

# The Faculty of Science Research Day 2010

## Various Aspects of Evolution

February 4, 2008, 9:30-18:00  
The Wallenberg Conference Centre  
Register no later than January 27. [REGISTRATION >>](#)

### PROGRAMME

**09:30-10:00** Coffee

**10:00-10:05** Introduction, David Turner

**10:05-10:30** **On the origin of homochirality,**  
**Mikael Håkansson, Department of Chemistry**

Homochirality is the signature of Life (at least as we know it). Yet the origin of biomolecular homochirality is still somewhat of an unsolved mystery, which has been used as an argument by creationists against the theory of evolution. Chemical reactions that can create optical activity constitute examples of Absolute Asymmetric Synthesis (AAS). Only a few genuine examples of are AAS known; we have developed a route that uses organometallic reagents in chiral crystals.

**10:30-11:00** **More species than you can imagine**  
**– on cryptic speciation in common oligochaete**  
**worms, Christer Erséus, Department of Zoology**

Assessment of DNA from common earthworms and some of their smaller aquatic relatives reveals that the true number of species (defined as separately evolving metapopulations) can be up to one order of magnitude higher than what is suggested by traditional classification of these animals. This has great impact on estimating and monitoring Swedish biodiversity, especially in a period of climatic and other environmental change.

**11:00-11:30** **Evolution in the universe,**  
**Maria Sundin, Department of Physics**

The universe is constantly changing on both slow and fast time scales. Objects like e.g. planetary systems, stars, the interstellar medium and galaxies are evolving. Among all these object we will choose a few and discuss the new results of exoplanets, life in the universe and interacting galaxies.

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**11:30-12:00 The newer systematics – gene trees, species trees, and species delimitations**  
**Anne-Cathrine Scheen, Department of Plant and Environmental Sciences**

DNA sequence information is often used to recover phylogenetic (evolutionary) relationships among species. However, different genes may resolve different relationships for several reasons. Therefore, the use of single genes to infer species relationships may be misleading. Information from several gene trees is needed to reconstruct the species tree. On the other hand, the gene tree/species tree discord may offer a solution to the “species problem”, i.e. how to delimit species.

**12:00-13:00 Lunch**

**13:00-13:30 Selection, hybridisation and the essence of evolution – a yeast perspective**  
**Jonas Warringer, Department of Cell and Molecular Biology**

Evolution is centered on two core concepts: selective competition between different trait variants resulting from the accumulation of random mutations and non-additive inheritance of these traits following hybridization of two parent genomes. Here, a research program studying both evolutionary selection and hybridization in one of the key model organisms, the baker's yeast *S. cerevisiae* will be presented. To study selection, the parallel evolution of isogenic yeast founder populations in a wide variety of evolutionary pressures, each extensively replicated, was followed over 250 generations. The change over time of the core fitness variables, growth rate, growth lag and growth efficiency was continuously and precisely quantified and evaluated. Different modes of selective adaptation, their relation to the selective pressure and population variation will be discussed. To study hybridization, yeast individuals from a huge variety of ecological niches were isolated, genome sequence as well as traits determined, and controlled hybridization of diverging genomes were performed. The non-additive inheritance of traits in the offspring was quantified in terms of strength and frequency and will be discussed with specific focus on heterosis, i.e. the offspring being better than both parents.

**13:30-14:00 Is sympatric speciation conceivable?**  
**Peter Jagers, Department of Mathematical Sciences**

I describe a toy population model with clonal reproduction and mutation, where species evolve towards higher fitness, and ultimately can branch into coexisting morphs. Realism is weak, but the model shows, at least, that such phenomena can be conceived.

**14:00-14:30 Genetic basis of adaptation and speciation**  
**Marina Panova, Department of Marine Ecology**

Year 2009 we celebrated the 150th anniversary of the most influential event in the history of biology: the publication of Darwin's “Origin of species”. Another milestone was the Modern Evolutionary Synthesis, which combined Darwin's theory of natural selection with physical entities: genes, and their evolution. Now, when we entered the post-genomic era, with many genomes and various molecular tools at hand, the next challenge is to identify molecular mechanisms of adaptations and to pinpoint genes, that cause reproductive isolation at the first place (“speciation genes”). In my talk, I will give a brief overview of what is currently known about changes at the gene level related to adaptation and speciation.

**14:30-15:00 Black holes as Nature's most efficient engines**  
**Marek Abramowicz, Department of Physics**

Accretion of matter into black holes is the most efficient way of a long-term energy production known in Nature. Quasars which are the most powerful steady energy sources, as well as Gamma Ray Bursts, which are most spectacular explosions observed, are due to accreting black holes. However, it is unlikely that we humans may ever use black holes to produce energy.

**15:00-15:45 Presentation of the Faculty of Science Research Award, the Faculty of Science Doctoral Thesis Award and coffee**

**15:45-16:15 Lecture by the awardee of the Faculty of Science Research Award**

**16:15-16:30 Introduction to beer-tasting**  
**Peter Norberg, Department of Cell and Molecular Biology**

**16:30 Beer-tasting**