpsest softground suites and understanding their conditions of formation can enhance the sequence stratigraphic interpretation of ancient successions.