

The Faculty of Mathematics and Natural Sciences

## CEES - Centre for Ecological and Evolutionary Synthesis

# Symposium: Determinants of Rates of Origination, Extinction and Evolution

Supported by Tømttestifelsen and the Research Council of Norway.

The aim of the symposium is to help the scientific community better understand the impact of environmental (climate) change on biodiversity, by integrating insights from geological time scales (macroevolution) with our current understanding of short-term, microevolution. Open to anyone interested. Please register.

Time and place: June 28, 2022 9:00 AM–June 29, 2022 5:00 PM, Det Norske Videnskapsakademi, Oslo, Norway

During the symposium, presentations will be shown in this livestream. If you follow the livestream and have a question for a speaker, please send your question to [ratessymposium@gmail.com](mailto:ratessymposium@gmail.com) and a moderator may present it to the speaker. After the symposium, recorded talks will be available here.

Registration (online form)

Please note that if you register for on-site participation after Friday 24 June at 10:00 AM, we may not be able to arrange lunch for you.

## Background

We are on the verge of the 6<sup>th</sup> major mass extinction, due to human-caused habitat loss and environmental change. These changes take place very rapidly, but evolutionary biologists have documented in a wide range of natural and laboratory populations that genetically diverse populations can rapidly adapt to changing conditions. Therefore, scientific investigations to predict the effects of climate change, as well as applied measures to mitigate these effects in disciplines like forestry, fisheries, and nature conservation, are often based on the idea that (semi)natural populations can adapt to a changing environment if they harbour sufficient genetic variation. But why, then, are we entering the 6th major mass extinction and not the 6th major mass adaptation? Are many conservation and mitigation measures unrealistic in their predictions and expectations?

An overarching question, addressed from different perspectives during this symposium, is whether short-term so-called microevolution and long-term or macroevolution are decoupled processes, or can be integrated into a predictive understanding of macroevolutionary phenomena and processes using our understanding (and models) of microevolutionary processes. This topic has for decades been of fundamental scientific interest, and has now become urgently important for our response to the ongoing climate and biodiversity crises.

Addressing these questions naturally involves different disciplines: geology and palaeontology, evolutionary biology and ecology, mathematical and statistical modelling. In recent years, individual disciplines have seen significant progress: improved statistics to analyse more complete fossil records and improved reconstructions of abiotic conditions, computational power and statistical techniques to construct and analyse molecular phylogenies of major groups of species, and availability of “-omics” techniques for non-model species. The proposed symposium aims to synthesize this progress.

## Speakers

Carl Simpson, Assistant professor at Colorado Museum of Natural History

Christophe Pelabon, Professor at NTNU

Daniele Silvestro, Assistant professor at the University of Fribourg

Erin Saupe, Associate professor at the University of Oxford

Frietson Gallis, Curator at Naturalis biodiversity Centre

Jan Nordbotten, Professor at the university of Bergen

Jonathan Rolland, Researcher at the university of Toulouse

Kjetil Voje, Associate professor at the Natural History Museum in Oslo

Lee Hsiang Liow, Professor at the Natural History Museum in Oslo

Naoki Irie, Associate professor at the university of Tokyo

Nils Christian Stenseth, Professor at the university of Oslo

Shan Huang, Researcher at Senckenberg Biodiversity and Climate research Centre

Søren Faurby, Associate Professor at Gothenburg University

Stacey Smith, Associate professor at Colorado University

Thomas Ezard, Professor at the university of Southampton

Wolfgang Kiessling, Professor at Geozentrum Nordbayern

## Contact

For questions about the symposium, please contact the organizers at [ratessymposium@gmail.com](mailto:ratessymposium@gmail.com)

## Programme

Day 1: Plenary talks, open to anyone interested

**9:00-9:15 Nils Chr. Stenseth, Professor at the University of Oslo**

Welcome and introduction

**9:15-9:45 Erin Saupe, Associate professor at the University of Oxford**

Elucidating community and species' responses to environmental change across spatial and temporal scales.

**9:45-10:15 Naoki Irie, Associate professor at Tokyo University**

Organismal intrinsic factors possibly limiting evolutionary diversification. (online)

### Coffee break

**10:45-11:15 Shan Huang, Postdoc at Senckenberg Biodiversity and Climate Research Center**

Biotic-abiotic interactions shaping broad-scale biodiversity dynamics in space and time

**11:15-11:45 Jan M. Nordbotten, Professor at the University of Bergen**

Multiscale modelling of ecological processes to link micro- and macroevolution

**11:45-12:15 Jonathan Rolland, Researcher at the university of Toulouse**

Using fossils and present-day data to study how climatic preferences of vertebrates evolved over long time scales, and how this relates to current biodiversity patterns

## **Lunch break**

### **13:45-14:15 Lee Hsiang Liow, Prof. at the Natural History Museum, Oslo**

Intra and interspecific life history traits over varying time scales — is anything predictable?

### **14:15-14:45 Kjetil Voje, Associate Professor at the Natural History Museum, Oslo**

Investigating the dynamics of the adaptive landscape on mesoevolutionary timescales using evolutionary time-series

### **14:45-15:15 Stacey Smith, Associate professor at Colorado University**

Why are some convergent traits rare and others common? Microevolutionary drivers and macroevolutionary patterns in flower color evolution

## **Tea break**

### **15:30-16:00 Christophe Pelabon, Professor at NTNU**

Genetic architecture and (macro)evolutionary potential

### **16:00-16:30 Søren Faurby, Associate professor at University of Gothenburg**

Anthropogenic biases in evolutionary patterns

### **16:30-17:00 Carl Simpson, Assistant professor at Colorado Museum of Natural History**

Levels of selection and the connection between micro- and macroevolution. (online)

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## **Morning Day 2: Plenary talks, open to anyone interested**

### **9:00-9:30 Thomas Ezard, Professor at the University of Southampton**

Identifying the regulating factors of biodiversity in deep time

### **9:30-10:00 Frietson Galis, curator at Naturalis biodiversity center, Leiden**

Breaking constraints of the number of cervical vertebrae in mammals: On slow loris and pottos.  
(online)

## **Coffee break**

**10:30-11:00 Daniele Silvestro Assistant professor at the University of Fribourg**

Modelling the effects of intraspecific variance on trait evolution

**11:00-11:30 Wolfgang Kiessling, Professor at Friedrich-Alexander-University of Erlangen-Nürnberg**

Vulnerability and adaptation to past climate changes across scales (online)

## **Lunch break**

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**Afternoon Day 2: Group and plenary discussions (invited participants only)**

### **13:00-13:30**

1. The role of major environmental changes in origination and extinction.
2. Integrating insights from past and present responses to environmental change.
3. Development, evolutionary novelty, and new niches.

### **13:30-14:00**

1. What determines the persistence of (new) species?
2. Biotic interactions: equivalents of ecological processes?
3. (Gradual) adaptation vs. species selection

## **14:00-14:30**

1. What governs rates of phenotypic evolution?
2. Is the rate of extinction dependent on taxon age?
3. Are rates of higher taxon origination and extinction predictable?

## **Tea break**

## **Plenary discussions**

### **15:00-15:30**

- Biotic response to small and large, fast and slow abiotic changes

### **15:30-16:00**

- Biotic versus abiotic factors

### **16:00-16:30**

- Modeling interacting processes: from taxon-specific descriptions to general predictions

### **16:30-17:00**

- Things we don't know yet but need to find out (Wrapping up)  
Chair: Nils Chr. Stenseth

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