

Honorary Doctors 2022

SEMINAR PROGRAMME, 2 JUNE 2022 | FACULTY OF SCIENCE | LUND UNIVERSITY



Programme

TIME AND PLACE

2 June, 10:00–13:00

Lundmarksalen lecture hall, Astronomihuset, Sölvegatan 27

10:00

Opening address by Sven Lidin, Dean of the Faculty of Science.

10:10

Professor Christer Brönmark, Department of Biology, will introduce Professor Kerstin Johannesson – the Honorary Doctorate of Philosophy. Kerstin Johannesson will then give a seminar entitled “Biological speciation on rocky shores”.

11:00

Professor Edvin Lundgren, Department of Physics, will introduce Professor Georg Kresse – the Honorary Doctorate of Philosophy. Georg Kresse will then give a seminar entitled “Quantum Mechanics Calculations quo Vadis?”.

11:50

Closing of seminar session by Sven Lidin.

12:00

Light refreshments and mingle outside Lundmarksalen lecture hall.

Meet the 2022 Honorary Doctors



KERSTIN JOHANNESSON

Seminar title: Biological speciation on rocky shores

Abstract

Biological speciation – the formation of new species by divergence of an ancestral species – is one of the big mysteries of biology. Earlier studies focused on the geographic setting and the presence of external barriers that isolated populations that accumulated differences that made them genetically incompatible. However, a small rocky shore snail, *Littorina saxatilis*, challenged this view by being in a stage of “ongoing” speciation even without physical barriers. On rocky shores there are different challenges: crabs among boulders but wave surf on rocky outcrops. For the snails, this translates to strong divergent selection and evolution of different “ecotypes” – snails need to be large, thick-shelled and scared of coming out of the shell to survive in the crab-rich environments, but small, thin-shelled and bold to live in wave-swept shores. Despite these differences the ecotypes do hybridize and produce fertile offspring in hybrid zones, but exchange of genetic material is hampered (“incipient speciation”). Interestingly, “crab-snails” and “wave-snails” have evolved in parallel in different geographic areas (e.g. UK, Spain and Sweden) and the mechanisms involved seem similar. Hence, this fascinating snail system provides us with a replicated experiment of biological speciation. DNA sequencing has brought speciation researchers new tools, and also new perspectives. Today we focus on finding the internal genetic barriers to gene flow rather than the external physical barriers. In the snail, we have developed strong genomic resources that allow detailed studies of the DNA differences and the barriers to gene flow in the genome. In this talk I will present intriguing recent findings and relate these to similar findings in other species, that seem to promote local adaptation and speciation more generally.



GEORG KRESSE

Seminar title: Quantum Mechanics Calculations quo Vadis?

Abstract

Max Plank, Niels Bohr, Paul Dirac, Erwin Schrödinger and Werner Heisenberg were the titans who laid the foundations for quantum mechanics at the beginning of the 20th century. Today, quantum mechanics are at the heart of our understanding of the world. Without quantum mechanics, we would not be able to understand how and why chemical bonds form, what makes materials stable, and how chemical and biological processes work and operate. In chemistry and materials sciences, the advent of supercomputers in the 1980s made simulations using quantum mechanics possible, and with the award of the Nobel Prize in Chemistry to Walter Kohn and John A. Pople, quantum mechanical calculations for chemical and materials science problems became mainstream. Today, we can make predictions for virtually any materials property, and many experiments on materials are inconceivable without the support of quantum mechanical simulations. The simulation code VASP (Vienna ab initio simulation package) has become one of the world’s leading tools in this field, and I will talk a little about how and why this came about, and how countless innovative studies in surface sciences, carried out jointly in Lund and Vienna around 2005, have fueled this process.

The talk will also summarize the difficulties and challenges we have solved as a community over the last 50 years and give a glimpse of how new methods and ideas, such as machine learning, will revolutionize our modeling of materials and their surfaces. It is quite conceivable that with these advances, simulating complex chemical reactions on surfaces or at interfaces will soon become a reality.



**FACULTY
OF SCIENCE**

LUND UNIVERSITY
Faculty of Science

Box 117
SE-221 00 Lund
Tel +46 (0)46 222 00 00