

Paleoproterozoic, black shales of the Franceville Series, Republic of Gabon

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A vast amount of reduced carbon exists in the 2.1 Ga old black shale of the FB Formation of the Franceville Series, Gabon. Ranging in thickness from 600 to 1000 m and covering about 35,000 km<sup>2</sup>, this formation consists of 80% marine shale with 0.5 to 15% total organic carbon. The weakly metamorphosed condition of these rocks has contributed to preservation of several kinds of microfossils, among them some resembling sulfate-reducing bacteria. Passing through the oil window ca.2.0 Ga ago, the FB Formation yielded over  $12 \times 10^9$  m<sup>3</sup> (ca.  $84 \times 10^9$  bbls) of liquid hydrocarbon, some of which is preserved as solid bitumen within structural traps and some as fossils seeps within black shale. During secondary migration, liquid bitumen interacted with U<sup>+6</sup> in aqueous solution to generate the uranium ores at Oklo. Compared to the metalliferous black shale standard SDO-1 met, the FB Formation is marginally enriched in only Au, Ag, Ba and Cr. The chondrite normalized rare earth pattern of the Franceville Series black shales resembles that of greywacke-shale turbidites of Archean greentone belts.