LOCATION AND SAMPLING

We conducted a focused microscopic study of the dolostones, breccias, and sandstones found at Brussels Hill to look for shock-metamorphic features that could be diagnostic of an impact origin. By examining thin sections made from samples collected in the field, our goals were to (1) determine the stratigraphic origin of the in situ sandstones, (2) examine deformational characteristics of the breccias on the micro-level, (3) classify and describe any shock-metamorphic features found in the samples, and (4) determine if an impact origin is the best fit for explaining the disturbance at Brussels Hill.

THIN SECTIONS: SANDSTONES AND BRECCIAS

Thin sections from reconstituted sandstone sample Bru N149-4. Fractures extend the length of the grain, but sometimes appear slightly more curvilinear than planar. May possibly be PFs, which are alone not diagnostic of an impact but are an important shock-metamorphic feature. (Cross-polarized light.)

Thin sections from sandstone block sample Bru N140-3. Yellow circles around select grains of glauconite; red circles around feldspar grains; orange circles around angular grains/fragments and grains with concave margins. (Cross-polarized light.)

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Sandstone ORIGIN

The sandstones are from the Tunnel City Group of the Early Ordovician (~460 m below the Brussels Hill target rocks) and excavated from up to ~406 m below the Brussels Hill target rocks. Green star highlights the Tunnel City Group of the Early Ordovician (~283–365 m depth below the Brussels Hill target rocks). Red star highlights the Ordovician (~149 m north of the southwest corner of the quarry). Contact between the sandstone block and the dolomite features portion of strongly reconstituted, sandstone. The sandstones contain abundant grains of glauconite. Glauconite is indicative of shallow marine depositional settings and is a staple of Wisconsin Cambrian sandstones. The sandstones also contain plagioclase feldspar, which is unusual in sandstone but is more common in Wisconsin Cambrian sandstone units.

CONCLUSIONS

Although Brussels Hill lacks certain diagnostic criteria of an impact structure, its shape, local deformation, stratigraphic uplift, and microscale deformation indicate that a meteorite impact is the most likely explanation for its formation. As a distinctive, nearly circular feature ~2 km in diameter with localized deformation and units excavated from great depth, Brussels Hill fits the general morphological criteria of a terrestrial impact structure. In addition to abundant monocrystalline breccias, Brussels Hill features Cambrian sandstones, likely from the Tunnel City Group, the likely source for the Brussels Hill sandstones and ~406 m below its target rocks. (Figure adapted from Wisconsin Geological and Natural History Timescale.)

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