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Old fossils, new tricks: the application of Reflectance Transformation Imaging (RTI) to the study of fossil insects from the Late Cretaceous (Cenomanian) of Labrador

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Photographic imaging of compression and impression fossil specimens is often constrained by lighting orientation and the shadows resulting from surface three-dimensionality. Reflectance Transformation Imaging (RTI) is a relatively simple method that may alleviate these issues. Initially developed for archaeology, RTI enhances the surface shape and colour of a 2D object, yet its application in palaeontology is only emerging. My Master's project has recently led me to use RTI on a recently expanded entomofauna from the Cenomanian of Labrador. In August 2018, I led a joint expedition by the Redpath Museum and the Musée de paléontologie et de l'évolution (MPE) to Schefferville, where the abandoned Redmond #1 iron ore mine contains the remnants of a small lakebed whose shales contain leaf and insect impression fossils. The efforts of the Redpath Museum and the MPE have expanded the abundance of this fauna tenfold in four weeks of fieldwork. Since many of these potentially new species consist solely of isolated wings, the examination of venation characters is crucial to their description. Considering the promising properties of RTI for observing diagnostic wing venation characters, the best-preserved Redmond insects were brought to the Muséum national d'histoire naturelle, Paris, to be studied under the supervision of one of the palaeontological pioneers for this method. For such small specimens, the ideal RTI setup consists in a dome with a row of lights on its inner surface, and a round hole at its apex for inserting a camera lens. For each photograph of the same specimen, a different light combination was turned on, and all photographs united in a single file in which the lighting can be oriented in any direction. The initial round of imaging has currently contributed to the descriptions of the first mantodean and hemipteran known from this unique Canadian Cretaceous locality.
