

**CORRELATION OF HELIKIAN STRATA, MACKENZIE MOUNTAINS – BROCK INLIER – VICTORIA ISLAND**

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**Field and Laboratory Investigations**

Aitken and Long spent the first week of June re-examining the Precambrian succession of Brock Inlier, before continuing their investigations in Mackenzie Mountains (Fig. 1). John Park (Earth Physics Branch) accompanied them for the first three weeks, to sample the succession for paleomagnetic investigations.

Semikhatov spent the period from July 25 to August 13 with the party in Mackenzie Mountains (see preceding note "Progress in Helikian Stratigraphy, Mackenzie Mountains"), where he familiarized himself with the Precambrian succession and sampled the stromatolite assemblages.

On return to Calgary, Semikhatov made a preliminary examination of stromatolites collected this year from Brock Inlier, and those collected by Aitken from Victoria Island in 1975.

**Results**

A consistent succession of stromatolite assemblages in the three regions (Fig. 1) suggests correlations differing in part from those proposed by Jefferson and Young (1977) and Young (1977a, b).

Mackenzie Mountains

The oldest formation exposed in the frontal Mackenzie Mountains, map-unit H1 (Aitken et al., 1973) contains the stromatolites **Conophyton**, **Jacutophyton**, **Svetliella**, **Baicalia** and a distinctive development of **Stratifera** with roof-like ridges (Table 1). This assemblage is unknown at Brock Inlier and Victoria Island. On the basis of studies in the USSR, the presence of **Svetliella** suggests a basal Middle Rhiphaean age, 1350 ± 50 m.y.

Stromatolites of the Tsezotene Formation, known from one member only, were not examined.

Stromatolite assemblages from the upper division of the Katherine Group and map-unit H5 (Aitken, 1977) are dominated by **Baicalia** and similar but unbranched stromatolites (Table 1). A possible **Inzeria** occurs in unit K6 of the Upper Katherine (Aitken et al., 1978) and passively branching wall-less forms in the "Basinal sequence" of map-unit H5. Stromatolite reefs in this "Basinal sequence" (ibid.) are dominated by small, irregularly active-branching, wall-less forms.

The dominance of **Baicalia** persists upward through about the lower third of the "Upper carbonate sub-unit" (Aitken et al., 1978; inappropriately referred to as "Little Dal Formation, sensu stricto" by Aitken, 1977). Higher in the sub-unit, **Boxonia** and **Gymnosolen** appear. These two groups, with **Jurusania**, cf. **Minjaria**, **Parmites** and some **Baicalia** characterize the upper two thirds of the sub-unit. The overlying Redstone River and Coppercap formations lack well organized columnar stromatolites.

Table 1  
 Correlation of Helikian formations between Mackenzie Mountains and Victoria Island

STROMATOLITE ASSEMBLAGE	R E G I O N		
	MACKENZIE MOUNTAINS	BROCK INLIER	VICTORIA ISLAND
<i>Gymnosolen, Boxonia</i>	Coppercap Fm. (carbonates)		not present
	Redstone River Fm. (red beds, conglomerate, evaporites)	not present	Kilian Fm. (red beds, evaporites, minor carbonates)
<i>Baicalia and others</i>	Map-unit H5 (Aitken, 1977a) Type Little Dal Formation (Gabrielse et al., 1973)	Upper carbonate subunit ("Little Dal s.s.") (mainly carbonates)	not present
		Rusty shale subunit (mainly clastics)	Map-unit P5 (Cook and Aitken, 1969) (evaporites, clastics)
	Gypsum subunit		Wynniatt Fm. (mainly carbonates)
	Grainstone subunit (mainly carbonates)	Map-unit P4 (ibid.) (mainly carbonates)	Minto Inlet Fm. (evaporites, fine clastics)
	Basinal sequence (carbonates, fine clastics)		Reynolds Point Fm. (except basal clastics)
	Mud-cracked subunit (sandstone, shale)	Map-unit P3 (ibid.) (sandstone, quartzite)	Reynolds Point Fm. (basal sandstones only)
	Katherine Group (mainly sandstone)		Glenelg Fm. (upper sandstones only)
Correlation of lower formations unresolved			
<i>Conophyton, Jacutophyton, Svetliella</i>	Tsezotene Fm. (mainly clastics)	Map-unit P2 (ibid.) (carbonates)	Glenelg Fm. (cherty dolomites)
	Map-unit H1 (mainly carbonates)	Map-unit P1 (ibid.) (mainly shale)	

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Figure 1. Index map. Exposures of Precambrian rocks shown in black.

The appearance of *Boxonia* and *Gymnosolen* is taken by many Soviet geologists to mark the base of the Upper Rhiphaean ( $950 \pm 50$  m.y.; see Semikhatov, 1974, Fig. 14).

#### Brock Inlier

The Brock Inlier contains two carbonate-dominated formations, designated "P2" and "P4" by Cook and Aitken (1969). The lower "P2" is characterized by *Colonella* and *Baicalia*. The upper "P4" is extremely stromatolitic and characterized throughout by *Baicalia* and similar but unbranched columns, comparable to those that occur in biostromes present as tongues in the "Basinal sequence" of map-unit H5 in Mackenzie Mountains (Aitken, 1977).

#### Victoria Island

The lowest stromatolites reported from the Shaler Group are *Basisphaera* and *Inzeria*, from a unit of cherty dolomite within the Glenelg Formation (Young and Jefferson, 1975). *Conophyton* also occurs in the Glenelg Formation (C.W. Jefferson, pers. comm., 1977).

At the top of the Glenelg, *Inzeria* appears with *Baicalia* in a regional biostrome.

The Reynolds Point Formation is dominated by *Baicalia*. Here also occurs a small, irregularly active-branching wall-less form similar to the principal reef-builders of the "Basinal sequence" of map-unit H5. This is the "finger stromatolite" of Young and Jefferson (*ibid.*).

The Wynniatt Formation contains *Baicalia* in its lower part, but *Boxonia* occurs in the formation as low as 300 m above the base.

Stromatolites collected from the Kilian Formation have not yet been identified.

#### Summary

Three distinct stromatolite assemblages can be recognized through preliminary field studies. The lowest, characterized by *Conophyton*, *Jacutophyton*, and *Svetliella*, is known only from the base of the Mackenzie Mountains succession. It is succeeded by an assemblage, characterized by the dominance of *Baicalia* and passively branching, wall-less forms, that occurs in Mackenzie Mountains, Brock Inlier and Victoria Island. The third assemblage, found near the top of the Mackenzie Mountains and Victoria Island successions, is characterized by *Boxonia* and *Gymnosolen*.

Correlation of the boundary between the *Baicalia*-dominated and the *Boxonia*-*Gymnosolen* assemblages supports a straightforward correlation, based on gross lithology, for the top of the principal sandstone formation in each region and the succeeding formations (Table 1). Correlation of lower formations is not yet clear.

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