

Additional details of removal of fossils and partial destructive analyses by Dr. Robert Muir, University of the Free State

Motivation:

As stipulated in the application and full research proposal attached, the research requires fossil sampling and partial destruction in order to achieve the aims. This has been given careful consideration in order to best enhance rather than destroy the palaeo-heritage of the Eastern Cape and South Africa. The analyses that will be done will target exclusively the most common mollusc taxa at the two sites, which are in large abundances. In this way, there will be no significant loss of important palaeo-heritage. Furthermore, the project will enhance our understanding of these common fossils, by: (a) Contextualising their deposition within the Kirkwood and Sundays River Formations; and (b) Reconstructing the sea-water conditions in the Uitenhage Group in the Late Jurassic and Early Cretaceous using stable isotope analysis. This represents a new advance in our understanding of this ancient environment, preserved in the South African rock record. Details about the activities are given below:

Removal from original site:
The fossils that are selected for sampling are common, and their sedimentological context will be assessed in order to determine if they are *in-situ* or *ex-situ*. Only *in-situ* specimens will be collected, as their stratigraphic position is preserved. The up to 30 mollusc fossils will be described, labeled and collected and carefully transported to the laboratory at the University of the Free State (UFS) for preparation. At the UFS, they will be cleaned and documented, prior to analysis. It is required that the samples are removed for subsequent analysis to take place.

Analysis:

The samples will be cut in half using a fine rock saw, in order to expose their mid-sections. Subsequently, they will be polished to enhance the visibility of any layering, growth rings, or structural obscurity in the shell cross-section that requires consideration. Once polished sections are inspected and documented, several small pits will be drilled into the shell in different growth layers and in different lateral positions within each layer. The powder extracted from the drill holes will be dissolved and analysed for stable isotopes of carbon and oxygen at the University of Cape Town's Stable Light Isotope Laboratory based in the Archeology department under the supervision of Dr Julie Luyt, and collaborators at UCT, either Prof Chris Harris and Dr. Rosalie Tostevin. Carbon and Oxygen isotopic analysis will be run on the Delta Plus XP (2004) mass spectrometer. Once samples are analysed, all materials will be stored at the UFS archival space, room 116