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Supplemental Material

Supplemental Material 1. Faulted contact of the Handren Hill Member with the Ediacaran Coldbrook Group along eastern Hanford Brook section.

Supplemental Material 2. Field photograph of the upper part of the Quaco Road Member in the Somerset Street section (southwestern margin) illustrating faults related to the disappearance of nearly the whole Mystery Lake Member and the entire *Skiagia-Fimbriaglomerella* Zone (Palacios et al., 2011).

Supplemental Material 3. Setting of Landing and MacGabhann's (2010) diamictite in lower Mystery Lake Member on Hanford Brook. **A.** Topographic map showing the members of the Ratcliffe Brook Formation and the location of field sites HB-9, HB-12 and HB-14 figure 5 from Landing and MacGabhann (2010) showing photographs of "lithology and depositional context of lower Mystery Lake Member diamictite.". **C.** Photographs taken at field sites HB-9, HB-12 and HB-14 documenting how Landing and MacGabhann's (2010) figure 5B and figure 5C represent two beds of the Mystery Lake Member, ~70 m and 110 m, respectively, above the level from which the 40-cm-thick diamictite level was reported (adapted from Johnson et al., 2019).

Supplemental Material 1

FAULTED CONTACT OF THE HANDREN HILL MEMBER WITH THE EDIACARAN COLDBROOK GROUP ALONG EASTERN HANFORD BROOK SECTION

In the classic Hanford Brook east section, the contact between the Ratcliffe Brook Formation and Coldbrook Group is exposed on the north side of the brook (45.4553°N −65.6018°W), where the latter has been variously described as “fossil soil” (Patel, 1977), “reddish-brown volcanic?” (McCutcheon, 1987) or “purple rhyolite” (Landing and Westrop, 1998). The reddish brown rock lying directly beneath the basal conglomerate on the north bank of the stream is strongly altered with both iron oxide and iron carbonate and is similar in appearance to hematitized, dense gray basalt on the north side of the stream ~50 m to the east and amygdaloidal basalt exposed on the opposite (south) side of the stream (45.4550°N −65.6020°W). The basal conglomerate dips moderately and strikes SW into a WNW-trending fault that follows the trend of the stream for ~150 m, with conglomerate on the north side and hematitized amygdaloidal basalt on the south side (see Supplemental Material 3). At the western end of the conglomerate exposure it grades upward into pink sandstone with small pebbles and granules of quartz and polymictic clasts and then into what Tanoli and Pickerill (1990) described as “white, extremely mature pebbly sandstone-conglomerate with crude inverse grading and low-angle cross stratification”. The WNW-trending fault separates the steeply-dipping, mature pebbly sandstone-conglomerate from polymictic conglomerate on the south side of the brook that forms the north end of a prominent NS-trending conglomerate ridge (Fig. S1). The abrupt changes in strike direction coincide with a WNW break in the aeromagnetic signature (Kiss et al., 2004) strongly suggesting a faulted contact between the basalt and conglomerate along this trend. The conglomerate ridge extends to the south for over 2 km to Porter Road, where detrital muscovite and a mylonitic quartzite clast from the conglomerate were sampled for U-Pb and $^{40}Ar/^{39}Ar$ dating (Barr et al., 2003; Reynolds et al., 2009). The N-S trending contact between the basalt and conglomerate ridge is concealed but it is interesting to note that a conjugate fracture set in the basalt (5/50N and 100/80S) (Fig. S2) mimics the change in the strike of the conglomerate supporting a synsedimentary origin for the faulting. In addition, the presence of a thick basalt unit directly beneath the Cambrian conglomerate suggests that the rhyolitic volcanic rocks of the Silver Hill Formation (the uppermost formation of the Coldbrook Group) have been removed by normal faulting, exposing the underlying basalt of the Burley Lake Formation on the uplifted block.

Figure S1. WNW-trending fault separating a steeply-dipping, mature pebbly sandstone-conglomerate from a polymictic conglomerate on the south side of the brook.

Figure S2. N-S trending contact between a basalt (including a conjugate fracture set in the basalt) and a conglomerate ridge.

Supplemental Material 2

Figure S3. Several small, dip-slip shear surfaces with slickensides indicating reverse movement were observed throughout the Ratcliffe Brook Formation on Somerset Street SW. In the lower part of the section beneath the ash layers shown on the log of Palacios et al. (2011), reverse faults were observed truncating earlier strike-slip faults with unknown amounts of displacement. (a) reverse fault ~5 m below the Glen Falls contact (b) chlorite-calcite slickenfibers on footwall of reverse fault in sandstone below the ash layers.

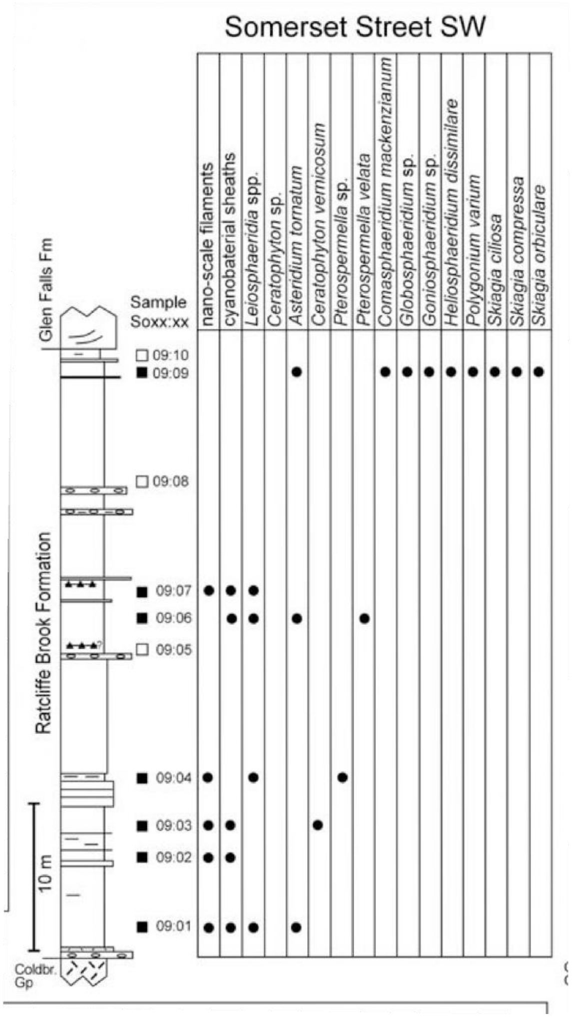
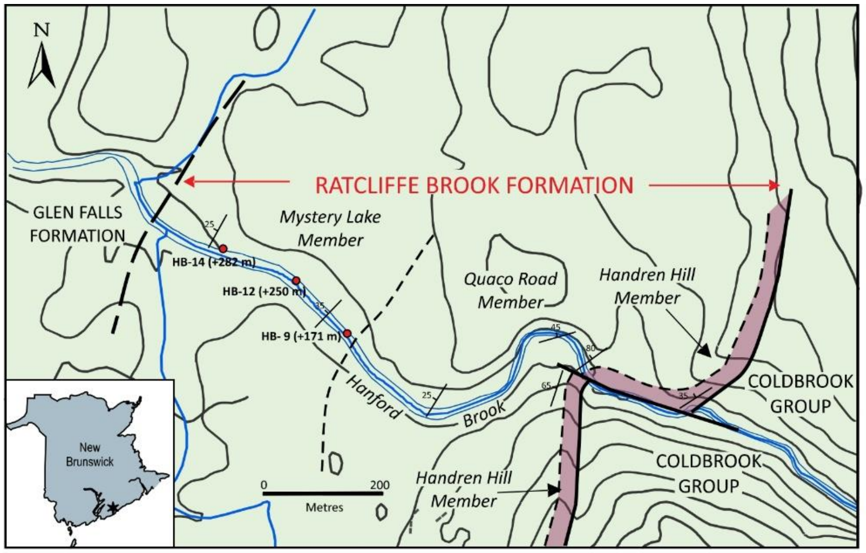


Figure S4. Palacios et al. (2011).

Supplemental Material 3

Figure S5. Setting of Landing and MacGabhann's (2010) diamictite in lower Mystery Lake Member on Hanford Brook. **A.** Topographic map showing the members of the Ratcliffe Brook Formation and the location of field sites HB-9, HB-12 and HB-14 figure 5 from Landing and MacGabhann (2010) showing photographs of "lithology and depositional context of lower Mystery Lake Member diamictite.". **B.** Figures illustrated by Landing and MacGabhann (2010). (A) Trough cross-bedded, braided stream deposits that underlie dropstone bed in lower Mystery Lake Member of the Chapel Island Formation; length of hammer 30 cm. (B) Tip of yellow arrow marks top of dropstone bed in lower Mystery Lake Member. (C) Hammer (30 cm long) is propped on dropstone bed; note outlines of small, teardrop-shaped ball-and-pillow structures. **C.** Photographs taken at field sites HB-9, HB-12 and HB-14 documenting how Landing and MacGabhann's (2010) figure 5B and figure 5C represent two beds of the Mystery Lake Member, ~70 m and 110 m, respectively, above the level from which the 40-cm-thick diamictite level was reported (adapted from Johnson et al., 2019).

A



Johnson et al. (2019)

B

E. Landing, B.A. MacGabhann / Palaeogeography, Palaeoclimatology, Palaeoecology 285 (2010) 174–185 179

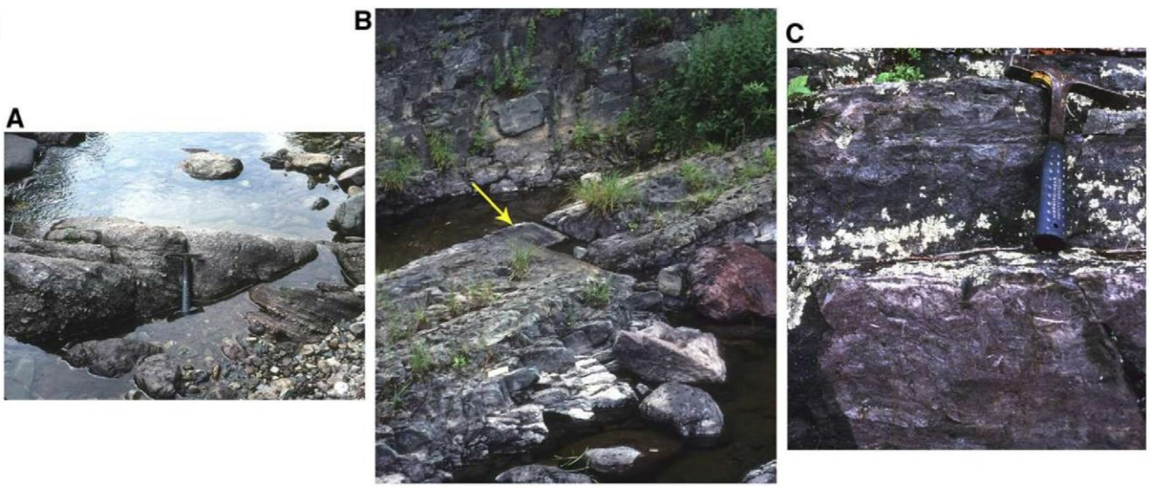
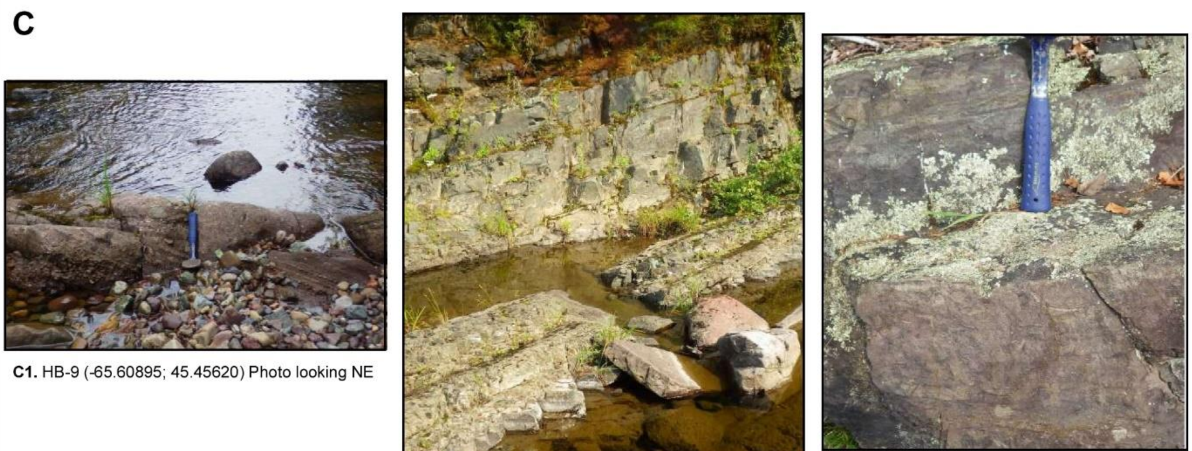


Fig. 5. Lithologies and depositional context of lower Mystery Lake Member diamictite in Hanford Brook East section. (A) Trough cross-bedded, braided stream deposits that underlie dropstone bed in lower Mystery Lake Member of the Chapel Island Formation; length of hammer 30 cm. (B) Tip of yellow arrow marks top of dropstone bed in lower Mystery Lake Member. (C) Hammer (30 cm long) is propped on dropstone bed; note outlines of small, teardrop-shaped ball-and-pillow structures.

C



C1. HB-9 (-65.60895; 45.45620) Photo looking NE

C2. HB-12 (-65.61039; 45.45701) Photo looking N

C3. HB-14 (-65.61134; 45.45729) Photo looking N

Johnson et al. (2019)

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