

LESC NEWS

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

Editorial: Systems, a unifying concept?

The span of research domains covered by the Standing Committee for Life, Earth and Environmental Sciences (LESC) is very broad. It ranges from life sciences (including e.g. molecular genetics, biology, bioengineering) over environmental issues (including e.g. ecology, forestry, agriculture, crop science) to geosciences (including e.g. geology, seismology, oceanography). Over the past decade we have learned in the Standing Committee that in many of these disciplines the concept of systems is central toward an integrated understanding of functions, processes and structures.

A system can be defined as a group of parts that interact according to some kind of process. Therefore, systems are often visualized as component blocks with connections drawn between them. Because of the interactions between the different parts, the whole (system) becomes more than the sum of the parts, whether these parts are chemical molecules, cellular organs, individuals, populations, or landscapes. A system has emergent properties from the interactions among the parts. For instance, systems biology 'seeks to bring together understanding of structure (in terms of gene and biochemical networks), system dynamics (involving predictive modeling), system control methods (such as cybernetics) and system design'.

Within the realm of size there are parts that interact to form other (sub)systems. For example, several chemical molecules form chemical systems, biological cells and organs form biological systems, organisms and physical components form ecological systems, and there are larger interactions of humanity and nature that form environmental systems. In ecology, for example, the ecosystem is the basic functional unit since it includes both organisms (biotic communities) and the abiotic environment, each influencing the properties of the other and both necessary for maintenance of life as we know it on Earth.

The laws of thermodynamics apply to nearly all systems. Although the temporal and spatial

scales might differ dramatically, the concept of systems can help us to better understand (and predict) the various challenges that many living (and non-living) systems on our planet encounter. These include global changes, extreme events, sustainable development and production, as well as applications of modern biology, bioengineering and innovative molecular biology toward an improvement of the quality of life on Earth.



**Professor Reinhart
Ceulemans**

Member of the Core Group
of the Standing Committee
of LESC

LESC Standing Committee meets in Tallinn

The LESC Core Group and Standing Committee met on 19-20 April 2007 in the historical city of Tallinn, Estonia. The meetings were kindly hosted by Dr. Meelis Sirendi of the Estonian Science Foundation.

The LESC Standing Committee is one of the five disciplinary Committees composed of a Chair and leading scientists nominated by the ESF Member Organisations. Many of the 35 LESC Standing Committee members are distinguished professors in their own countries having close relations with the national research funding organisations. The ESF Standing Committees are responsible for



View across Tallinn (photo: Céline Seewald)

identifying scientific priorities, formulating strategies and developing research agenda. The LESC Standing Committee develops scientific initiatives and uses peer review as a key component of the decision-making process. The LESC Core Group consists of nine Standing Committee members and the Chair. It meets more often and does the preparatory work for the Standing Committee meetings.

The main focus of the 20th LESC Standing Committee meeting was the recommendation and ranking of the 40 Research Networking Programme proposals of relevance to LESC. ESF Research Networking Programmes are networking activities bringing together nationally funded research activities for four to five years, to address major scientific issues or science-driven topics of research infrastructure at the European level with the aim of advancing the frontiers of science. At the moment 16 Research Networking Programmes are led by LESC.

The first top ten proposals were first ranked by the Core Group and then ratified by the LESC Standing Committee. After the meeting of the five chairs of the ESF Standing Committees, 5 proposals in the LESC remit, 15 in total, were forwarded to the Member Organisations for their consideration for funding. Programmes which achieve a viable level of funding will be launched in early 2008.

ESF Member Organisation representatives and LESC Core Group members discuss Forward Looks and visibility of LESC

The LESC Core Group invites relevant disciplinary Heads of the Member Organisations once a year to discuss science policy and other issues of common interest. This year, the Round Table meeting took place in June in Prague at the kind invitation of the Czech Science Foundation (Grantová agentura České republiky - GAČR). The meeting was hosted by the President, Professor Josef Syka, and Dr. Veronika Paleckova from the Department of International Relations.



Puppets in Prague (photo: Céline Seewald)

At the heart of the Round Table meeting were the discussions of LESC visibility and Forward Looks in general and the needs of Member Organisations specifically. The communication strategy of ESF was presented by Mr. Claus Nowotny, head of the ESF Communications Unit. It was generally agreed that LESC visibility could be increased among scientists if there were annual scientific reports available.

Two break-out sessions focusing on the Life Sciences and Earth & Environmental Sciences, respectively, discussed Forward Looks around 6 questions developed by the LESC Core Group. The outcome of the break-out and subsequent plenary discussions clearly revealed that Forward Looks are appreciated by Member Organisations. At the same time, suggestions were put forward to improve the current Forward Look Scheme. Amongst those, "timeliness" was seen as a major issue as it impacts on a number of stages, namely the selection of a topic, conducting the Forward Look, and publication of the outcome and recommendations. The suggestions made by the Member Organisations touched on shortening the selection phase of topics by replacing the external review process through recommendations by Standing Committees to be forwarded to the Governing Council, the decision-making body of ESF. Exploratory Workshops were seen as an additional source for Forward Look topics. In general, once a topic has been selected, a scoping workshop should be put in place to evaluate whether all areas are covered and whether they are reflected in the composition of the Organizing Committee membership. The latter was seen as very crucial, as it drives the activities of the Forward Look. Finally, the Round Table discussions revealed that the recommendations worked out during the Forward Look activities should be specific and published in a timely manner in the form of a Science Policy Briefing and/or a Final report, in order to feed into the

national and European research agendas. Follow-up activities were seen as particularly important to further ensure that Forward Look recommendations are broadly disseminated and taken up by the respective stakeholders.

Forward Looks

European Food Systems in a Changing World

Food security is a primary societal goal in which food systems play a pivotal role. The notion of food systems embraces all activities related to production, processing, packaging, distribution, retailing, preparation and consumption of food. European food systems are changing, driven by complex technological and policy factors. These changes will affect the interactions between food availability, food access and food utilization, all of which are the outcomes of food systems activities, in uncertain ways. In addition to providing safe and healthy food, European food systems also contribute to an increasing number of goals including environmental functions and landscape and society objectives.



The Forward Look on “European Food Systems in a Changing World” is a multidisciplinary initiative, jointly supported by the ESF and COST. Its objective is to develop medium to long-term views of future research developments around the thematic focus of food security. At its last workshop in Preddvor in May, the Organising Committee brought together 26 experts to discuss future food systems and to conduct scenario exercises. Scenario exercises are a means of developing a research agenda by looking at factors that

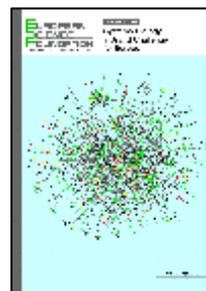
influence food systems, such as degree of climate change, energy security, health, technology innovation etc.

The scenario exercise, which was conducted by scenario exercise professionals, was extremely fruitful as it helped the participants to open up their thinking about potential future developments relevant to all areas of the European food system. For instance, the blue-sky thinking prompted several research questions such as: “What type of adaptation is needed to help food production to cope with crises, especially energy, climate and water?” and “How to improve health and food understanding?” It also revealed that strategic investigation of food systems in an integrated manner is important: links between consumers and producers and between social and natural sciences should be studied in order to get a better picture of the food system as whole.

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

Systems Biology

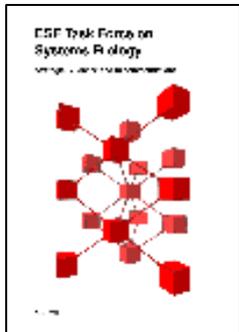
The European Science Foundation has published a Forward Look report *Systems Biology: a Grand Challenge for Europe*; an attempt to identify how research in Systems Biology could be accelerated and developed further in Europe. The report concludes with a set of specific recommendations that aims at consolidating Systems Biology efforts in Europe. It is based on extensive discussions during a number of focused workshops and meetings between scientists and policy makers from academia and industry.



The report, which includes 12 essays from the scientific experts in academia and industry, illustrates the need to develop a well-coordinated effort, which should bring together different research activities, and development of basic technologies, reference labs and training a new generation of researchers in Europe.

ESF has invited renowned scientific leaders to offer their expertise on how to best implement the Forward Look report’s recommendations. This Task Force, comprising of nine experts in the field, has now published a series of

recommendations built on the ESF Forward Look report.



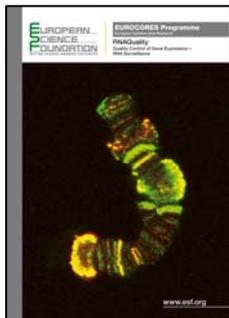
The Task Force set out a road map to establish a pioneering Systems Biology research programme in Europe. The next step will be to start actual discussions among the ESF Member Organisations and other actors in the field, both public and private, on how to go forward.

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

EUROCORES News

New activities launched

RNAQuality - A new EUROCORES Programme in the Life Sciences



RNA quality control has only recently emerged as a new field of RNA research and is now one of the most exciting areas of molecular biology. ESF promotes research on this cutting-edge topic through the EUROCORES Programme RNAQuality.

Sixteen research groups from nine European countries participate in RNAQuality. Their projects aim at uncovering processes that act as quality control checkpoints in gene expression and understanding how these function at a molecular level. Multidisciplinary approaches, ranging from molecular and cellular biology to structural analysis and high-throughput and computational approaches will be employed in diverse model systems.

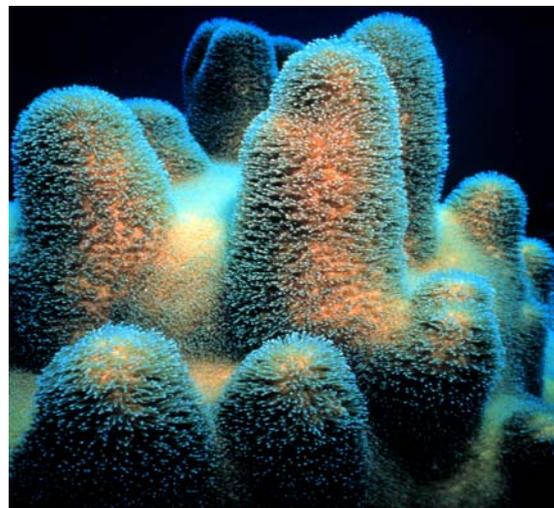
The RNAQuality community met at its kick-off meeting on 11 May 2007 in Strasbourg to discuss the needs of the field. Future activities will put emphasis on the training of young researchers and establishing a platform for European investigators to join forces and to stimulate new research initiatives in this exciting field. Amongst the forthcoming events

planned are a mini-symposium in 2007, a PhD school in 2008 and a larger conference in 2009.

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

EuroDEEP

The official launch of the ESF EUROCORES Programme EuroDEEP 'Ecosystem functioning and biodiversity in the deep sea', involving ten science funding and performing agencies from eight European countries, took place in Brussels (BE) on 5 June 2007, with a first kick-off meeting.



Pillar Coral, (c) Wikimedia

EuroDEEP has mobilised about 4 million Euros from national funding agencies that allow more than 25 research teams from 10 countries throughout four trans-national collaborative research projects to:

- study the deep sea ecosystem functions in contrasting southern European deep-sea environments;
- study microbial diversity in hypersaline lakes;
- investigate colonisation processes in chemosynthetic ecosystems;
- unravel population connectivity for sustainable fisheries during the next three years.

A first Programme-level workshop will take place at the end of November 2007 in Taormina, Sicily.

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

Networking activities

EuroDIVERSITY



The ESF **EuroDIVERSITY** Programme 'Challenges of Biodiversity Science' fosters pan-European collaborative research, networking and training as well as dissemination of scientific results and activities developed. In the framework of the

Programme, scientists further bridge the gaps between the natural and social sciences, between work on terrestrial, freshwater and marine ecosystems, between work on plants, animals and micro-organisms.

EuroDIVERSITY is a European Collaborative Research Programme (EUROCORES) in biodiversity science that brings together more than 100 research groups from 20 countries. It was launched in April 2006 and includes ten international, multidisciplinary projects with a total research budget of about 10 Mio Euros.

The **first Topical Workshop** "Microbial Diversity and Ecosystem Functions" organized by Dr. Tom Battin and Dr. Peter Frenzel took place in Lunz, Austria in March 2007. The Workshop was a great success, bringing together more than 50 scientists from 4 different Collaborative Research Projects and was complemented with invited key note speakers from Europe and the US. The Workshop provided a unique platform for world-class leading scientists and young researchers in the field of microbial diversity science and ecosystem modelers to interact and discuss the biodiversity of microbes.



Scientists discussing during the poster sessions (photo: *WasserCluster Lunz*)

The main conclusions of the workshop were:

- The biodiversity of microbes is similar to the biodiversity of animals and plants, because microbes steer global processes in the environment.
- Human activities increasingly have an impact on microbes, which can have far-reaching consequences, even going so far as to affect climate change.
- There should also be "red lists" for micro organisms - above all bacteria and mushrooms, because they play, for instance, a crucial role with the production of the greenhouse gas methane.



Scientists in a small working group, here under the guidance of Dr. Peter Frenzel (photo: *WasserCluster Lunz*)

The outcome of the workshop will be a joint peer-reviewed publication in 'Trends in Ecology & Evolution', bringing together the findings of both ecological modelers and microbial biologists.

Another Programme-level activity was the participation of young researchers during summer in the *International Association of Landscape Ecology 2007 Intensive Courses* in Wageningen, the Netherlands.

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

EuroCLIMATE: ESF-LESC climate efforts in international climate research

EuroCLIMATE is a European Collaborative Research Programme (EUROCORES) within the LESL domain that coordinates and promotes research on climate variability and the past, present, and future dynamics of the carbon cycle. The programme was launched in June 2005 and includes nine international, multidisciplinary collaborative research projects addressing a variety of approaches for better

understanding and reconstruction of past climate; from pollen and tree rings, to ice and lakes cores, and ocean plankton. During the past year EuroCLIMATE has organized, planned and taken an active leading role in a number of activities including: 5 workshops, a special session, a summer school on Chronology, capacity building/training including a training course for high school teachers on Climate and carbon, and numerous presentations at International conferences, including sponsoring 21 young scientists to give presentations at the EGU conference.

These events are addressing topics currently in the frontier of climate research and are receiving recognition from the international science community and programmes, as well as policy makers and funding organisations.

Some recent successes include:

- 1) prestigious Vernadsky Medal awarded to EuroCLIMATE Principal Investigator Jaap Sinninghe Damsté at the European Geosciences Union (EGU) General Assembly in Vienna;
- 2) publication of the Joint PAGES-EuroCLIMATE workshop on Radiocarbon and Ice-Core Chronologies in the American Geophysical Union newspaper, EOS;
- 3) EuroCLIMATE - EVOLTREE (EU Network of Excellence) initiative to establish European Pollen Database;
- 4) upcoming collaborative workshop with PAGES, SOLAS and IMBER addressing urgent issue of impact of ocean acidification, and featuring world-class key note speakers.



EuroCLIMATE: crossing borders

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

LESC Travel Grants to key events



In late 2006 LESC Standing Committee decided to allocate some strategic funding to a limited number of key scientific events within its remit. Up until now, more than a dozen suggestions have been considered according to their strategic importance or relevance, either proposed by members of the LESC Standing Committee or derived from external requests for ESF-LESC support. In that framework, support (up to 1000 Euros each) has been allocated to a selection of excellent, young, European scientists to participate actively in one of the selected events, ranging in topics from Aquaculture, Limnology, Evolutionary Biology, Glycoconjugates, Stress, Human Health, Climate Forecasting, Geochemistry, Paleoceanography and Sea-level change and human adaptation.

The Conferences supported in this way are asked to clearly identify the activity as being co-sponsored by the European Science Foundation.

Following the receipt of 146 applications, 38 travel grants so far have been awarded to young researchers from 18 nationalities from across Europe. An almost equal proportion of female and male researchers have been successful. The overall success rate of the applications is about 27%.

The payment of the grant is subject to the submission of a short scientific report after the event, and to approval of the report by ESF. In these reports, the young scientists have expressed their strong appreciation at having been given the opportunity to present their work and to interact with other scientists at these events.

For information on current Calls for applications in the LESC domain, see:

<http://www.esf.org/lesc/grants>

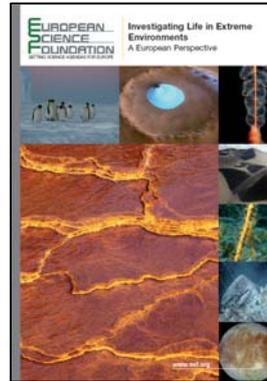
TESSY – fostering the development of Synthetic Biology in Europe

Synthetic Biology is an emerging area at the cross-roads between molecular biology and engineering. It aims to (re)design and manufacture biologically based devices and systems employing engineering principles. Most of the research in this nascent field has been pioneered by groups in the US; and although Europe has a large pool of expertise no systematic efforts have been put in place as yet to generate a framework for this field to develop. This was why ESF decided to contribute to the development of this young field by joining the EC Specific Support Action (SSA) called TESSY - *Towards a European Strategy for Synthetic Biology* - coordinated by the Fraunhofer Institute on Systems and Innovation Research. TESSY aims to map the current state of Synthetic Biology and to develop a roadmap and necessary actions to further advance the field.

In June 2007, the TESSY project was presented to the scientific community at the third international conference on Synthetic Biology in Zurich, the first conference of this type to be organized in Europe. Back-to-back to this event, TESSY held its “Road mapping Workshop”, for which it brought together a Core Group composed of representatives from research and funding agencies active in this scientific area. Major outcomes of this meeting are the development of a common understanding of the synthetic biology field and compilation of the synthetic biology potentials, technological milestones, framework conditions and measures. The data gathered will serve as a basis for the development of a European roadmap with the synthetic biology community at large. Of special mention is the fact that currently no dedicated Synthetic Biology research programmes exist. Most European groups working on synthetic biology projects are financially supported on a national level within the broad topic of “biotechnology” or “genetic engineering”. Clearly, there is a need to implement Synthetic Biology as a stand-alone research area within funding agencies and to launch European Calls for proposals.

<http://www.tessy-europe.eu/>

Investigating Life in Extreme Environments



From the deepest seafloor to the highest mountain, from the hottest region to the cold Antarctic plateau, environments labelled as extreme are numerous on Earth and they present a wide variety of features and characteristics.

Investigating life processes in extreme environments not only can provide hints on how life first appeared and survived on Earth (as early Earth was an extreme environment) but it can also give indication for the search for life on other planets.

To examine these issues and other matters, the European Science Foundation (ESF) has published a 58-page report *Investigating Life in Extreme Environments – A European Perspective*. Among other issues, the report has stated how global changes in the recent decades have turned some environment settings into becoming “extreme” conditions for the normal ecosystems (e.g. acidification of the oceans). Therefore, the understanding of tolerance/adaptation/non-adaptation to extreme conditions and ecosystem functioning is able to help predict the impact of global change on biodiversity.

This report results from an ESF inter-committee initiative involving the Marine Board (MB-ESF), the European Polar Board (EPB), the European Space Science Committee (ESSC), the Life, Earth and Environmental Sciences Standing Committee (LESC), the Standing Committee for Humanities (SCH) and the European Medical Research Councils (EMRC). This interdisciplinary initiative considered all types of life forms, from microbes to humans, evolving in a wide range of extreme environments, from deep sea to acidic rivers, polar regions or planetary bodies.

<http://www.esf.org/research-areas/marine-board/publications>

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Changes in LESC Unit



Didier Hauglustaine joined the LESC unit in April 2007. He is scientific coordinator for the EUROCORES Programmes EUROMARGINS, EUROMARC and TOPO-EUROPE.

Didier is on secondment from CNRS, France, and comes from the Laboratoire des Sciences du Climat et de l'Environnement (LSCE) located in Gif-sur-Yvette, France, where he holds a Directeur de Recherche position. He is a specialist of atmospheric chemistry, pollution and climate change.

Ellen Degott-Rekowski joined the LESC team in May 2007 as Administrator for 10 Research Networking Programmes (i.e. RSTCB, SIBAE, INTROP, VOCBAS, ArchEnviron, Magellan Workshop Series, NinE, MedClivar, ThermAdapt and SIZEMIC). She has a Masters degree in Environmental Technology and Ecological Management. Before joining ESF she worked on European (and South Pacific) nature conservation & management programmes and on environmental education projects.



Pat Cosgrove is on sabbatical leave until June 2008.

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Forthcoming meetings

September – December 2007

- **FFG School: European Institute in Statistical Genetics 2007**
3-12 September – Liège (BE)
- **New Perspectives on Volcano Behaviour, Volcanic Hazards and Volcanism-Related Mineral Resources**
Exploratory Workshop
4-7 September – Sovata (RO)
- **Econometric Time-Series Analysis Applied To Climate Research**
Exploratory Workshop
5-7 September – Frascati (IT)
- **Biosupramolecular Chemistry**
Exploratory Workshop
5-7 September – Bristol (UK)
- **New approaches for the study nucleotide triphosphate (ATP/GTP) hydrolysis dependent signal transduction pathways**
Exploratory Workshop
5-8 September - Arcachon (FR)
- **INTROP: 2nd International Workshop on Stable Isotope Ratio Infrared Spectrometry**
7-8 September - Pratolino, Firenze (Italy) (IT)
- **FFG: 4th Integrative Bioinformatics Conference**
10-12 September – Ghent (BE)
- **MAGELLAN Workshop: Marine Impacts and Environmental Consequences**
10-13 September - Longyearbyen (NO)
- **Communication on Environmental Research at the Science Policy Interface (CSPI) Science Policy Workshop**
11 September – Strasbourg (FR)
- **Understanding The Functional Consequences Of Natural Variation In Ecological Adaptation**
Exploratory Workshop
14-17 September - Vienna (AT)
- **CONGEN Workshop: Population genetics modelling and habitat fragmentation: separating recent and ancient events for efficient conservation**
19-21 September - Oeiras (PT)
- **MAGELLAN Workshop: Southern African Climates, Agulhas Warm Water Transports and Retroflexion, and Interocean Exchanges**
19-21 September – Kiel (DE)

- **BEPAR** Workshop: **Parasitoids in a changing world**
19 September – Sicily (IT)
- **Valuing Biofilm Services: The Beauty and the Beast**
Exploratory Workshop
20-22 September – Lunz am See (AT)
- **Biomagnetism and Magnetic Biosystems Based on Molecular Recognition Processes**
ESF Research Conference
22-27 September – Sant Feliu de Guixols (ES)
- **ArchEnviron** Workshop: **Barberton Greenstones: window to the Archean Habitat**
25-30 September - Badplaas (ZA)
- **INTROP** Workshop: **Simulation and Assessment of Chemical Processes in a Multiphase Environment**
1-4 October - Alushta (UA)
- **VOCBAS** Conference: **Biogenic Volatile Organic Compounds - Sources and Fates in a Changing World**
2-5 October - Montpellier (FR)
- **EuroDIVERSITY: 1st Programme Conference**
3-5 October – Paris (FR)
- **Three Dimensional Sensory and Motor Space**
ESF Research Conference
6-10 October - Sant Feliu de Guixols (ES)
- **MedCLIVAR** Workshop: **Connections between Mediterranean and global climate variability**
8-10 October - La Londe les Maures (FR)
- **EuroMARC Scientific Committee Meeting**
8 October – Strasbourg (FR)
- **Computational Approaches to the Role of Epigenetic Marks in Transcription Regulation**
Exploratory Workshop
17-19 October – Basle (CH)
- **INTROP** Workshop: **Modelling of Hemispheric Transport of Air Pollution**
17-19 October – Jülich (DE)
- **Comparative Genomics of Eukaryotic Microorganisms**
ESF Research Conference
20-25 October - Sant Feliu de Guixols (ES)
- **Probing Interactions between Nanoparticles/Biomaterials and Biological Systems - Alternative Approaches to Bio- and Nano- Safety**
ESF Research Conference
3-8 November - Sant Feliu de Guixols (ES)
- **EuroMARC Management Committee Meeting**
12 November – Brussels (BE)
- **Laser Scanning For Alpine Natural Hazard Management - Development Of New Concepts**
Exploratory Workshop
15-17 November – Obergurgl (AT)
- **RSTCB Final Conference & Steering Committee meeting**
19-22 November - Pont-à-Mousson (FR)
- **FFG: ESF-UB European Conference on Synthetic Biology (ECSB): Design, Programming and Optimisation of Biological Systems**
ESF Research Conference
24-29 November - Sant Feliu de Guixols (ES)
- **EuroDEEP 1st Programme meeting**
26-29 November - Taormina (IT)
- **EuroBioForum**
5-7 December – Lisbon (PT)

- **LESC Core Group and Standing Committee meetings**
18-19 October – Warsaw (PL)
- **LESC/COST Synergy meeting**
6 December – Brussels (BE)

The European Science Foundation (ESF) provides a platform for its Member Organisations to advance European research and explore new directions for research at the European level.

Established in 1974 as an independent non-governmental organisation, the ESF currently serves 75 Member Organisations across 30 countries.