Kentucky Section
of the
American Institute of Professional Geologists

DARWIN LECTURE SERIES

presents

Dr. Andrew H. Knoll

More information on Dr. Knoll

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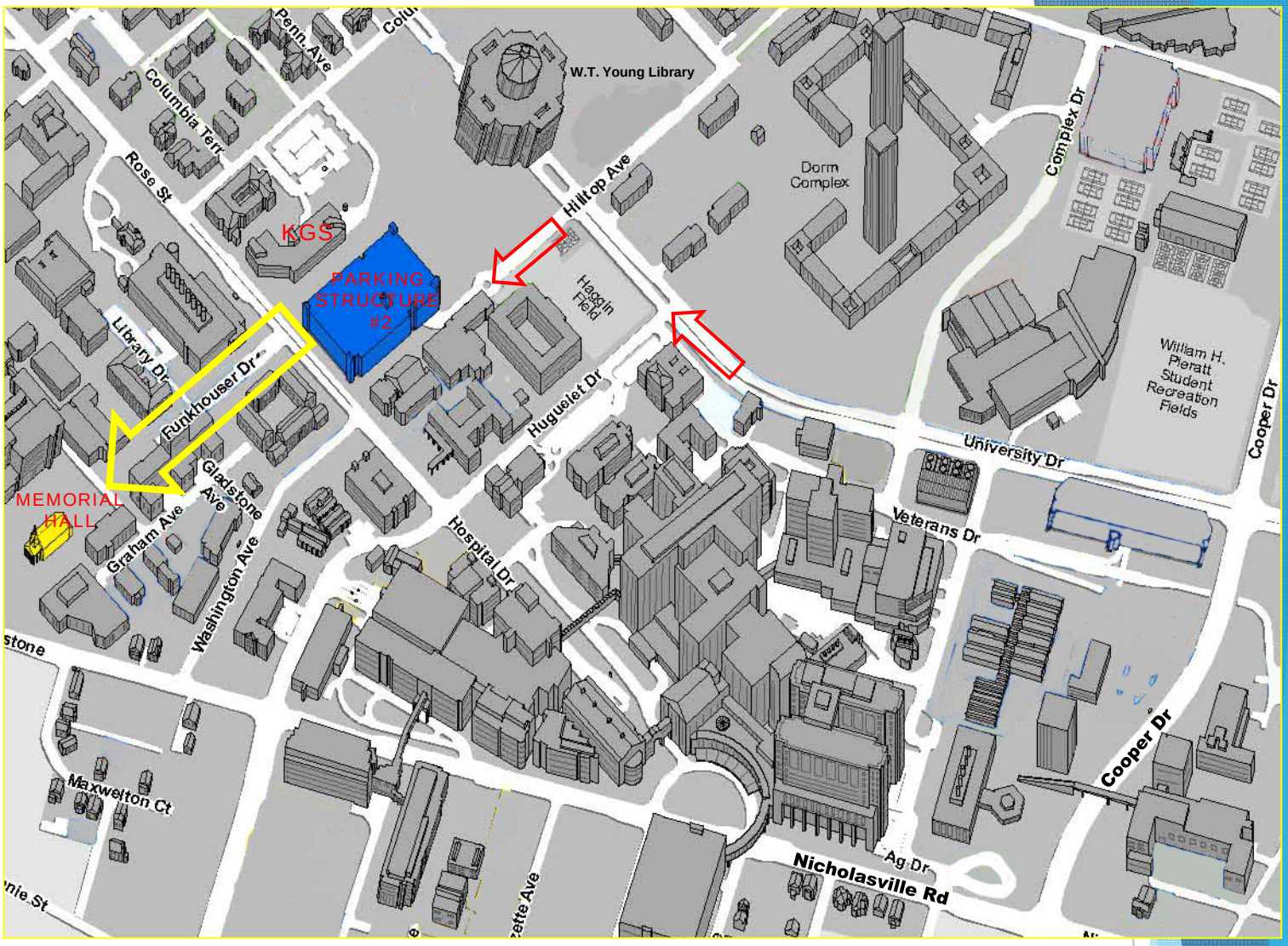
"The Deep History of Life"

What kinds of life characterized Earth during the Precambrian?

FREE ADMISSION

University of Kentucky
Memorial Hall 7 PM
April 1, 2014

Free parking in structure #2 off of Hilltop Avenue
By the W.T. Young Library
(See map on next page)



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See lecture abstract on next page.

The Deep History of Life

What kinds of life characterized Earth during the Precambrian?

The interplay between life and environment plays out on many scales, but none more dramatic than the largest ─ planetary in extent and billions of years long. Fossils of shells, bones, tracks, and trails record a history of animal evolution more than 600 million years in duration. Earth, however, is some 4 ½ billion years old, prompting the question of what kinds of life characterized our planet's youth and middle age. Genealogical relationships among living organisms, inferred from molecular sequence comparisons, suggest that the deep history of life is microbial, and over the past three decades paleontologists have discovered a rich record of bacteria, archaea, and microscopic eukaryotes in rocks that long predate the earliest records of animals. Moreover, emerging geochemical research on the same rocks establishes a long-term record of environmental change that provides a critical framework for evaluating evolutionary history.

Broadly, our planetary history has three major chapters. The familiar record of diverse animals in oxygen-rich habitats can be found in the most recent part. In contrast, the long opening chapter, the first 2 billion years of Earth history, records an alien and forbidding world in which communities of microorganisms neither generated nor consumed oxygen. Between these extremes lies Earth's middle age, an interval more than a billion years long during which largely microbial communities lived in oceans with modest amounts of oxygen in surface waters but hydrogen sulfide at depth.

The constraints placed by environmental evolution on life are well known: Animals that require abundant oxygen to meet their physiological needs radiated only with the establishment of an oxygen-rich atmosphere and oceans. Increasingly, however, it appears that the reverse is also true: Life has played a key role in sustaining Earth's three great long-lived environmental states. Earth itself, however, enabled the critical transition from environmental middle age to the modern world.

Dr. Andrew H. Knoll