

The Burrowed Zone of the Cadotte Member: Sedimentological and Ichnological Wonders from the Interface of Dramatically Different Shoreface Zones

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Summary

The Cadotte Member shoreface succession typically displays a peculiar vertical profile, with most examples broken by a prominent scour surface into a lower unit of very fine- to fine-grained sandstone (the “lower” Cadotte) and an upper unit of coarse-grained sandstone and pebble conglomerate (the “upper” Cadotte). This surface has alternately been interpreted as an unconformable contact, a channel scour cut within a deltaic setting, and a conformable surface developed within a barred nearshore-beach succession. This latter interpretation has fallen into favor, and serves as the foundation for a discussion of a facies zone transitional between the underlying wave shoaling and the overlying breaker/surf depositional zones.

At the top of the lower Cadotte, immediately underlying the scour surface, a unit of carbonaceous, often well-bioturbated, low-angle laminated sandstone grades out of the storm-amalgamated zone below. This “burrowed zone” is in stark contrast to the bulk of the lower Cadotte, which generally exhibits storm bedding of a much more energetic character and a paucity of macrofaunal trace fossils. Although the burrowed zone is typically well sorted and slightly finer grained than the underlying sandstones, it is common to find well rounded chert granules and pebbles dispersed throughout it or concentrated into stringers.

Schaubcylindrichnus and *Palaeophycus* are ubiquitous in the burrowed zone, with robust *Macaronichnus*, *Rosselia*, *Conichnus*, *Ophiomorpha*, and fugichnia abundant in many examples. Preferential preservation of burrowing at this level within the shoreface is counterintuitive, as one would not expect to encounter the preservation of fair-weather faunal activity in a position intermediate between energetic storm reworking below and coarse, current-generated nearshore cross-bedding above. An explanation may be found in the morphological response of the shoreface profile to the onset of storm conditions, or the sheltering effect of a storm-responsive breaker-bar found slightly seaward of this position.

An assortment of examples of the lower Cadotte-upper Cadotte interface will be laid out for display. These will demonstrate that although the sedimentological and ichnological details of this transition vary from well to well, the overlying theme of a punctuated, but conformable transition from

oscillation-driven to current-driven processes remains constant. Some of the ichological niceties that will be on display include: *Ophiomorpha irregulaire* displaying a fill coarser than the host sediment (tubular tempestites), *Rosselia* bulbs and *Schaubcylindrichnus* tubes that have been winnowed out of “life position” and redeposited along scour surfaces, cryptic bioturbation created by organisms with body sizes comparable to the sediment grain size, and a two variants of *Macaronichnus* segregated into distinct levels of the shoreface.