NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

BIOLOGY COLLOQUIUM

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Hosted by Professor Rudolf Meier

THE ECOLOGY OF DESERT MICROBES from Earth to Mars

By **Stephen Pointing**

Professor, Yale-NUS College, National University of Singapore

Deserts comprise the largest terrestrial biome on Earth. In extreme deserts, environmental stress limits animal and plant life such that microbial communities assume the dominant ecological role. These unusual microbial communities are made up of diverse surface-associated soil and rock biofilms. Here I will describe my research to understand these systems from research in deserts on every continent. The keystone microbial taxa have emerged as photoautotrophic cyanobacteria and these scaffold diverse biofilms that include other bacteria, eukaryotic microorganisms and bryophytes. Functional studies have revealed community assembly is primarily related to stress avoidance rather than resource utilisation, and is intimately associated with properties of the abiotic substrate. Global patterns in diversity suggest local and regional dispersal are decoupled with long-range transport limited to stochastic desert dust events, and consequently a high degree of microbial endemism occurs in deserts worldwide. Desert microbiology also has significant applied value in predicting and ameliorating drought response, dust storms and productivity patterns in drylands in response to climate change. I will present data from ongoing research in these areas as well as an exciting collaboration with the US space agency NASA, where desert microbes are being used to evaluate technology to be deployed on Mars surface in the search for traces of extraterrestrial life.

Brief Bio

Professor Stephen (Steve) Pointing is Professor of Environmental Studies and Director of the Science Division at Yale-NUS College in Singapore. Steve earned his BSc and MSc degrees in microbiology from the UK. He won the prestigious Sainsbury Scholarship for postgraduate environmental research at the Bermuda Ocean Institute, and was awarded a PhD in marine microbiology in 1995. Steve gained his MBA in Education Management from Leicester University in 2010. Prior to joining Yale-NUS he held academic positions in the UK, Hong Kong, Japan and New Zealand. Professor Pointing's research addresses fundamental questions in biogeography: the science of understanding spatial and temporal distributions for life. Current research is focused on resolving drivers of microbial diversity in desert environments, assessing intercontinental dispersal of microbes, and applied research to evaluate technology designed to search for traces of life on Mars.

Artwork by Ann Nee, DBS, NUS