CASP Research Award for Geological Fieldwork- 2018 Award Winner

Applicant: Anthony Shillito
Project title: Shifts in ichnological character during the Late Palaeozoic evolution of the Maritimes Basin, Atlantic Canada; Cambridge University
Award: £3,113

Scientific Question and Rationale:
Certain basin-wide sedimentary successions, such as those of the Maritimes Basin of eastern Canada, have global palaeontological significance for understanding the record of the colonization of the land by flora and fauna. These successions are often read as a literal historical record of palaeontological changes through stratigraphic time. In this project I am interested in asking "How might regional basin evolution have skewed, biased or influenced the known record of the colonization of land?" This project will provide a unique insight into how terrestrial communities developed in relation to a filling basin during the first 100 Ma of the animal colonisation of land, from changes in the invertebrate trace fossil record. As bioturbation affects the porosity and permeability of sedimentary strata, a better understanding of the relative influence of global evolution and basin controls will provide insights beneficial to studies seeking to characterize Palaeozoic reservoir rocks.

Specific Objectives and Deliverables: This study will ichnologically and sedimentological characterize three environmentally-similar units from different stages of the Maritimes Basin's history; the Devonian Gaspé Sandstones, Mississippian Horton Group, and Pennsylvanian Cumberland Group. I will perform a systematic survey of the ichnotaxa for each case study, recording trace fossil and bioturbation type, dimensions and pervasiveness in the successions. This will be supported by sedimentary logging for ascertaining local depositional controls. This will provide a record of the changes in biological signatures over the course of the evolution of the Maritimes Basin. This can then be compared and contrasted to the global changes in biological signatures in similar environments over the same time frame, to assess the influence of changing basin dynamics.

Proposed Work Plan:
I will operate the three work packages (Gaspé, Horton and Cumberland) over the course of three weeks, with seven days for each. These field areas have been selected as they provide stratigraphic insights into different stages in the evolution of the basin, and are renowned for quality exposure. The Gaspé Sandstones contain a diverse early terrestrial plant assemblage and fossil fish Lagerstätte. It was deposited during primary infilling of the basin, following initial rifting. My work here will focus on the Gaspé Bay area in Quebec, as the extensive cliff exposures are well suited to ichnological and sedimentological data collection. The Horton Group is known for its assemblage of tetrapod tracks from within Romer's Gap, but also recognised for its hydrocarbon potential. It was deposited late in the extensional stage of basin development. This second work package will be split between eastern and central Nova Scotia to maximise coverage of exposure. The Cumberland Group is renowned for its extensive exposure of coal bearing strata and spectacular flora of the Joggins UNESCO site, deposited following thermal subsidence in the middle Carboniferous. This section of work will focus on the extensive cliff exposures in the Joggins region.

Proposed Expenditure including details of any other sources of funding: Petrol: ~45 gallons = £141
Accommodation: 21 nights camping/motels @ £10-40 per night = £525
Flights: return from London to Moncton for myself + field assistant (Kayak) = £1,482
Car hire: standard sized car (Hertz)= £650 Subsistence: ~£5 per meal = £315 **Total: £3,113**
Other Funding: I have no other source of funding for this proposed project. The total requested herein will provide enough to cover all essential expenses for the work.