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REPORT FOR IAS STUDENT GRANT

The Triassic-Jurassic boundary coincides with one of the five largest mass extinction events of the Phanerozoic, and of these five, the Triassic-Jurassic extinction is the most poorly understood. A complete section located at Ferguson Hill (also known as New York Canyon or Muller Canyon) is an ideal locality to perform fine-scale geochemical studies.

Originally, funding was requested for conducting fine-scale studies of the distribution and composition of carbonate rocks and faunas in order to determine whether ocean acidification was a viable kill mechanism for the end-Triassic mass extinction. However, after visiting the locality and conducting some initial examinations, it was clear that an isotopic analysis would be much more interesting and profitable than a faunal analysis. Despite the well-documented biostratigraphy, the carbon isotope chemostratigraphy published by different research groups is not consistent. This study aims to determine the source of the discrepancy in the organic carbon isotope curves previously published and determine whether there is actually a significant carbon isotopic excursion at the Triassic Jurassic boundary.

The stratigraphic intervals and stage boundaries in this study follow those defined by Jean Guex and his research group however, the sample processing follows the methods outlined by Peter Ward and his research group (Ward et al. 2007). Sample localities were excavated to a depth of approximately 0.5 meters, in order to collect fresh samples that had not been weathered. These samples were then trimmed in order to remove the weathered edges, crushed, and ground to a fine powder and separated for total carbonate and organic $\delta^{13}C$ analysis. Trimmed portions of samples were also processed in order to determine whether different areas of the samples would yield different isotopic results.

The $\delta^{13}C_{organic}$ isotope curve obtained could not reproduce any of the excursions previously reported for this section. Furthermore, the isotope profile rarely deviates from an average value of -28‰ and the isotopic values of beds sampled are often inconsistent with published values. The $\delta^{13}C_{carbonate}$ isotope curve, on the other hand, shows a protracted -2.5‰ excursion beginning roughly two meters above the Triassic-Jurassic boundary, a second, shorter -1.5‰ excursion also occurs roughly thirty-two meters above the Triassic-Jurassic boundary.

Additionally, three horizons were sampled ten times along strike in order to resolve whether the carbon isotopes of this section are laterally continuous. If this is the case, the collection or analysis methods employed by different groups may be the cause of the variation in published results. However, if results are not laterally congruent, the validity of this section as a GSSP candidate should be challenged. Initial results suggest that very different isotopic values can be obtained from samples collected at the same horizon. Samples collected at the same stratigraphic interval but 10 meters apart had a 1‰ spread in values, and different parts of the same sample (weathered versus unweathered portions), which showed a 2‰

spread in the data. These results suggest significant issues for the validity and significance of the reported -2‰ isotopic excursion discussed in the literature.

BUDGET

New York Canyon was accessed by department vehicles, rented at a rate of €0.4/mi (792 mi round trip). Unfortunately, due to bad weather, camping was not possible and so four nights were spent in a hotel (€28.72/night). Field equipment was also purchased; large and medium sized sample bags (€63.10), an archaeological pick and marker flags (€52.35 with taxes and shipping). Twenty-six thin sections were made at €17.26 per section (€482.28).

Budget Summary	***Total***
Travel to Locality	€316.80
Hotel	€114.88
Field Equipment	€115.45
Thin Sections	€448.76
TOTAL	€1013.06