



UPPSALA
UNIVERSITET

2015 CELSIUS-LINNÉ SYMPOSIUM
Friday February 27th 2015 in Siegbahnsalen

*Importance of
Basic Research to Society
– some examples*

A BI-DISCIPLINARY SEMINAR

- 9:30 INTRODUCTION
- 9:35 JENNIFER DOUDNA
Re-writing Genomes: From Discoveries to Applications
- 10:25 DAN MCKENZIE
Outside and inside BP
- 11:15 ULF LANDEGREN
Molecular tools – from academia to industry
- 11:50 LUNCH BREAK
- 12:50 ÓLAFUR GUDMUNDSSON
How exploitable is geothermal energy?
- 13:25 DIARMAID HUGHES
*Antibiotic Resistance: From Evolution to Environmental
Action Plan*
- 14:00 DAVID GEE
*The Enigmatic High Arctic: Origin, Evolution, Resources
and Environment*
- 14:35 CONCLUDING DISCUSSION
- 15:00 Finish with coffee and cake



JENNIFER A. DOUDNA, UNIVERSITY OF CALIFORNIA, BERKELEY, CA USA

Re-writing Genomes: From Discoveries to Applications

Bacteria have evolved elegant systems for protecting their genomes from invasive elements using enzyme systems that detect and destroy foreign nucleic acids. We research CRISPR systems and related pathways in which enzymes recognize and manipulate nucleic acids in a sequence-guided fashion. Many of these enzymes have potential utility for various applications in research and the clinic, and have been harnessed based on a fundamental understanding of their biochemical and biological functions. The CRISPR-Cas9 system has emerged as a revolutionary technology, underscoring the role of basic research as an engine of innovation and tool development.

DAVID GEE, DEPT. OF EARTH SCIENCES, UPPSALA UNIVERSITY

The Enigmatic High Arctic: Origin, Evolution, Resources and Environment

The high Arctic, with its deep basins and shallow ridges is the least known ocean on Earth, its secrets well preserved beneath the constantly moving cover of sea-ice. Geologists and geophysicists world-wide are engaged in research to better understand the origin and evolution of the high Arctic. Likewise there is a great interest for resources, particularly oil and gas, but their exploration and exploitation may never be economic. Climate is constantly changing and the warming since the Little Ice Age is making research and tourism easier. Everyone should visit this fascinating world!

ÓLAFUR GUDMUNDSSON, DEPT OF EARTH SCIENCES, UPPSALA UNIVERSITY

How exploitable is geothermal energy?

Enormous amounts of heat are stored in Earth's upper crust, within reach of current drilling technology, potentially constituting a significant, temporally even, low environmental-cost energy source. Our challenge to understand the potential of geothermal energy is to better understand geological processes in the crust. This potential depends on a number of poorly known geological factors, including: variation of permeability at depth, detailed variations of heat flow and occurrence of "hot plutons" and risk of induced seismicity associated with hydro fracturing at depth; factors controlled by processes that require basic research to advance our understanding.

DIARMAID HUGHES, DEPT. OF MEDICAL BIOCHEMISTRY AND MICROBIOLOGY, UPPSALA UNIVERSITY

Antibiotic Resistance: From Evolution to Environmental Action Plan

Research into antibiotic resistance shows that, in general, bacteria becoming resistant grow very poorly and risk going extinct. And yet we have a major resistance problem! We discovered that very low levels of antibiotics, such as pollute many environments, select for highly fit antibiotic-resistant bacteria, with other pollutants contributing. Accordingly, a serious medical problem may be driven by environmental pollution. Thus, basic academic research into bacterial genetics is motivating the need to act on monitoring and cleaning the wider environment to reduce the selection and evolution of resistant bacteria.

ULF LANDEGREN , DEPT. OF IMMUNOLOGY, GENETICS AND PATHOLOGY, UPPSALA UNIVERSITY

Molecular tools – from academia to industry

Molecular analyses are fundamental to biological research, and their importance in clinical medicine is rapidly expanding. By applying a few general principles for molecular recognition, our research group has over the years constructed a molecular toolbox for analyzing DNA, RNA and protein molecules.

Universities are ideal places to conceive and explore new technologies for biomedical analysis, but in order to make these more widely available the first phase of academic research needs to be followed by industrial and later clinical application, and there are many hurdles to overcome along this path.

DAN MCKENZIE, CAMBRIDGE UNIVERSITY, U.K.

Outside and inside BP

In 1997 Andrew Mackenzie from BP (no relation) and I set up the BP Institute in Cambridge. I then served on the Technology Advisory Council of BP, which reported to the main board, for eight years. We met in different parts of the world and saw the entire enterprise from the inside. In my last year, when we were particularly concerned with CO₂ sequestration, we met eight times. By chance we visited several places where serious accidents occurred shortly after our visits.

