

THE SEDIMENTOLOGY OF THE MARINE
MOOSEBAR TONGUE AND BOUNDING STRATA,
LOWER CRETACEOUS BLAIRMORE GROUP,
CENTRAL AND SOUTHERN FOOTHILLS
OF ALBERTA

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In earliest Blairmore time (Hauterivian-Barremian?), uplift in the Cordillera resulted in a period of extensive pedimentation and deposition of coarse clastics of the Cadomin Formation. Paleogeographic reconstructions have shown that a series of humid-climate alluvial fans to the west fed a northwest-flowing trunk stream that occu-

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ped the Spirit River Channel. A series of lenticular channels filled with conglomerate and coarse-grained, trough crossbedded sandstone suggest that deposition in the Spirit River Channel was in pebbly braided and sandy braided fluvial environments.

Subsequent to the deposition of the Cadomin Formation, finer grained sandstones and shales of the Gladstone Formation form a series of sharp-based, medium-grained sandstones up to 15 m thickness that fine upwards and contain lateral accretion surfaces (epsilon crossbeds). The upper contact of these sandstones is rooted and grades into a thick (up to 30-40 m) sequence of interbedded fine-grained rooted sandstones and shales. The fining-upwards sandstones are interpreted as point bar deposits of a high sinuosity meandering fluvial system. The interbedded rooted sandstones and shales overlying the point bars are interpreted as overbank and floodplain deposits. Paleoflow data indicate that the rivers occupying the basin in lowermost Gladstone time flowed NNW and debouched into the Clearwater Sea to the north. The uppermost part of the Gladstone Formation (the Calcareous Member and equivalent strata) comprises a series of 3-7 m thick coarsening- and fining -upwards sequences. Wave generated sedimentary structures, abundant bioturbation, and brackish fauna suggest that deposition was in a large standing body of water, possibly a large brackish lake or an estuarine system. Brackish conditions are related to the southward transgression of the Clearwater Sea.

In early Albian time, the Clearwater Sea had covered most of central Alberta. Marine sandstones and shales of the Moosebar Tongue were deposited at this time. Marine fauna were recovered from a sequence of shales overlying the upper Gladstone Formation at the Elbow River, southwest of Calgary, indicating that the Clearwater Sea transgressed at least this far south in the Alberta Foothills. Farther north in the central Foothills, the Moosebar Tongue consists of a number of coarsening-upwards cycles. The sandstones in the uppermost parts of the cycles are dominated by swaley cross-stratification, suggesting that deposition occurred in a high energy, storm-influenced nearshore environment. Paleocurrent data indicate that the shoreline of the Clearwater Sea was oriented ENE-WSW in the study area.

Following regression of the Clearwater Sea from the Foothills region in Early to Middle Albian time, a coastal plain environment prevailed. As regression continued, the coastal plain environment was overlain by a fluvial sequence deposited by large-scale, low sinuosity meandering rivers. Paleocurrent data indicate that these rivers flowed generally northwards and debouched into the Boreal sea which lay to the north.