

# CELSIUS – LINNÆUS SYMPOSIUM

## *Environment, Climate Change and Human Health*

Polhemsalen, Ångström Laboratory,  
Thursday February 7, 13.30 – 17.00

ASSOCIATE PROFESSOR OSKAR KARLSSON

*Department of Environmental Science and Analytical Chemistry, ACES, Stockholm University*

### ***Molecular Toxicology: understanding the effects of environmental contaminants***

Increasing societal dependence on manmade chemicals and lack of knowledge about their potential adverse effects is a major threat to wildlife and human health. Evidence show that exposure to air pollution or the over 100,000 chemicals that contaminate our environment are main risk factors for many chronic diseases. Understanding what environmental contaminants we are exposed to, their properties and the interactions with biological systems are therefore essential.

PROFESSOR ANNA RUTGERSSON

*Department of Earth Sciences, Program for Air, Water and Landscape Sciences,  
Meteorology and UUSI, Uppsala University*

### ***Impact of CO<sub>2</sub> in the atmosphere on our climate***

It is now well established that increased concentrations of carbon dioxide in the atmosphere has an impact on the global climate. This is true for mean parameters as global temperature and precipitation. A larger risk for the society is the potential risk of changes in extreme conditions and also the possibility of the existence of tipping points. There is also a response of the increase of atmospheric carbon dioxide concentrations from terrestrial, aquatic and marine biogeochemical systems.

SENIOR PROFESSOR OLLE MATSSON

*Department of Chemistry - BMC, Organic Chemistry, Uppsala University*

### ***Everything is Poisonous***

The focus of this talk will be on deadly substances and their role in history. The talk will give some examples of the encounter of mankind with poisons through history - as a danger in food, its use in hunting and fishing, as a healing drug, as a weapon in fiction as well as in reality, and as a tool in African ordeals to find the guilty of crime or in chemical warfare.

PROFESSOR JOACIM ROCKLÖV

*Section of Sustainable Health, Department of Public Health and Clinical Medicine, Umeå University*

### ***Effects of climate change on human health***

The talk will outline and discuss direct and indirect interlinkages between extreme weather, climate change and human health. It will further discuss the situation in Sweden by local studies, make international outlooks and contrast the Swedish situation to the situation in, for example, south Europe and low- and middle-income countries. In the talk I will further discuss adaptation, and specifically the development of early warning systems. While the talk will have an overall nature initially, I will go deeper into effects on heat-related mortality, vibriosis and arboviruses, such as dengue, Zika and chikungunya.

*The day ends with a panel discussion with the Celsius-Linnaeus and symposium lecturers.*

# CELSIUS – LINNÆUS LECTURES

The Celsius and Linné Honorary Lectures are arranged annually by the Faculty of Science and Technology in memory of Anders Celsius and Carl von Linné (Linnaeus), world-renowned professors of Uppsala University.

Anders Celsius was appointed professor of Astronomy at Uppsala University in 1730 at the age of 28. He established the first professional astronomical observatory in Uppsala around 1740. His scientific activities included work on celestial mechanics, studies on comets and satellites, pioneering contributions to stellar photometry, to geodesy and to geophysics. He discovered that auroræ caused magnetic disturbances and he invented the temperature scale that bears his name. Anders Celsius died in 1744.

Carl von Linné was appointed professor of Medicine at Uppsala University in 1741 at the age of 34. Linné had already in 1735 declared that the two most important tasks in natural history were "classification and naming" (divisio et denominatio). His Systema naturæ was published in 1735 at Leiden. Here we meet his permanent contribution to science, the naming practice, the binary nomenclature or binomial system. Linné founded the Royal Academy of Sciences, now responsible for the Nobel Prize awards, and of which he became the first president. He died in 1778.

Celsius

Linné



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# CELSIUS – LINNÆUS LECTURES 2019

## CELSIUS LECTURE

*A tale of X-ray vision, rocks, oil  
and carbon dioxide storage*

**Martin Blunt**

## LINNÆUS LECTURE

*1.5° Celsius: our climate, our  
environmental health, our future*

**Linda S. Birnbaum**

# CELSIUS – LINNÆUS LECTURES 2019

*Thursday February 7<sup>th</sup>  
Siegbahnsalen, Ångström Laboratory*

## 09.15 – CELSIUS LECTURE

*A tale of X-ray vision, rocks, oil and  
carbon dioxide storage*

**Martin Blunt**

Shell Professor of Reservoir Engineering at the Department of Earth Science and  
Engineering, Imperial College, London

## 10.45 – LINNÆUS LECTURE

*1.5° Celsius: our climate,  
our environmental health, our future*

**Linda S. Birnbaum**

Ph.D, D.A.B.T., A.T.S, Director, National Institute of Environmental Health Sciences and  
National Toxicology Program, North Carolina, USA

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## CELSIUS-LINNÆUS SYMPOSIUM

*February 7<sup>th</sup> 13.30-17.00. Polhemsalen, Ångström Laboratory*

*Environment, Climate Change and Human Health*

## CELSIUS LECTURE

*A tale of X-ray vision, rocks, oil  
and carbon dioxide storage*

**Martin Blunt**

Shell Professor of Reservoir Engineering at the Department of Earth Science and  
Engineering, Imperial College, London



The use of X-ray micro-tomography enables rock structure and fluid flow to be imaged in three dimensions at micron resolution and over timescales of a few seconds to hours. This has transformed our understanding of how multiple fluid phases flow through the microscopic pore spaces of porous rock deep underground. This understanding is necessary to design and manage many processes in the subsurface, including improved oil and gas recovery, unconventional hydrocarbon production, groundwater extraction and pollutant removal, and carbon dioxide storage to mitigate climate change. Indeed, the science of flow in porous media underpins many of this century's most important challenges associated with access to clean water and energy, while dealing with the threat of climate change. I will outline how with a combination of careful experiments on rock samples, imaging, analysis and modelling, the processes controlling flow and fluid retention in porous materials can be quantified. The trapping of fluids by capillary action can be facilitated to design the safe and effective storage of carbon dioxide in aquifers and depleted hydrocarbon fields, while the characterization and manipulation of wettability is crucial for the efficient recovery of oil and pollutants. The dynamics of pore-scale displacement will also be described to uncover new macroscopic equations that describe flow from the cm to km scales.

*Martin Blunt joined Imperial College London in June 1999 as a Professor of Petroleum Engineering. He served as Head of the Department of Earth Science and Engineering from 2006-2011. Previous to this he was Associate Professor of Petroleum Engineering at Stanford University in California. Before joining Stanford in 1992, he was a research reservoir engineer with BP in Sunbury-on-Thames. He holds MA and PhD (1988) degrees in theoretical physics from Cambridge University. Professor Blunt's research interests are in multiphase flow in porous media with applications to geological carbon storage, oil and gas recovery, and contaminant transport and clean-up in polluted aquifers. He performs experimental, theoretical and numerical research into many aspects of flow and transport in porous systems, including pore-scale modelling of displacement processes, and large-scale simulation using streamline-based methods. Professor Blunt's work has helped transform our understanding of how fluids move underground. This research plays a vital role in our energy transition through the better design and management of gas production and carbon dioxide storage.*

## LINNÆUS LECTURE

*1.5° Celsius: our climate,  
our environmental health, our future*

**Linda S. Birnbaum**

Ph.D, D.A.B.T., A.T.S, Director, National Institute of Environmental Health Sciences and  
National Toxicology Program, North Carolina, USA



Human health is directly impacted by the environments in which we live. As the world changes around us, the complex relationship between our inherent genetic susceptibilities and the environmental influences that lead to health and wellness or disease also change. Dr. Linda Birnbaum, Director of the U.S. National Institute of Environmental Health Sciences (NIEHS) and National Toxicology Program, has spent nearly 40 years researching, evaluating and educating the public on risks associated with hazardous environmental exposures. The air we breathe, the water we drink, and the places we live, work, and play all contribute to unnecessary burdens of disease and are opportunities to advance global environmental health and wellness. By engaging in collaborative approaches for basic mechanistic research, predictive toxicology, exposure sciences, epidemiology, and training, we can address the complex challenges of 21st century environmental health. In honor of the 2019 Celsius-Linnaeus Lectures hosted by Uppsala University, Dr. Birnbaum will address the question, **How might public health be impacted by an environmental change of 1.5°Celsius?**

*Linda S. Birnbaum, Ph.D., is director of the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health, and the National Toxicology Program (NTP). A board-certified toxicologist, Birnbaum has served as a federal scientist for nearly 39 years. Prior to her appointment as NIEHS and NTP Director in 2009, she spent 19 years at the U.S. Environmental Protection Agency (EPA), where she directed the largest division focusing on environmental health research. Birnbaum is an active member of the scientific community. She was vice president of the International Union of Toxicology, the umbrella organization for toxicology societies in more than 50 countries, and former president of the Society of Toxicology, the largest professional organization of toxicologists in the world. She is the author of more than 800 peer-reviewed publications, book chapters, and reports. Birnbaum's own research focuses on the pharmacokinetic behavior of environmental chemicals, mechanisms of action of toxicants including endocrine disruption, and linking of real-world exposures to health effects. She is also an adjunct professor in the Gillings School of Global Public Health, the Curriculum in Toxicology, and the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill, as well as in the Integrated Toxicology and Environmental Health Program at Duke University.*