Frontiers of Functional Genomics

An ESF Research Network Programme

The Final Frontier

Welcome to the latest but also the last newsletter of the ESF Frontiers of Functional Genomics RNP – FFG.

Following a decade of support in the area of Functional Genomics, the FFG programme has come to an end. Therefore in this newsletter there is a retrospective look at what the programme has achieved over the last ten years. Also we have a meeting report from Cambridge where computational and experimental scientists met to better understand cellular regulatory networks. And our final steering committee spotlight features our Finnish committee member who has risen to many a challenge (not least undergraduate chemistry!) to become a world renowned expert in medical genetics.

The end of an era: a decade of functional genomics at the ESF

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Following the sequencing of the human genome in 2000, the past decade has been marked by an unprecedented growth in research within the genetics and genomics fields. The wide-ranging potential for application and the promise of unbiased insight into gene functions and the related consequences for human health have quickly been embraced by both scientists as well as funding organisations. Through the Research Networking Programme (RNP) instrument, which is a bottom-up programme for scientific networking and exchange, the European Science Foundation (ESF) quickly detected the need for interaction and exchange among researchers in this emerging field. Accordingly, the "GENOMICS" RNP was launched by ESF in 2001 and, after its finalisation in 2005, was immediately followed by the Frontiers of Functional Genomics (FFG), which has funded activities during the years from 2006 to 2011.

By all measures, the timeliness and broad relevance of the GENOMICS and FFG networking programmes are evident. The amount of contributed funds by the 23 (GENOMICS; 2001-2005) and 17 (FFG; 2006-2011) national ESF member organisations by far exceed other similar programmes at the European scale (figure 1).

Similarly, the combined number of networking activities supported under the auspices of these programmes (114) during the period from 2001-2011, with a variety ranging from large international conferences to focused workshops and training courses, indicate a successful implementation and acceptance of these consecutive RNPs within the research community for genomics-based studies (figure 2).

European Science Foundation
SETTING SCIENCE AGENDAS FOR EUROPE

For scientific reports from our past events, please go to our website http://www.functionalgenomics.org.uk/.

GENOMICS (23)	FFG (17)
• Austria	• Austria
• Belgium	• Belgium
• Czech Republic	• Czech Republic
• Denmark	• Denmark
• Estonia	• Estonia
• Finland	• Finland
• France	• France
• Germany	• Germany
• Hungary	• Luxembourg
• Ireland	• Netherlands
• Israel	• Norway
• Italy	• Poland
• Luxembourg	• Spain
• Netherlands	• Sweden
• Norway	• Switzerland
• Poland	• Turkey
• Portugal	• United Kingdom
• Slovenia	
• Spain	
• Sweden	
• Switzerland	
• Turkey	
• United Kingdom	

Figure 1: List of countries from which contribution was received for the GENOMICS and FFG programmes

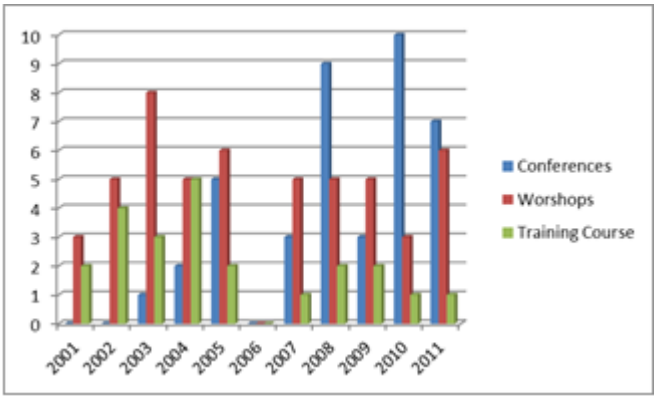

Figure 2: Number of funded networking activities throughout the 10 year period of the GENOMICS and FFG programmes. Different coloured bars represent the three main networking activities funded.

As a further important measure for any RNP, the number of sponsored visits and funded exchange grants for young researchers may provide an indication of the long-term impact of the programme.

Using this indicator, the GENOMICS and FFG programmes have supported a total of 173 exchange visits over a decade (GENOMICS 70; FFG 103). The number of young scientists that have directly received support through the exchange visit programmes comes from all of the original 23 funding countries as well as approximately 6% of young researchers from non-contributing countries (figure 3).

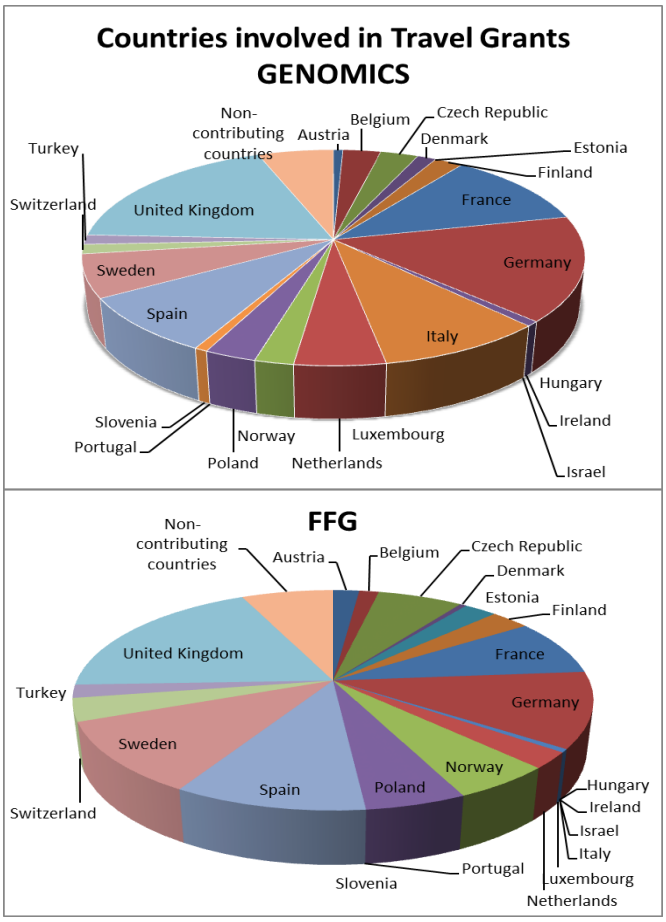

Figure 3: Overview, by nationality of the awardee, of the travel grants funded through the GENOMICS and FFG programmes.

In conclusion, the ESF networking programmes on genomics and functional genomics have since their launch in 2001 significantly contributed to coordinate and facilitate exchange at the European level within a new and emerging area. Through its involvement and support for these RNPs, the ESF may rightfully say that it has lived up to its ambition to set the agenda for science in Europe.

On behalf of the ESF staff we would like to thank the expert scientists that have been central to establishing this decade of networking and exchange. Further, we wish to congratulate the community of genetics and genomics research for their use of and contribution to these ESF programmes. Based on the numbers presented here, both of the GENOMICS and the FFG programmes can with certainty be claimed to represent ESF networking programmes that have been established by the community for the community!

How to understand the cell by breaking it

Florian Markowetz

Physicist Richard Feynman once said: "What I cannot create, I do not understand". A complex system is not understood solely by passive contemplation, it needs active manipulation by the researcher. In biology this fact is long known and some of the hottest areas of modern biology focus on engineering approaches to design and construct new biological functions. However, most of what we know today about gene function wasn't found by creating a system, it was found by breaking it: "What I cannot break, I do not understand" is the credo of functional genomics.

This is why in September 2011 the FFG workshop 'From phenotypes to pathways' in Cambridge, UK, focussed on novel experimental and computational strategies for gene perturbation analysis in dissecting cellular regulatory networks and disease mechanisms. How to link genotypes and phenotypes is a long-standing question in modern biology and modern high-throughput approaches are a key technology at the forefront of genetic research. They enable the analysis of a biological response to thousands of experimental perturbations and require a tight collaboration between experimental and computational scientists. To put this systematically in practice, however, poses new challenges for experimental and theoretical approaches. The objective of the workshop was to provide a platform for such exchanges and to initiate interdisciplinary collaborations. Thirty-one participants from 14 countries presented their work in a wide variety of model systems using different perturbation strategies. The format of the meeting was focussed on discussions. Together with the 50/50 mix of computational and experimental scientists this resulted in very active discussions and close interactions between participants. The main topics were the generation and interpretation of synthetic genetic interaction networks, the analysis of natural somatic and experimental perturbations in cancer, as well as the set-up of large-scale and high-content perturbation screens. A common theme in all discussions was the need for integrative approaches leveraging complementary data types to identify the signalling networks underlying the observed phenotypes. The meeting was extremely well received and many participants were interested in a follow-up workshop, which we plan to hold in Fall 2012.

Steering committee spotlight

Aarno Palotie is the Finnish member of the FFG steering committee. It was suggested to him as a child that he should become a doctor and that is exactly what he has done – and also so much more. He went to one of the most northerly medical schools in the world - Oulu near the Finnish artic circle. This choice did not reflect his love of long summer days, but that he had unfortunately failed chemistry. In fact chemistry continued to be a challenge to Aarno throughout his training, but rising to that challenge, he ultimately specialised in clinical chemistry. His early research on brittle bone disease piqued his interest in genetics, therefore following his compulsory military service, Aarno went on to set up a DNA diagnostic lab in Helsinki which grew to be one of the largest in the Nordic countries. After working as a professor in UCLA and then at the Broad Institute, Aarno now has a position at the Institute for Molecular Medicine Finland in Helsinki and is a Senior Researcher at the Wellcome Trust Sanger Institute where he continues to work with the Finnish population which, due to its isolated nature, allows the identification of 1 or 2 mutations per disease. His work at the forefront of migraine genetics has now broadened to include other neurodevelopmental traits. Reflecting on the end of 10 years of ESF functional genomics programmes, Aarno feels that these programmes have had a massive impact at the European level, bringing people together at some of the best meetings in the field.

Compiled and created by Cheryl Smythe, FFG Coordinator