

Molecular Biosignatures from the NAI Archean Biosphere Drilling Project

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The NAI-sponsored Archean Biosphere Drilling Project (ABDP) has as a primary goal the expansion of knowledge of the molecular record of early life on Earth, a time from which few morphological fossils survive to inform us about ancient biodiversity and ecology. To this end, in 2004 the ABDP recovered over a kilometer of diamond drill core from the Hamersley Basin in Western Australia, intersecting Archean strata of low metamorphic grade with the highest potential for preserving molecular fossils over geologic time. Particular care was taken to minimize potential sources of organic contamination during drilling, sampling and analysis. Despite measures to exclude exogenous contamination, establishing the source of organic material in such ancient and altered rocks requires a combination of molecular, isotopic and geologic methods. Analyses of the ABDP cores have yielded lipid biomarkers indicative of the presence of a suite of microbial organisms in the Archean oceans, and point to the Precambrian sedimentary rock record as a key repository of information about the first three billion years of life on Earth.