



UPPSALA
UNIVERSITET

2014 CELSIUS-LINNAEUS SYMPOSIUM

Principles of evolution

A multi-disciplinary symposium

(following the Celsius-Linnaeus lectures Feb 13th www.teknat.uu.se/forskning/celsius-linne)

Friday February 14th 2014 in Ekmansalen, EBC

- 09:30 INTRODUCTION
- 09:35 MARLENE ZUK
Time, asteroids and complexity: what's unique about biological evolution
- 10.25 GEORGE EFSTATHIOU
The Fate of the Universe
- 11.15 SVERKER HOLMGREN
Genetic Algorithms: Using Models of Evolution to Solve Mathematical Problems
- 11:50 LUNCH BREAK
- 12:50 JENNY LARSSON
The Reconstruction of the Indo-European Language Family
- 13.25 GERRY GILMORE
The evolution of our Galaxy
- 14:00 PER AHLBERG
Looking in the mirror of evolution: fossils, development and the origin of the jawed vertebrate face
- 14.35 CONCLUDING DISCUSSION
- 15.00 Finish with coffee and cake



PER AHLBERG, DEPT. OF ORGANISMAL BIOLOGY, UPPSALA UNIVERSITY

***Looking in the mirror of evolution:
fossils, development and the origin of the jawed vertebrate face***

Facial anatomy and development differs fundamentally between extant jawless and jawed vertebrates. A series of fossils belonging to the jawed vertebrate stem group bridges the gap between these facial architectures and provides a surprisingly detailed account of the evolutionary and developmental transformation of the vertebrate face. I will present this fossil series, with particular focus on the 415 million year old placoderm Romundina which has been investigated using synchrotron microtomography, and discuss its impact on our understanding of the transformation process.

GEORGE EFSTATHIOU, KAVLI INSTITUTE FOR COSMOLOGY, UNIVERSITY OF CAMBRIDGE, U.K.

The Fate of the Universe

I will review evidence that our Universe is entering a second inflation-like accelerating phase. This poses interesting and not widely known problems. I will argue that our Universe cannot be entering a de Sitter phase of evolution. It seems more likely that the accelerating phase is temporary and a manifestation of a “metastable” vacuum state.

GERRY GILMORE, INSITUTE OF ASTRONOMY, UNIVERSITY OF CAMBRIDGE, U.K.

The evolution of our Galaxy

Our Milky Way galaxy is typical of those which generate most starlight in the Universe. It is thus an ideal test case to identify the physical processes which led from sound waves in the early Universe, through the first stars, the creation and dispersal of the chemical elements, the distribution and nature of the Dark Matter which dominates what we can weigh, the physical processes which (re-)distribute gas and stars, through to the beautiful Milky Way we see now, and its impending destruction. This understanding remains a work in progress, with dramatic advances anticipated over the next decade.

SVERKER HOLMGREN, DEPT. OF INFORMATION TECHNOLOGY, UPPSALA UNIVERSITY

Genetic Algorithms: Using Models of Evolution to Solve Mathematical Problems

Global optimisation problems, that is, optimisation problems where there might be several or even many local optima are often challenging tasks even with today’s computer power. Genetic algorithms that are based on models of evolution are often used for such problems, where little is known about the optimisation landscape. The basic ideas of genetic algorithms will be described, and some comparisons to other types algorithms for global optimisation will be presented.

JENNY LARSSON, DEPT. OF BALTIC STUDIES, FINNISH, AND GERMAN, STOCKHOLM UNIVERSITY

The Reconstruction of the Indo-European Language Family

The Indo-European languages have evolved from a common proto-language, and in my talk I will describe the comparative methods applied in linguistic reconstruction. The recent developments in the so-called phylogenetic linguistics will also be addressed.

MARLENE ZUK, DEPT. OF EVOLUTION AND BEHAVIOR, UNIVERSITY OF MINNESOTA, USA

Time, asteroids and complexity: what's unique about biological evolution

Evolution has become a very broad term in society, referring to almost any kind of change over time. Scientists in other fields also talk about evolutionary processes, with regard to planets and particles. But biologists have a much more specific meaning for the word, and the distinction is crucial. Although many objects, share a tendency to become less uniform over time, only biological entities increase in complexity and have a shared history reflected in their current relationships. All of this means that evolution is more than a handy analogy.

