Visualizing biomarkers using antibodies

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Sedimentary hydrocarbons have been widely identified and studied via chromatographic techniques, such as GC-MS. These types of bulk analysis, however, do not typically capture the fine-scale spatial distribution of biomarkers within their sedimentary fabric. Here, we show that monoclonal antibodies used in life science applications can similarly be employed for the *in situ* visualization of biomarkers, providing an imaging tool at the macro and micro scale for a variety of samples, from organic-containing rocks to microfossils. As a proof of concept, monoclonal antibodies developed to target squalene were shown to also bind other acyclic isoprenoids and were used to visualize these compounds in rock extracts, organic laminae and fish fossils from the Eocene Green River Formation. Different detection methods were evaluated to improve the signal-to-noise ratio and the sensitivity of the visualized biomarkers, along with the development of techniques to identify specific biomarker-antibody pairs in complex geologic matrices. Imaging the spatial heterogeneity of sedimentary organic matter at depositional-relevant scales by the development of new antibody lines could help address questions related to biomarker syngeneity and identification of biological clades represented by controversial fossil remains.