

Lacustrine environmental facies of Scots Bay Formation, Nova Scotia, Canada

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At the top of the Fundy Group, the Early Jurassic Scots Bay Formation is exposed along the south shore of the Bay of Fundy. These cherty lacustrine sandstone and limestones range in thickness from 2.5 to 7 meters and rest nonconformably on the North Mountain Basalt, as indicated by palaeo-weathering, erosion, topographic surface irregularities and an old soil horizon.

Four environmental facies are recognized in the Scots Bay Formation: 1) marginal channel facies, 2) offshore facies, 3) nearshore facies, and 4) shoreline facies. The marginal channel facies is represented by moderately sorted, mixed coarse to fine subarkosic sandstone with clasts mainly composed of basalt fragments and sand-sized quartz grains. The basalt fragments may indicate subaerial erosion of nearby basaltic lava deposits. The fining-upward nature of this unit may indicate that a meandering stream deposited this sandstone.

The offshore facies, represented by a silty sandstone unit, is characterized by fine siliciclastic materials. It is a massive or thinly laminated unit containing a significant amount of dark basaltic grains. The presence of claystone suggests that deposition involved settling of at least some suspended material in a quiet environment. Bioturbation may indicate that the bottom waters and sediments were well oxygenated and below local wave base.

The nearshore facies is represented by two subfacies: a lower high-energy nearshore subfacies that is characterized by mixed carbonate and siliciclastic content and an upper low-energy nearshore subfacies that is characterized by fine-grained limestone. The high-energy nearshore facies consists of bioclastic, silty, sandy limestone and peloidal calcareous sandstone. It contains desiccation cracks, horizontal laminations, rock fragments and chert. Scattered, uncommon oolite grains are present. The low-energy nearshore subfacies is micrite-dominated and consists of a wackestone-packstone unit and a silicified stromatolitic (LLH) unit. These stromatolites are a series of small domes or hemispheroids stacked upon each other and composed of dark argillaceous and calcareous sandstone.

The nearshore facies of the Scots Bay Formation contains a higher percentage of carbonate than the offshore and shoreline facies, possibly because carbonate production rates were highest in shallow, nearshore environments. Calcareous fossils, such as ostracodes, mollusks and calcareous algae, may have been the major carbonate sources. Fossils in the nearshore facies include gastropods represented by *Hydrobia*, *Valvata*, and *Gyraulus* and ostracodes represented by *Darwinula*, *Timiriasevia* and *Metacypris*. Specimens of a "giant ostracode" and a small clam have not yet been identified. Travertine-like deposits and charophytic remains

are also present.

The shoreline facies is represented by feldspathic litharenitic sandstone that contains truncated ripple marks associated with low-angle cross-stratification and horizontal current laminations. Desiccation cracks and dinosaur footprints suggest subaerial exposure was routine during the

deposition of this sandstone.

The vertical stratigraphic sequence of these facies record a regressive phase during most of the history of "Scots Bay" lake. The source area for the siliciclastic materials is thought to be from the southeast .