

**EUROPEAN NETWORKING SUMMER SCHOOL (ENSS):
PLANT GENOMICS & BIOINFORMATICS**

Standing Committee for Life, Earth and Environmental Sciences (LESC)



Introduction

The European Science Foundation (ESF) is an independent, non-governmental organisation, the members of which are 79 national funding agencies, research-performing agencies, academies and learned societies from 30 countries.

The strength of ESF lies in the influential membership and in its ability to bring together the different domains of European science in order to meet the challenges of the future.

Since its establishment in 1974, ESF, which has its headquarters in Strasbourg with offices in Brussels and Ostend, has assembled a host of organisations that span all disciplines of science, to create a common platform for cross-border cooperation in Europe.

ESF is dedicated to promote collaboration in scientific research, funding of research and science policy across Europe. Through its activities and instruments ESF has made major contributions to science in a global context. The ESF covers the following scientific domains:

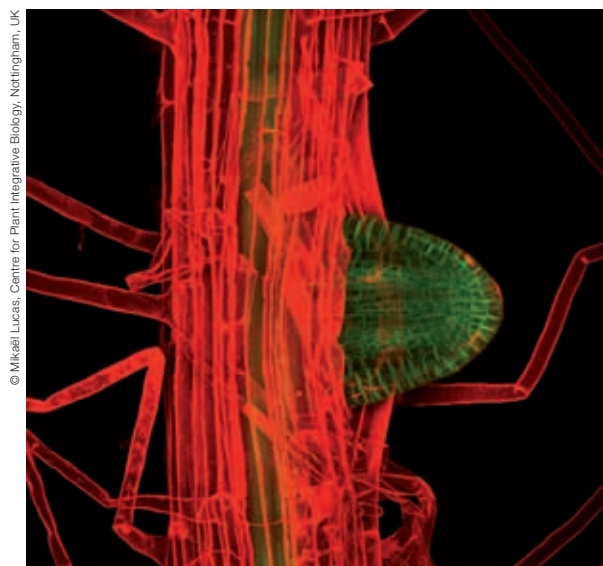
- Humanities
- Life, Earth and Environmental Sciences
- Medical Sciences
- Physical and Engineering Sciences
- Social Sciences
- Marine Sciences
- Nuclear Physics
- Polar Sciences
- Radio Astronomy Frequencies
- Space Sciences

Plant genome research has developed into one of the most dynamic disciplines of molecular life sciences. Plants are recognised as the basis of a bio-based economy and play a fundamental role in sustaining our environment. European countries concentrate their efforts in the field through national and regional research programmes. While some of these have already developed sustainable cooperations with joint research projects, many of these activities are currently limited to Western Europe.

In 2007 the European Science Foundation launched the Research Networking Programme *European Networking Summer School (ENSS): Plant Genomics & Bioinformatics* with the objective of supporting research networks all over Europe, by training young investigators and promoting the transfer of knowledge and technology. To facilitate this objective, annual European Networking Summer Schools will be organised for a geographical mixture of young, motivated researchers from Europe. These courses will focus on training, the exchange of ideas and the creation of an active network between European scientists, research organisations and research programmes.

Each Summer School will address a different subject of topical interest and importance. The Summer Schools will combine theoretical and practical elements delivered by experts in the fields of research.

The running period of the ESF Research Networking Programme *European Networking Summer School: Plant Genomics & Bioinformatics (ENSS)* is for five years, from September 2007 to September 2012.



Confocal microscope image of an emerging lateral root in *Arabidopsis*.

Previous and Forthcoming Summer Schools

ENSS 2009 – Plant Bioinformatics, Systems and Synthetic Biology

27-31 July 2009

Venue: University of Nottingham, United Kingdom
Organisers: Natalio Krasnogor, Jaume Bacardit, Malcolm Bennett

The summer school intends to introduce PhD students to cutting-edge research in bioinformatics, systems and synthetic biology, applied to plant biology. The school is explicitly interdisciplinary. Computational biology, bioinformatics and systems biology lie at the interface of a number of disciplines, yet traditional discipline-led teaching rarely provides opportunities to explore this interface. This summer school aims to address that issue, and plant science provides the ideal biological arena in which to do this. More at: <http://lobelia.cs.nott.ac.uk/plantsummerschool/>

ENSS 2010 – Plant Epigenetics

September 2010

Venue: Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) in Gatersleben, Germany
Organiser: Michael Florian Mette

The term “epigenetics” refers to cases of alternate gene expression states that are heritable, but are not based on changes in DNA sequences. Prime examples of epigenetic processes such as paramutation, control of transposon activity, genomic imprinting or silencing of transgenes have a long-term record in plant genetic research and were in many cases originally described using plant species as experimental systems. Current genetic and molecular analyses indicate that epigenetic changes of the expression potential of genes can be based on modification at the chromatin level. In plants, key mechanisms involved are methylation of DNA, covalent modification of histones and generation of short interfering (si)RNAs. In recent years, forward and reverse genetic screens in the model plant *Arabidopsis thaliana* have helped to identify many of the proteins involved in epigenetic processes, which can by now be sorted into first draft pathways of chromatin regulation. Simultaneously, cytogenetic and high-throughput molecular methods have been applied to map DNA methylation, histone modifications and siRNAs in *A. thaliana* and other plants at a genome-scale.

The summer school combined the practical expertise of research groups at IPK Gatersleben working in different fields with lectures held by outstanding external researchers to provide participants with a timely, comprehensible overview of concepts and methods in plant epigenetics.

ENSS 2011 – Physiology and Biophysics of Photosynthetic Organisms

21-28 August 2011

Venue: the Centre for Membrane Proteomics, Johann Wolfgang Goethe University Frankfurt/Main, Germany
Organisers: Enrico Schleiff and Ina Koch

Plants and other photosynthetic organisms are centrally involved in CO₂ fixation and are fundamental for the production of all biomass. Societal concerns related to the important issues related to global warming, global food shortage and renewable raw material therefore implicates and stresses the importance of a better understanding of plant systems, as a discussion on these problems without consideration of plants is impossible.

The organisers and lecturers at the summer school combine expertise within the areas of stress, photosynthesis and metabolites with cellular, structural aspects of molecular and cellular regulation. This offers an optimal environment for addressing complex scientific problems, and ensures a thorough education of students in techniques required for the global, cellular and molecular analysis of the biology of photosynthetic organisms. With the incorporation of bioinformatics/computational systems biology themes we take into account the current approaches on network analysis including network building techniques, flux analysis and other. We further aim to sensitise the molecular and structural oriented students for questions concerning breeding.

The summer school can accommodate 24 young European scientists for a full week course programme and subsequent participation in an international symposium. The students will be educated in the current methods and technologies applied for the study of physiology, biophysics and bioinformatics of photosynthetic organisms and systems.

Deadline for registration: **30 April 2011**
Registration: <http://www.cmp.uni-frankfurt.de/PG>

Open Call for Summer School Proposals 2012

The ENSS Research Networking Programme now invites proposals from the scientific community to organise a summer school to be held in 2012. The school should ideally target groups of approx. 20-50 young researchers from all over Europe, and combine the latest theoretical knowledge with practical lessons. The steering committee has identified three potential areas for the final ENSS summer school in 2012:

Extraction of biological information from high through-put data in plants

Recent technological advances have dramatically changed our view on life science research. Huge amounts of system-wide data such as transcriptome, proteome and metabolome data are being produced on an almost daily basis, while whole genome sequences are being determined at an ever-increasing pace. Furthermore, it has become clear that it is essential to integrate these various kinds of biological information and large-scale data sets through systematic analysis to describe and understand more complex biological phenomena. More and more, genes and proteins are no longer studied as isolated entities but as part of regulatory and interacting biological networks and scientists have recently started to tackle the functioning of complete biological systems using different sources of data. Such novel 'systems biology' approaches enable us to better comprehend the entirety of processes that happen in a biological system on multiple scales of organisation, in time and space, from genomes to cells and from organs to organisms.

Translational genomics – moving from model systems to crops

The use of model organisms is highly important to understand the molecular basis of development, physiology and evolution. While the transfer of knowledge to crops was slow, novel high through-put molecular analysis tools and reverse genetic technologies accelerate the translation. To increase reciprocity it is important to introduce young scientists to working with both model and less tractable plants with the aim of improving sustainable agricultural practice under increasing environmental pressures. Thus this school should be devoted to bridging the gap between basic research with model plants and agricultural and horticultural demands. It may present examples of successfully translated research, encourage participants to take advantage of the knowledge of model plants, discuss and introduce technologies applicable to crops and address obstacles that have to be tackled upon transfer of knowledge.

Genomics tools to study plant biodiversity

With rapid advances in sequencing techniques it is foreseeable that whole-genome approaches will revolutionise our knowledge about the molecular basis of evolution and biodiversity as well as crop breeding. However, such large-scale studies will need bioinformatics support for mining and interpreting. Skilled handling of established and new tools (algorithms) is needed to associate sequence variations with biochemical, metabolic, physiological, morphological and fitness traits and to support follow-up genetic analysis for the identification of the molecular basis of adaptive traits. Thus this course should combine (hands on) training on the latest genome sequencing methods with their bioinformatics analysis and advice on practical tools for experimentally testing the findings.

The deadline for submission of summer school proposals is **15 December 2010**.

For further information please contact:

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Application procedure

Potentially interested applicants should first submit a short expression of interest (email) to the chair and co-chair of 2012 (Yves van de Peer, yvpee@psb.ugent.be and Jack Leunissen, jack.leunissen@wur.nl).

This should include:

- A brief introduction to the topic;
- Practical aspects of the programme;
- Number of expected participants;
- Envisioned speakers, etc.

More information available on the ESF web pages

<http://www.esf.org/enss>

then click on the call for proposals item at the right side of the page.

The deadline for expressions of interest is in July and for applications in December 2011.

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For the latest information
on this Research Networking
Programme consult the ENSS
website:

www.esf.org/enss

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