

THE 14TH ANNUAL HAROLD I. SCHIFF LECTURE

FACULTY OF SCIENCE AND ENGINEERING

Presented by:

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*Mars: Atmospheric Chemistry,
Climate and the Search for Life*

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2:30 p.m.

Senate Chamber, N940, Ross Building
York University

Abstract. The most fascinating aspect of the photochemistry of Mars is the discovery in the 1970's that there is self-regulation of the oxidation state of the atmosphere by photochemistry and escape of hydrogen and oxygen from the planet. On Mars the global chemical environment was shown to be sensitively controlled by trace constituents that can act as catalysts for important chemical cycles. Similar catalytic chemistry is now known to be important in other planetary atmospheres, including that of Earth. Ancient fluvial channels, strongly suggesting a warmer climate that could sustain flow of water, at least episodically, cover the surface of Mars. That is very different from the current cold and arid climate. We will discuss the plausible causes of such drastic

environmental change. To sustain a warm climate with fluid flow on the surface, a greenhouse effect of 30 K is needed; a much thicker atmosphere would be required. Where shall we look for extra-terrestrial life? The likelihood of a warm life-sustaining ancient Mars, along with the origin of life, appears to be strong. It is known that life, once developed, is extremely persistent. Therefore, it is possible that there is extant life on Mars today, offering a natural explanation for the recent discovery of methane in its atmosphere. We will briefly address how the joint US-Canadian 2007 Phoenix mission to Mars can help to answer some of the fundamental questions of the Martian environment and its habitability.

Organized by the York University Centre for Atmospheric Chemistry. Email: cac@yorku.ca